



System Analysis and Development
Group Project
PRO220130
Proposal Document

Lesi Parking Management System

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November 2024

Declaration

The Lesi Parking System is designed to simplify parking management in Sri Lanka by enabling users to find, book, and pay for parking spaces online. This project aims to support both commuters and landowners with features like real-time availability, automated entry/exit, secure payments, Additionally, it promotes environmentally friendly parking incentives.

The system will be developed to meet high standards of performance, scalability, security, and usability. Our team commits to delivering a reliable and user-friendly solution by the project deadline.

Abstraction

The Lesi Parking System is designed to address the increasing demand for efficient and accessible parking solutions in urban areas of Sri Lanka. This project set out to create an online platform that enables users to locate, reserve, and pay for parking spaces with ease. By analyzing the needs of commuters, tourists, and landowners, we developed a system with key features including real-time availability updates, automated entry and exit processes, user accounts with loyalty programs, and incentives for environmentally friendly practices. The platform was developed using a combination of frontend and backend technologies, ensuring a seamless and secure user experience. Extensive testing was conducted to verify system functionality, usability, and reliability. The results demonstrate that the Lesi Parking System effectively reduces parking congestion, enhances user convenience, and provides a reliable income stream for landowners. We conclude that this system not only simplifies parking for users but also contributes positively to urban infrastructure by promoting sustainable parking practices. The Lesi Parking System is expected to be a valuable tool for both individuals and communities, supporting the growing need for smart city solutions in Sri Lanka.

Acknowledgments

We would like to express our sincere gratitude to our project supervisor Lecturer Mr. Chandana Deshapriya and Chobodhi Padmaperuma for their invaluable guidance and support throughout the development of this project. Their technical expertise and feedback greatly contributed to the successful completion of the Lesi Parking System. We also extend our thanks to the clients and stakeholders who provided crucial insights that helped shape the project to meet real-world needs. Finally, we thank our family and friends for their encouragement and motivation, which sustained us throughout the project.

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List of Acronyms

ER Diagram – Entity Relationship Diagram

Chapter 1 - Introduction

The **Parking Management System** project seeks to address the growing parking challenges faced in urban areas of Sri Lanka, where increased vehicle ownership has led to congestion and inefficiencies in finding available parking spaces. This digital solution will enable users to easily locate, reserve, and pay for parking spots through a user-friendly mobile application and web interface.

By incorporating real-time tracking, online payments, and advanced space monitoring technologies, the system aims to enhance the parking experience for drivers while also providing valuable insights for parking facility operators. This comprehensive approach not only promotes convenience and efficiency but also contributes to reducing traffic congestion and environmental impact, fostering a more sustainable urban mobility framework. Ultimately, this project aims to create a more organized and accessible parking ecosystem that benefits both users and city infrastructure.

1.1 Project title

Lesi Parking Web site

In Sri Lanka, finding a parking spot, especially in busy areas, is often difficult and time-consuming. With the growing number of vehicles on the road, people face daily struggles locating a safe and nearby place to park. Despite the demand, there isn't a proper system to help drivers find and book parking spaces easily. Our project aims to solve this problem by developing a *Parking Management System*, which will allow users to quickly find, book, and pay for parking online, saving them both time and effort.

This system will help in several key areas:

- **Making Parking Easier for Commuters and City Residents:** Many people waste valuable time looking for parking, especially in crowded city centers. Our system will show available spots in real time, allowing users to find and book parking right from their mobile device or computer. This will make parking more convenient and reduce stress.

- **Helping with Parking for Events and Busy Areas:** Places like shopping malls, hospitals, and event venues often face heavy parking demand. With our system, people can book a spot before they arrive, making it easier to plan trips during busy times and avoid last-minute struggles.
- **Supporting Tourism:** As more tourists visit Sri Lanka, especially in popular spots, finding parking can be challenging. Our system will help tourists locate parking easily, providing them with a smoother experience and encouraging more travel around the country.
- **Allowing Property Owners to List Parking Spaces:** People or businesses with unused parking spaces can list them on our platform, giving drivers more options while also helping property owners earn extra income. They can set their own rates and availability, making it a flexible way to share resources.
- **Reducing Traffic and Fuel Wastage:** Often, drivers end up driving around in circles looking for parking, which uses extra fuel and adds to traffic. By using our system, drivers can go directly to an available spot, saving fuel and reducing unnecessary congestion.

Our *Parking Management System* will make parking easier, faster, and more organized, benefiting drivers, businesses, tourists, and property owners alike.

1.2 Motivation

With rising vehicle numbers in Sri Lanka, finding parking is increasingly difficult, causing wasted time, fuel, and stress. Lesi Parking aims to simplify this by offering a digital platform for easy parking search, booking, and payment. This solution will reduce congestion, support sustainable commuting, and make parking more accessible and efficient for drivers and property owners alike.

1.3 Aim

To develop a scalable and efficient Parking Management System that simplifies parking for users by enabling easy discovery, booking, and management of parking spaces, while promoting sustainable urban mobility.

1.4 Objectives of the Project

1. Real-Time Updates and Space Monitoring:

- Implement sensors and IoT integration for live tracking of available spots, updating the system automatically when spaces become occupied or free.
- Enable users to see real-time updates on space availability, reducing parking search time and congestion in high-traffic areas.

2. Automated Entry and Exit Management:

- Integrate automated entry and exit controls, like license plate recognition or QR code scanning, to reduce the need for physical tickets or manual validation.
- Allow seamless entry/exit for users with pre-booked spots, ensuring a streamlined experience that reduces wait times at parking facilities.

3. User Account and Loyalty Features:

- Allow users to create accounts for tracking parking history, payments, and preferences, making it easier for them to manage bookings and earn loyalty rewards.
- Encourage user retention by offering rewards or discounts for frequent use, which could increase customer loyalty and usage.

4. Advance Booking and Reservations:

- Allow users to book parking spaces in advance, ensuring they have a guaranteed spot upon arrival and reducing last-minute hassles.
- Include a flexible booking management system so users can modify or cancel reservations as needed.

5. Responsive Web pages

- Ensure the Parking Management System features web-responsive pages that automatically adjust for different screen sizes, offering a seamless experience across desktops, tablets, and smartphones.
- Prioritize mobile-first design to enhance usability on mobile devices, ensuring users can easily access key features like parking search, booking, and payment.

1.5 Scope of the Project

The Lesi Parking Management System will provide a comprehensive digital platform to simplify parking in urban areas of Sri Lanka. It will allow users to create accounts, search for parking spots, and make advance reservations with real-time availability updates. Secure online payments will be supported, offering both one-time and subscription options. Automated entry and exit features will streamline the parking experience. Property owners can list and manage their spaces, while administrators will have tools for managing users, transactions, and system compliance. The system will also encourage sustainable practices by providing incentives for electric vehicles. Additionally, reporting and analytics features will help parking facility owners optimize space usage and track performance. This project scope aims to make parking more accessible, efficient, and environmentally friendly for drivers, property owners, and city infrastructure.

1.6 Summary

The Lesi Parking Management System project addresses the challenges of finding and managing parking in urban Sri Lanka by offering a digital solution that allows users to locate, book, and pay for parking easily. This platform aims to reduce the time, stress, and environmental impact associated with parking by providing real-time availability, automated entry/exit systems, and online payment options. The project promotes sustainable urban mobility through eco-friendly features, including incentives for electric vehicles and efficient parking space management.

The development process includes detailed design, implementation, and testing phases, with technologies such as vehicle number recognition for automated entry and exit, along with web development tools driving the system's functionality. With features for both drivers and property owners, the system ensures a seamless and efficient parking experience. The thesis chapters follow a structured approach, beginning with the problem and objectives, through methodology and implementation, and concluding with testing outcomes and recommendations. This project aims to create a more efficient, user-friendly, and sustainable parking experience.

Chapter 2 - Analysis

2.1 Explanation about the system using a Flow Chart

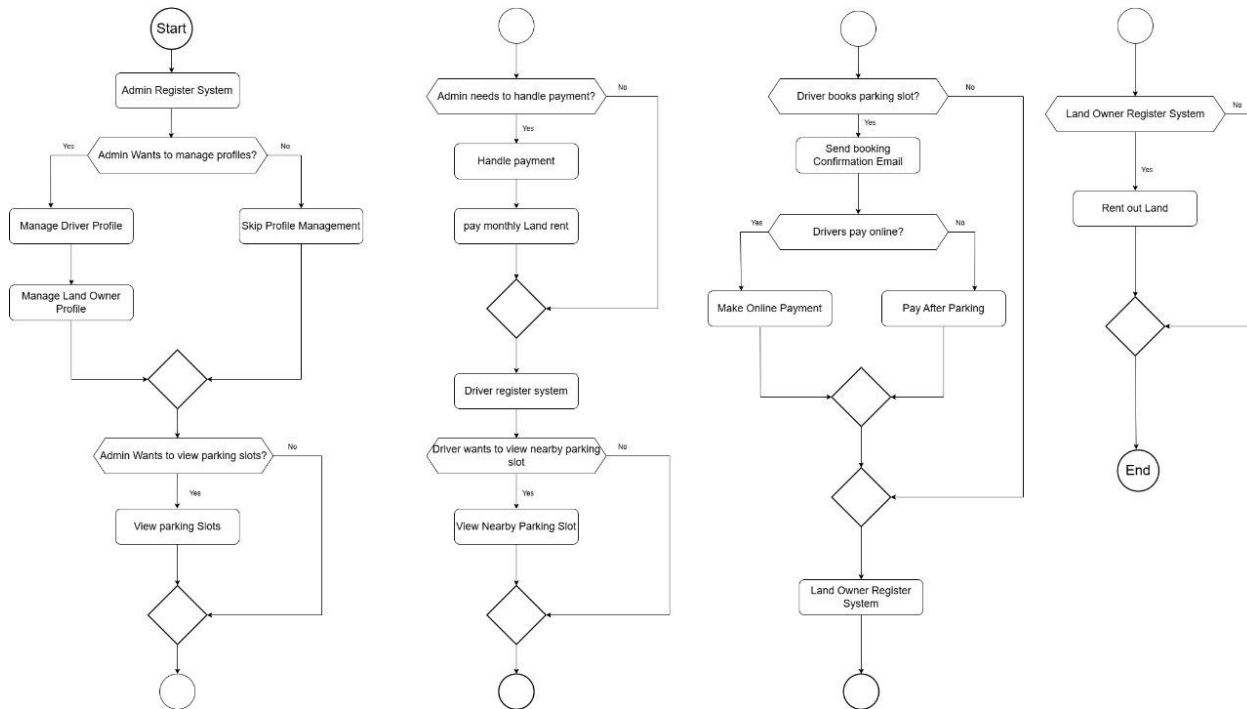


Figure 1 Flow Chart

1. Admin Control Center:

- The admin serves as the backbone of the system, ensuring smooth operations. They begin by registering on the platform, where they can oversee both driver and landowner profiles. This includes:
 - **Profile Management:** The admin has the flexibility to manage driver profiles (for users seeking parking) and landowner profiles (for those offering parking spaces).

- **Real-Time Parking Slot Monitoring:** The admin can view available parking slots in real time, which helps in coordinating bookings and optimizing slot usage.
- **Efficient Payment Management:** The admin handles payments, such as ensuring monthly land rent payments to landowners, making the platform financially sustainable.

2. Driver Journey:

- Drivers enjoy a streamlined experience from booking to payment. Key steps include:
 - **Convenient Booking & Confirmation:** Drivers can browse nearby parking options, choose a slot, and receive an immediate booking confirmation via email, enhancing reliability.
 - **Flexible Payment Options:** Drivers can pay for their slots in advance through online payment or choose to pay after parking, accommodating different user preferences.

3. Landowner Opportunities:

- Landowners can participate by registering to rent out their land for parking, turning unused spaces into a revenue source. The system guides landowners in listing their spaces and handling rental agreements with the admin's oversight.

This flowchart encapsulates a user-friendly system designed for seamless parking, helping drivers, landowners, and admins collaborate effortlessly. The flexible payment options, real-time updates, and organized profile management make Lesi Parking an efficient solution for urban parking challenges.

2.2 Review Similar Systems with References

Several parking management systems have been developed globally to address urban parking challenges, providing valuable insights for the development of the Lesi Parking Management System:

1. **Parkmobile (USA)**

Parkmobile allows users to find, book, and pay for parking through a mobile app, incorporating features like vehicle number plate recognition for automated entry and exit. This system has inspired our approach to automating parking access and simplifying the booking process for users.

Reference: "Parkmobile: Parking Made Easy," Parkmobile, 2024. <https://parkmobile.io/>

2. **JustPark (UK)**

JustPark enables users to search for and book parking spaces in advance. It also allows private property owners to list their spaces, fostering a peer-to-peer model. This feature has influenced our system's capability to let property owners list available parking spaces, increasing access and convenience.

Reference: "How JustPark is Changing the Way We Park," JustPark, 2024.
<https://www.justpark.com/>

3. **Parkopedia (Global)**

Parkopedia offers a global database of parking spaces, providing users with real-time information on parking availability, pricing, and locations. It also includes options for booking parking in advance. Parkopedia's emphasis on real-time parking information has influenced our system's focus on providing accurate, up-to-date details to users.

Reference: "Parkopedia: The Wikipedia of Parking," Parkopedia, 2024.
<https://www.parkopedia.com/>

Comparison with Our System

The Parkmobile, JustPark, and Parkopedia systems all provide key features such as real-time parking availability and seamless booking. Our system draws on these models while adapting them to the local needs in Sri Lanka. We aim to integrate vehicle number recognition for automated entry, as seen in Parkmobile, while also enabling property owners to list available

spaces, as demonstrated by JustPark. Additionally, like Parkopedia, we will offer real-time updates, but our system will take it a step further by including the option for users to reserve parking spots in advance and make online payments. Our focus on sustainability, such as incentives for electric vehicles, and a local context tailored to Sri Lanka further distinguishes our system from these global models.

2.3 Functional Requirements

Users (Possible Actors) of the System:

- Drivers (Users)
- Parking Facility Owners
- Administrators

Main Functionalities of the System

Drivers (Users)

1. Search Parking Spots:

- Users can search for available parking spaces based on their preferences, including location, price range, and type of parking (e.g., covered, open lot).
- The search functionality allows users to filter results by availability and distance from their intended destination.

2. View Parking Details:

- Users can view detailed information about parking spots, including pricing, availability, facility features (e.g., security, lighting), and user ratings.
- This functionality includes a gallery of images showcasing the parking area.

3. Make Reservations:

- Users can reserve parking spots in advance based on real-time availability.
- Reservations can be modified or canceled within specified timeframes.

4. Payments:

- Users can complete payments for their parking reservations online, offering options for one-time payments or subscriptions for regular users.
- Payment methods include credit/debit cards and digital wallets.

5. Notifications and Alerts:

- Users receive notifications for upcoming reservations, availability updates, and special promotions or discounts offered by parking facilities.

Landowner

1. Sign Up and Registration:

- Parking facility owners must register to create a profile and list their available parking spaces.
- Registration includes submitting details about the facility, such as location, capacity, pricing, and operating hours.

Administrators

1. User Management:

- Administrators can review and manage user registrations for both drivers and parking facility owners.
- They have the authority to approve or deny registrations based on compliance with system guidelines.

2. Monitor Reservations and Transactions:

- Administrators can oversee all reservations and transactions within the system, ensuring proper functionality and security.
- This includes resolving disputes and managing refunds as necessary.

3. Content Management:

- Administrators can manage the content displayed on the homepage, including promotions, announcements, and featured parking facilities.
- They ensure the information is up-to-date and relevant for users.

2.4 Non- Functional Requirements

1. Performance

The system should provide quick response times, with search results and page loads within 2-3 seconds to enhance user satisfaction. It should handle a high volume of concurrent users without performance degradation, especially during peak hours.

2. Scalability

The system should be designed to scale, allowing it to handle growing numbers of users and parking facilities. It should support future expansions, like adding new locations or services, without requiring complete redesigning.

3. Reliability and Availability

The system must be available 24/7 with minimal downtime, ensuring that users can access it at any time. Scheduled maintenance should be planned during low-traffic times and communicated to users in advance.

4. Usability

The interface should be intuitive and user-friendly, requiring minimal training or technical knowledge. Clear instructions and error messages should be provided, and the system should be accessible to users of different ages and abilities.

5. Security

The system must comply with data protection standards to secure user data, including payment information and personal details. Multi-factor authentication (MFA) should be implemented for user accounts, and sensitive data should be encrypted both in transit and at rest.

2.5 Identifying the suitable process model with justification

For the *Lesi Parking Management System*, the **Agile development model** is the most suitable due to its iterative approach, flexibility, and responsiveness to evolving requirements.

- **Flexibility with Requirements:** Agile accommodates changes, which is crucial for this project as it involves user feedback and evolving functional needs (like adjusting to new user requirements or additional features).
- **User-Centered Development:** Agile's iterative cycles allow us to release incremental features and gather user feedback regularly, ensuring the system aligns with user expectations and needs.
- **Rapid Delivery:** Agile enables faster delivery of usable parts of the system, such as core booking or payment features, allowing early testing and validation.
- **Improved Collaboration:** The Agile approach promotes collaboration with stakeholders throughout development, allowing real-time feedback from users and property owners, enhancing the final product quality.

This model supports a flexible, responsive, and user-focused approach essential for delivering a successful parking management system.

Figure 2 driver use case

This case diagram illustrates the core functionalities of a parking system from a driver's perspective. It shows how a driver can register, view available parking slots, receive real-time updates, book slots, and make payments. The diagram also highlights the system's flexibility in handling potential payment failures and providing confirmation for completed transactions. This visual representation aids in understanding the user journey and system requirements.

➤ Admin

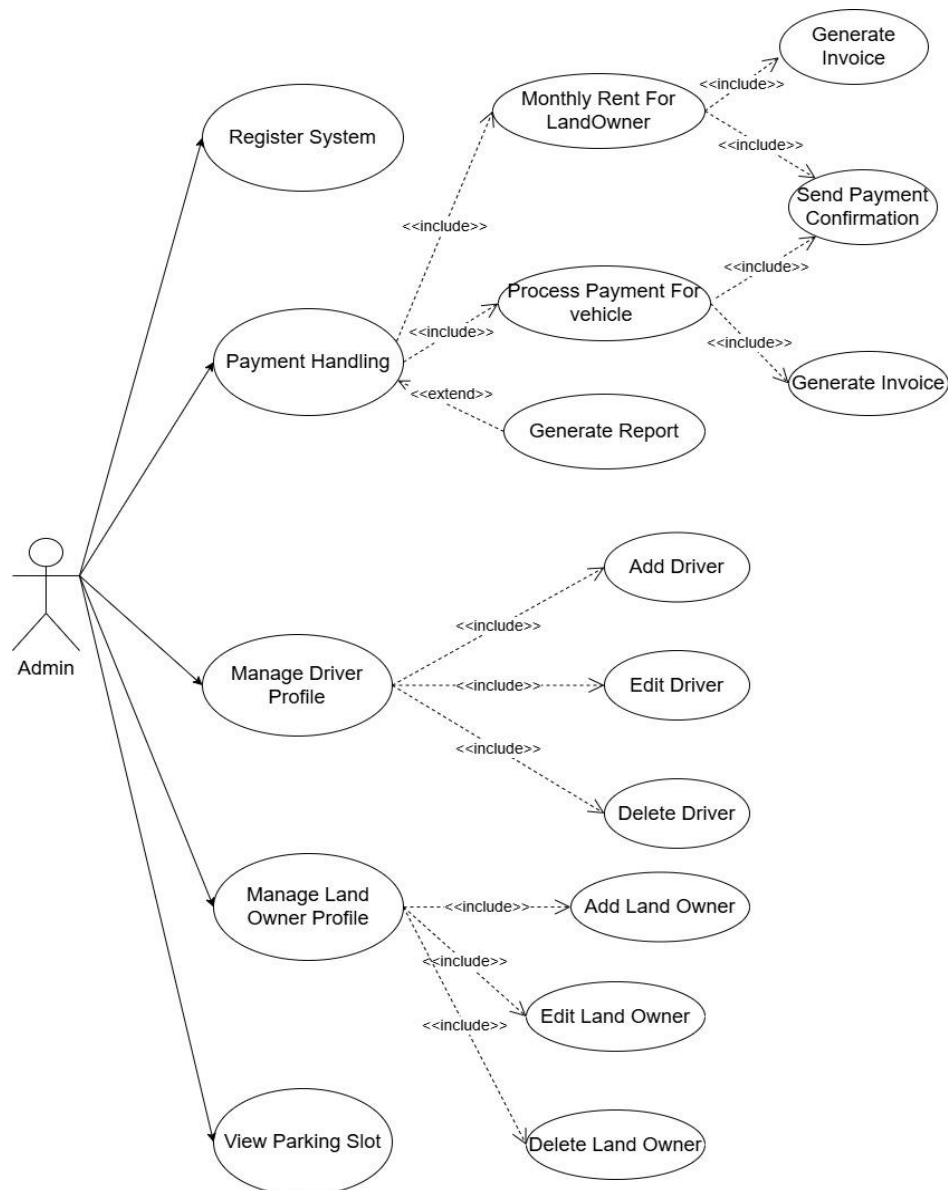


Figure 3 admin use case diagram

This use case diagram illustrates the core functionalities of a parking system from an admin's perspective. It shows how an admin can manage driver and landowner profiles, process payments, generate reports, and handle various system operations. The diagram also highlights the inclusion and extension relationships between use cases, indicating how certain actions are part of larger processes or can be extended under specific conditions.

➤ Landowner

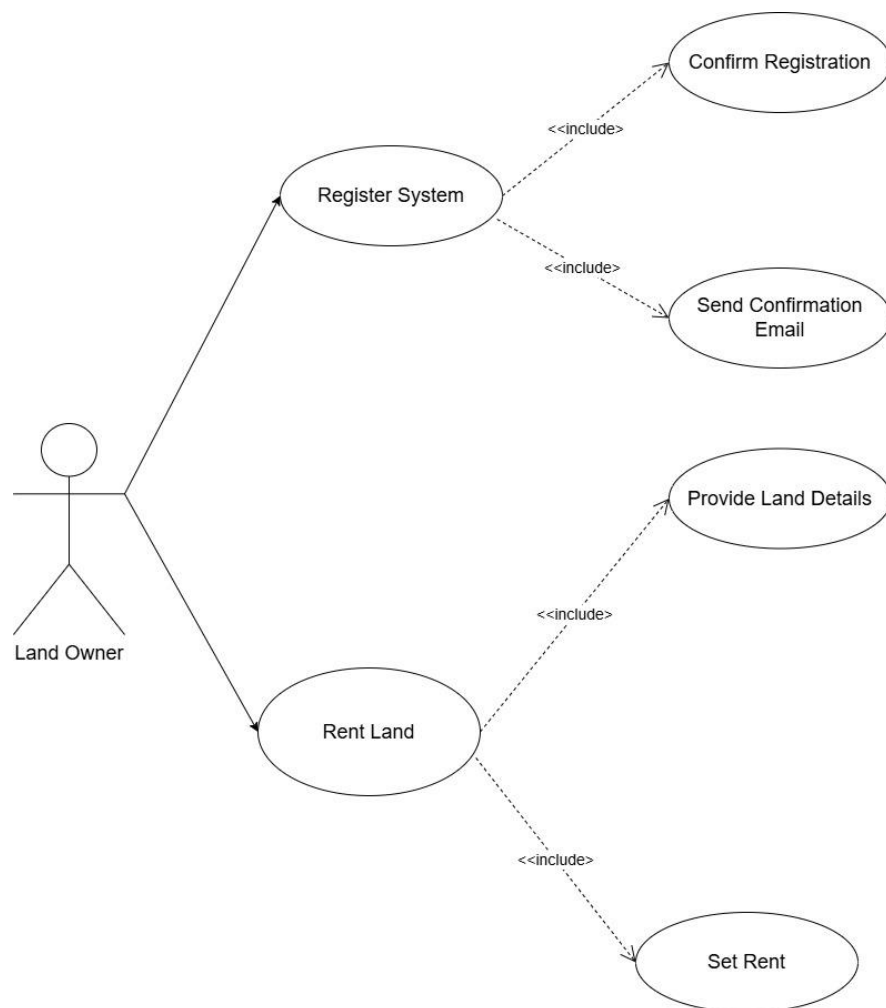


Figure 4 landowner use case diagram

This use case diagram illustrates the core functionalities of a land rental system from a landowner's perspective. It shows how a landowner can register with the system, rent out their land, and manage the rental process. The diagram also highlights the inclusion relationships between use cases, indicating how certain actions are part of larger processes.

3.1.2 Class Diagram

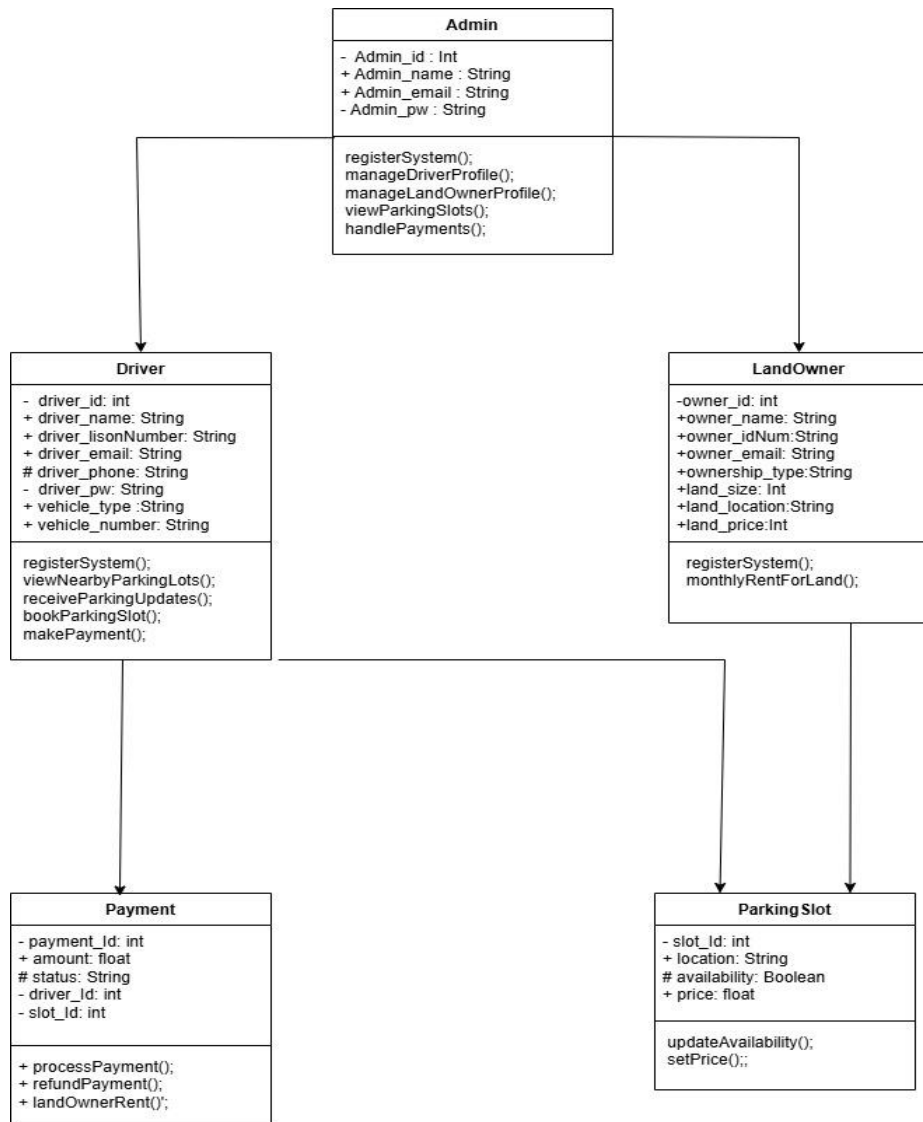


Figure 5 class diagram

This class diagram illustrates the core components of a parking management system. It showcases the relationships between entities like Admin, Driver, Land Owner, Payment, and Parking Slot. Each class represents a specific role or entity within the system, and their methods define their actions and interactions.

3.1.3 ER Diagram

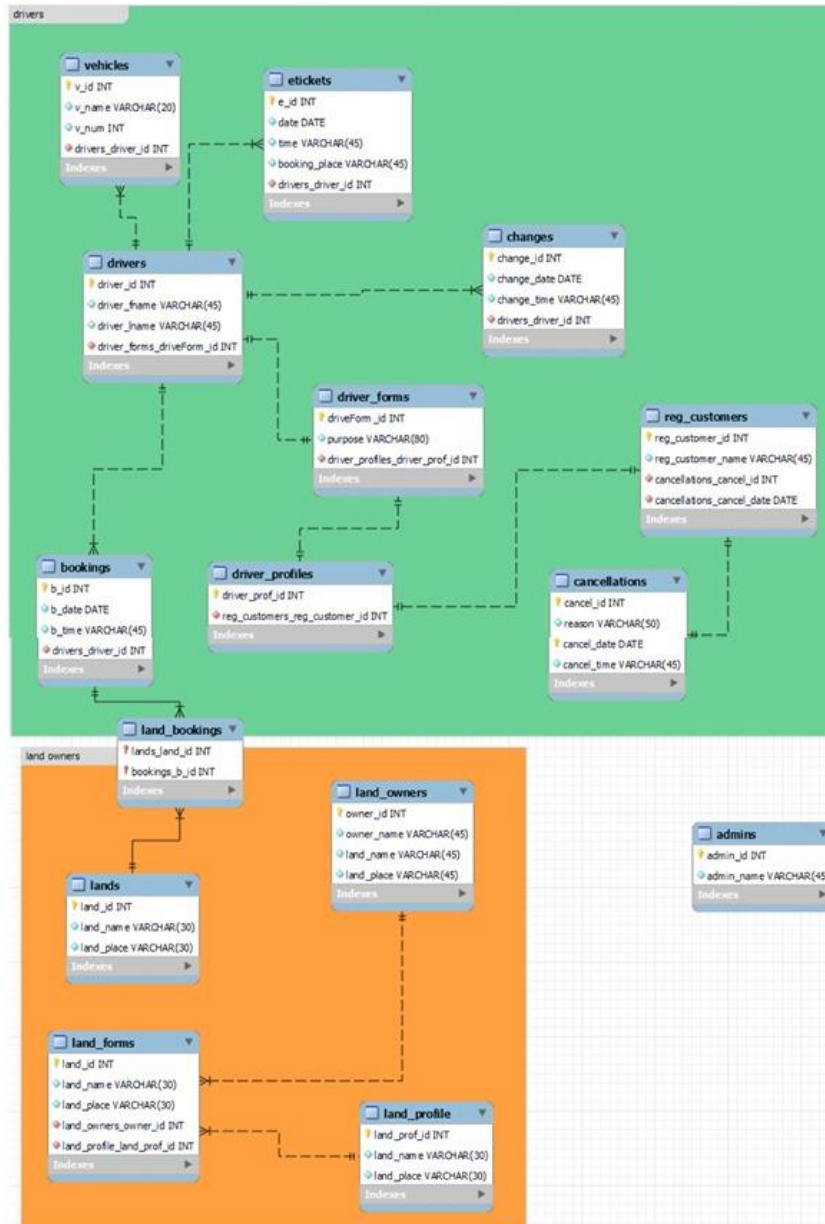


Figure 6 er diagram

This ER diagram depicts a parking management system's database structure. It showcases entities like Drivers, Vehicles, Bookings, Landowners, and Lands, along with their attributes and relationships. The diagram provides a visual representation of how data is organized and connected within the system, aiding in database design and understanding.

3.1.4 Software Architecture Diagram

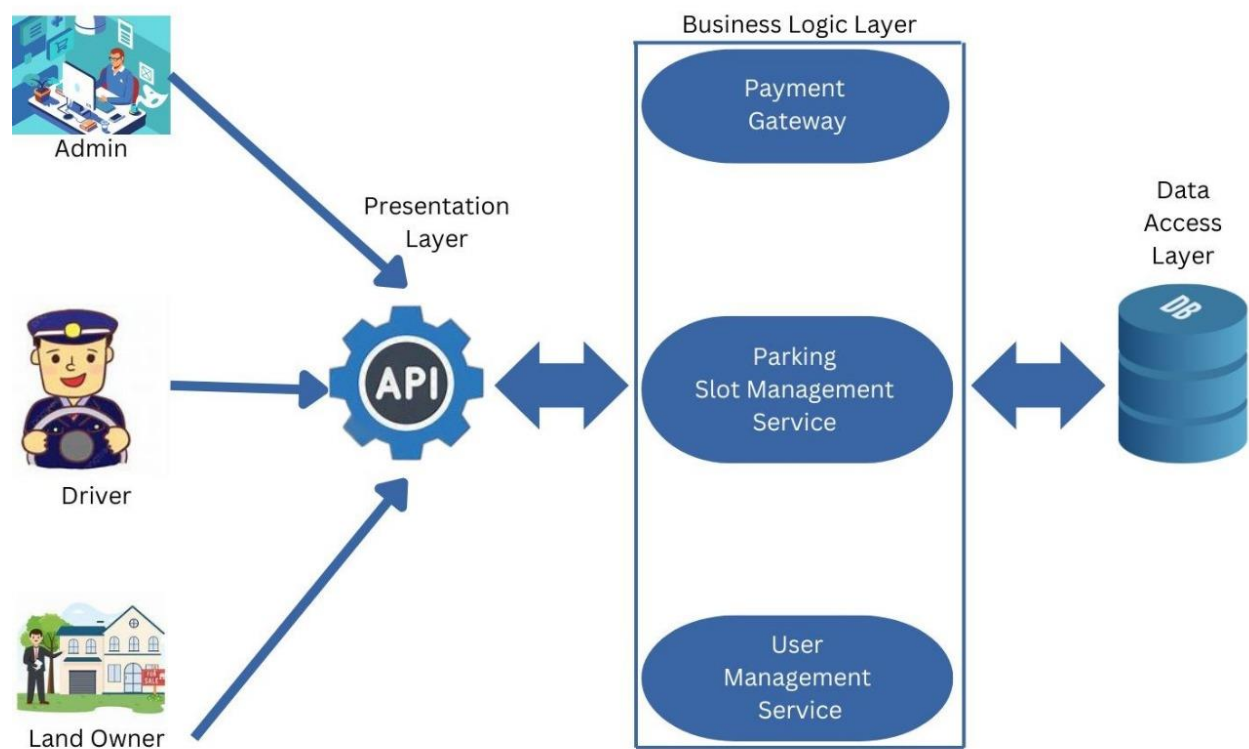


Figure 7 software architecture diagram

The diagram illustrates a system for managing parking slots. The system includes an API that serves as a central point of communication between various components. The Business Logic Layer houses services for parking slot management, user management, and payment processing. The Data Access Layer interacts with the database to store and retrieve information. The Presentation Layer handles the user interface and interacts with the API. The system caters to three main user groups: Admins, Drivers, and Landowners.

3.2 User interface design with Wireframes

These are the UI and wireframes of our system, showcasing the layout and design of key screens and user interactions.

➤ Home page

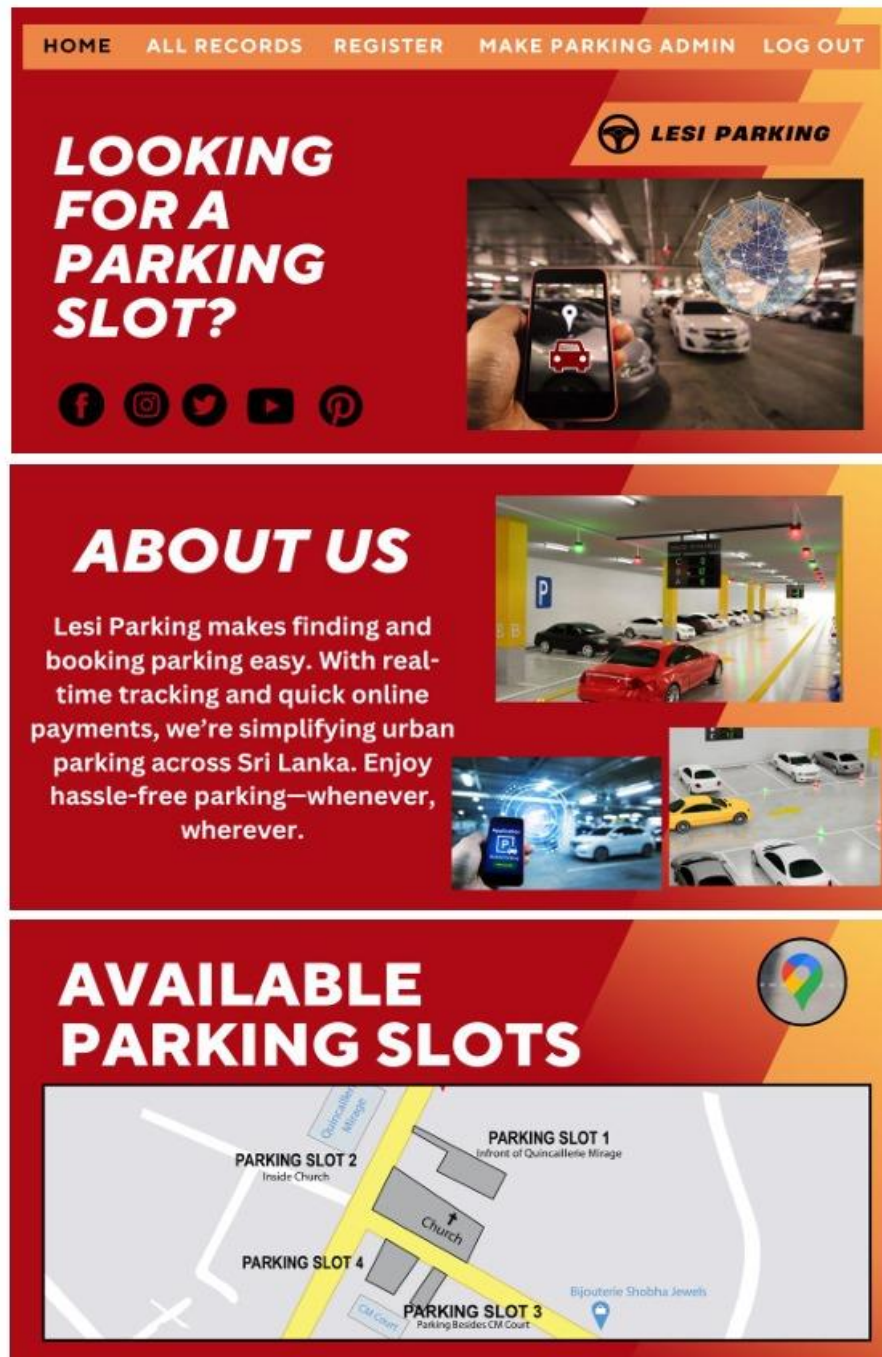


Figure 8 home page

The home page of the *Lesi Parking Management System* provides users with an easy starting point to search, book, and manage parking. It features a clean layout with quick access to core functions, including parking availability, user login, and account options for a seamless user experience.

➤ Admin Login

The image displays two versions of the Admin Login page for the Lesi Parking Management System. Both pages have a red and orange color scheme. The top navigation bar includes links: HOME, ALL RECORDS, REGISTER, MAKE PARKING ADMIN, and LOG OUT (top) or ADMIN (bottom). The main content area is titled 'ADMIN FORM' and contains the following fields and buttons:

Field Label	Value
USER NAME	Admin
E MAIL	admin123@gmail.com
PASS WORD	*****
CONFIRM PASSWORD	*****

Buttons: SUBMIT, LOG OUT (top) or LOG OUT (bottom).

Logo: LESI PARKING (with a steering wheel icon).

Image: A hand pointing at a login interface with fields for Username, Password, Cancel, and Login.

Figure 9 admin login page

The *Lesi Parking Management System* includes a secure Admin Login and Logout feature. The **Admin Login** page allows administrators to access their dashboard by entering their credentials. Once logged in, they can manage user accounts, monitor reservations, and oversee system transactions. The **Logout** option ensures secure session termination, protecting system data by securely logging the admin out after each session.

➤ User Registration



The screenshot shows the 'REGISTER' page of the Lesi Parking Management System. The page has a red and orange gradient background. At the top, there is a navigation bar with links: HOME, ALL RECORDS, REGISTER, MAKE PARKING ADMIN, and LOG OUT. The main heading is 'REGISTRATION'. Below this, there is a form with the following fields and values:

Field	Value
OWNER NAME	Anura Dissnayaka
CONTACT NUMBER	078 2349876
E MAIL	anura223@gmail.com
VEHICLE NAME	BMW
VEHICLE NUMBER	WP CAX 6869
PASSWORD	*****
CONFIRM PASSWORD	*****

Below the form, there are two buttons: 'SUBMIT' and 'VIEW PROFILE'. To the right of the form, there is a logo for 'LESI PARKING' and an image of a person holding a tablet displaying the 'Register Now' button.

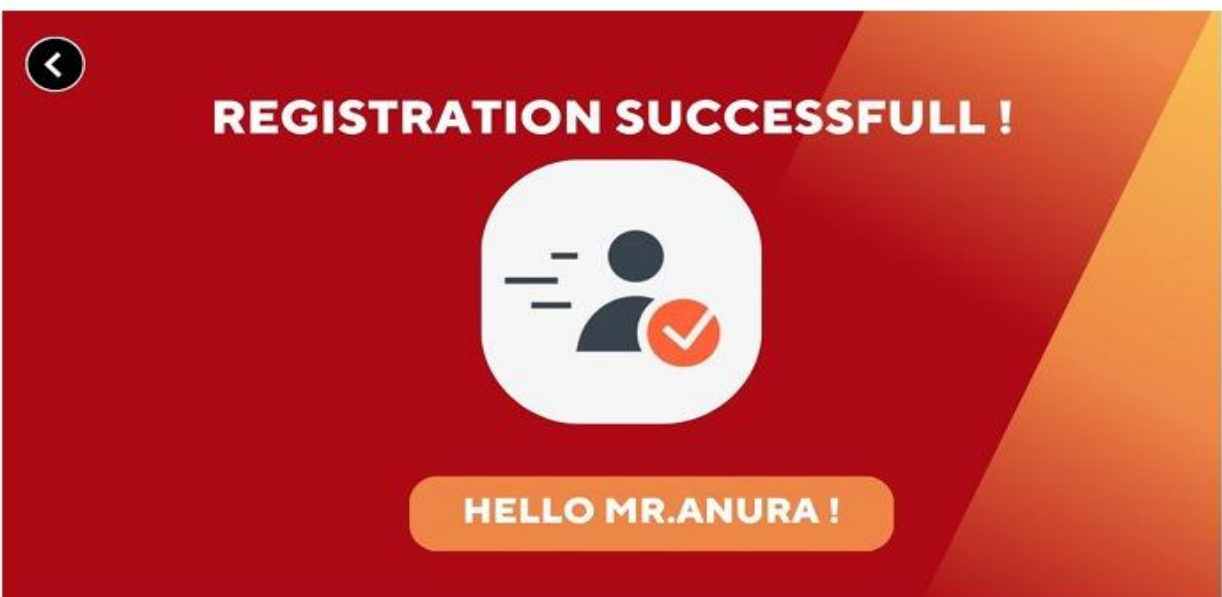


Figure 10 user registration page

The *Lesi Parking Management System* includes a **User Registration** feature, allowing new users to create accounts easily. During registration, users provide basic information like name, email, and vehicle details, enabling them to manage bookings, view parking history, and access exclusive features. This registration process ensures a personalized experience and allows seamless interaction with the system's core functionalities.

➤ User profile view

HOMEALL RECORDSREGISTERMAKE PARKING ADMINLOG OUT

REGISTRATION

OWNER NAMEAnura Dissnayaka

CONTACT NUMBER078 2349876

E MAILanura223@gmail.com


VEHICLE NAMEBMW


VEHICLE NUMBERWP CAX 6869


PASSWORD*****

CONFIRM PASSWORD*****

SUBMITVIEW PROFILE

 LESI PARKING



 PROFILE VIEW

OWNER NAMEAnura Dissnayaka

CONTACT NUMBER078 2349876

E MAILanura223@gmail.com

VEHICLE NAMEBMW

VEHICLE NUMBERWP CAX 6869

ENTRY TIME & DATE9.00 AM 10-11-2024

DURATION8 HRS

EXIT TIME & DURATION5.00 PM 10-11-2024

PAYMENTRS 2000




Figure 11 user profile view

The **User Profile View** in the *Lesi Parking Management System* allows users to access and manage their account details. Here, users can view personal information, parking history, payment records, and preferences. This section provides an organized overview, making it easy for users to update details and track their activity within the system.

➤ Vehicle records



OWNER NAME	VEHICLE NAME	VEHICLE NUMBER	ENTRY DATE	EXIT DATE	DURATION	PAYMENT
Saman Silva	SUZUKI	WP ABC 1234	10-11-2024	10-11-2024	8 hours	2000
Kalum Yapa	Toyota	SG ABC 1234	09-11-2024	09-11-2024	5 hours	1600
Nima Peiris	KDH	NW ABC 1234	06-11-2024	06-11-2024	3 hours	1200

Figure 12 vehicle records

The **Vehicle Records View** in the *Lesi Parking Management System* displays a comprehensive list of all registered vehicles associated with the user's account. Users can easily view details such as vehicle type, license plate number, and other relevant information. This view also allows for the addition of new vehicles or updating existing records, ensuring that users' vehicle information is always up to date for parking reservations.

3.3 Gantt charts to visualize the progress of the project and individual tasks

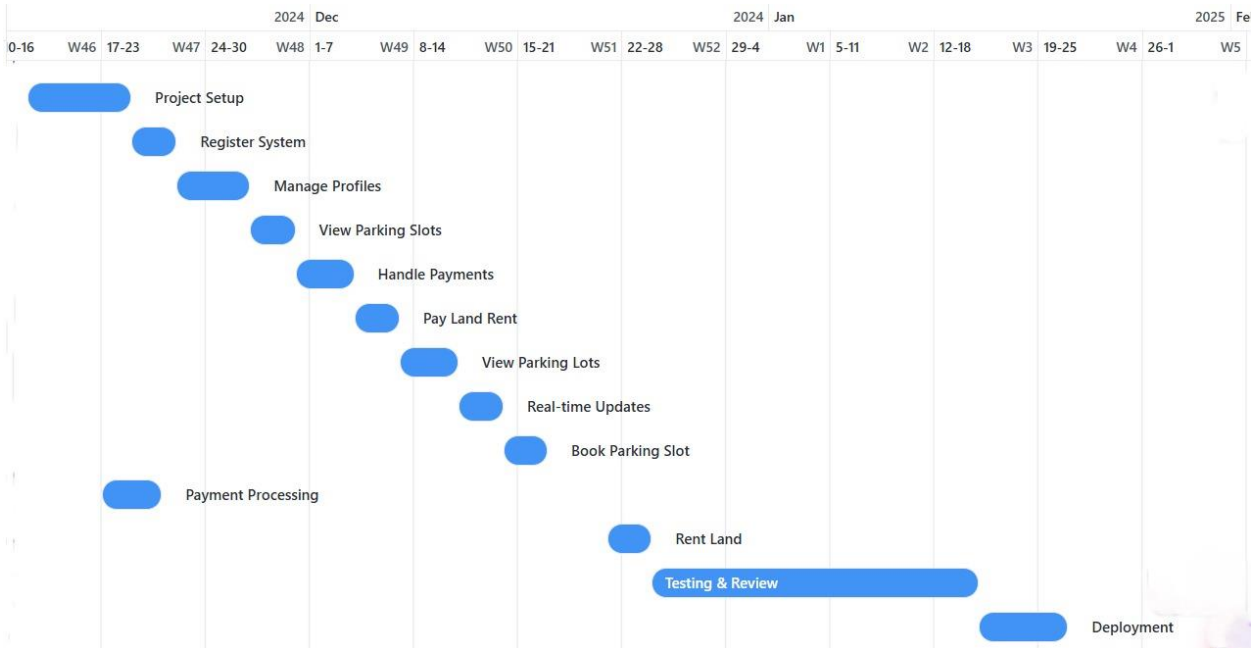


Figure 13 gantt chart

This Gantt chart outlines the comprehensive timeline for the development and deployment of the *Lesi Parking System*, a smart parking management solution, from mid-November 2024 to early February 2025. Below is a detailed phase-by-phase breakdown:

1. **Project Setup** (Weeks 46-48):

- This initial phase focuses on setting up the project's infrastructure, including server setup, database configuration, and establishing development environments. It also includes defining project goals, requirements gathering, and team alignment.

2. **Register System** (Weeks 47-48):

- This phase establishes the registration module where new users can create accounts, input essential data, and gain access to the system. It covers user authentication, role assignment, and basic data security protocols.

3. **Manage Profiles** (Weeks 48-49):

- The focus here is on developing a user-friendly interface for managing user profiles. This includes editing profile information, viewing account history, and managing preferences. It's essential for a personalized user experience.

4. **View Parking Slots** (Weeks 49-50):

- A feature enabling users to view available parking slots in real time. It includes visual elements like a map or grid view, and it's designed to offer clear insights into parking availability at various locations.

5. **Handle Payments** (Weeks 50-51):

- This critical phase involves implementing secure payment processing. It will cover different payment methods (credit cards, digital wallets) and include features like transaction history and notifications for successful payments.

6. **Pay Land Rent** (Week 51):

- Designed for users renting parking spaces on a long-term basis, this feature enables the payment of monthly or annual land rent. It involves integrating invoicing and a reminder system to keep users updated on due payments.

7. **View Parking Lots** (Weeks 51-52):

- This functionality provides an overview of available parking lots across different locations. Users can see location details, capacity, and availability, making it easier to plan for parking needs.

8. **Real-time Updates** (Week 52):

- A crucial addition for dynamic updates, this feature ensures users receive up-to-date information on slot availability, traffic, and potential issues. Real-time updates are especially important during peak hours to enhance user convenience.

9. Book Parking Slot (Weeks 52-1):

- This phase enables the functionality for booking specific parking slots. Users can reserve a spot ahead of time, with options for different durations, enhancing the overall user experience by securing parking in advance.

10. Rent Land (Week 1):

- This feature provides an option for users or business owners to rent larger land sections for parking purposes, either for personal or commercial use, adding versatility to the system's offerings.

11. Payment Processing (Weeks 50-51):

- This phase focuses on integrating robust payment gateways, ensuring secure transactions, and setting up the backend for handling financial data. This also includes fraud detection and compliance with industry standards.

12. Testing & Review (Weeks 2-4):

- A comprehensive testing and review phase where the system is assessed for performance, usability, and security. This includes unit testing, integration testing, and user acceptance testing to ensure *Lesi Parking System* is reliable and user-friendly.

13. Deployment (Week 5):

- The final stage involves deploying *Lesi Parking System* to the production environment, making it accessible to end-users. Post-deployment monitoring and minor adjustments may follow to ensure optimal performance.

3.3.1 Work Breakdown Structure

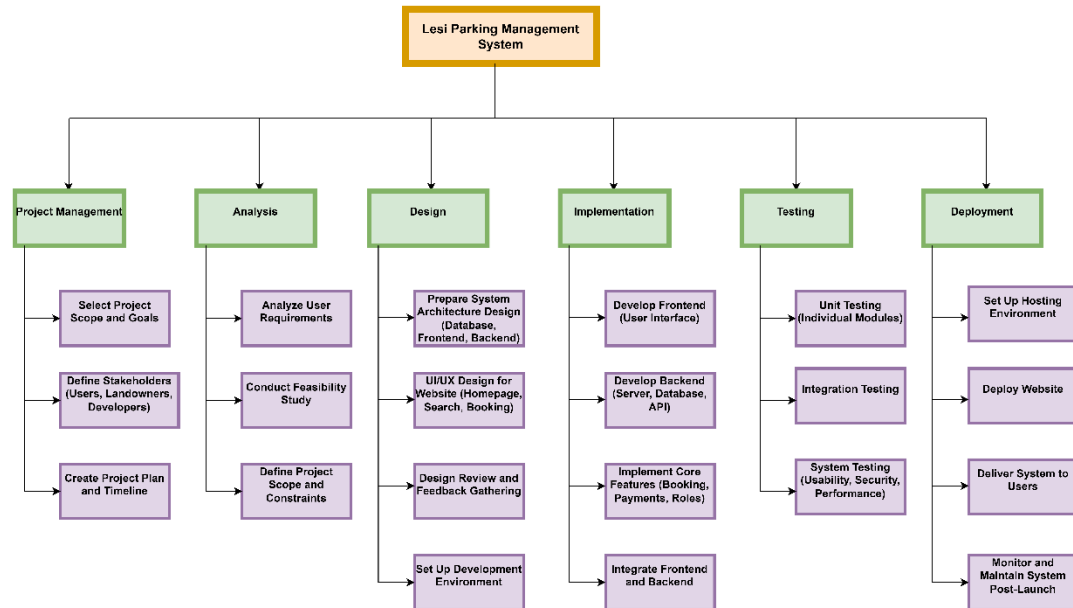


Figure 14 Work Break down Structure

The Work Breakdown Structure (WBS) for the *Lesi Parking Management System* outlines a systematic approach to project development by dividing it into six primary phases: **Project Management**, **Analysis**, **Design**, **Implementation**, **Testing**, and **Deployment**.

1. **Project Management** focuses on establishing project goals, defining stakeholders, and creating a detailed project timeline to guide the development process.
2. **Analysis** involves understanding user requirements, conducting a feasibility study, and defining the project's scope and constraints to ensure alignment with user needs.
3. **Design** entails creating the system's architecture, developing UI/UX for key features (e.g., homepage, booking interface), and setting up the development environment based on gathered feedback.

4. **Implementation** is where the actual development occurs. This includes building the frontend, backend (database, server, API), and integrating core functionalities like booking and payments.
5. **Testing** encompasses various levels, such as unit, integration, and system testing, to verify usability, security, and overall performance.
6. **Deployment** involves setting up the hosting environment, launching the website, and providing post-launch monitoring and maintenance to ensure smooth operation and reliability for users.

Chapter 4 – Implementation

For the *Lesi Parking Management System*, the implementation utilizes the following technologies:

Frontend

- **HTML**: The structure and layout of each page are defined with HTML, creating the foundation of the user interface.
- **Tailwind CSS**: A utility-first CSS framework, Tailwind is used for styling the website to ensure a responsive, modern, and cohesive look across different devices.

Backend

- **Django**: The web framework responsible for handling server-side logic, user authentication, and connecting the frontend with the database. Django also manages forms, views, and data processing.

Database

- **pgAdmin 4 and PostgreSQL**: The database for storing essential data, such as user profiles, parking slot records, and location data. PostgreSQL offers robustness and reliability, while pgAdmin 4 provides a graphical interface for easy management.

Google Maps API

- **Google Maps API:** Used to display an interactive map on the website, allowing users to locate nearby parking facilities. The integration with Google Maps helps users visualize locations and navigate to their selected parking spot with ease.

Chapter 5 - Evaluation

The evaluation of the *Lesi Parking Management System* assesses the effectiveness, usability, and functionality of the system in meeting its goals of simplifying parking for users and providing value to landowners. The evaluation process covers several key aspects:

1. Functionality

- **Objective Assessment:** The system's core features, such as account management, parking slot booking, and Google Maps integration, are checked to ensure they work as intended. Each feature is tested to confirm that it aligns with user needs and performs accurately under various conditions.
- **Integration Testing:** Ensures that all components—frontend, backend, database, and APIs—work seamlessly together, delivering a smooth user experience.

2. Usability

- **User Interface:** The evaluation considers if the Tailwind CSS-based design provides a responsive, accessible, and visually appealing experience across devices.
- **User Testing:** By collecting feedback from potential users, the system's ease of use and navigation are evaluated. Testers provide insights into how intuitive and efficient the interface is for locating and booking parking spaces.

3. Performance

- **Speed and Responsiveness:** The system is tested for load times and response rates, particularly during peak usage times, to ensure that users experience minimal delays.
- **Scalability:** Checks are done to evaluate if the backend and database can handle increased traffic as the user base grows.

4. Reliability and Security

- **Data Security:** The system's data handling processes are reviewed to ensure they meet security standards, protecting user data, and payment details.
- **Error Handling:** Evaluation of how the system manages errors, such as failed connections or incorrect data input, ensures that it responds appropriately and provides helpful feedback to users.

Chapter 6 - Conclusion

The **Lesi Parking System** is a comprehensive parking management solution designed to address the parking challenges in Sri Lanka. By enabling seamless discovery, booking, and management of parking spaces, it simplifies the process for commuters, tourists, and landowners. The system includes key features such as real-time updates, automated entry/exit processes, user accounts with loyalty programs, advance booking options, and feedback mechanisms. Additionally, it incorporates environmental incentives to encourage eco-friendly parking choices.

The system is built with scalability, performance, reliability, and security in mind, ensuring a smooth user experience across various platforms. The platform also allows landowners to list and manage parking spaces, making it a win-win for both users and property owners. The focus on usability makes the platform accessible to everyone, regardless of technical expertise.

By streamlining the parking experience and introducing innovative solutions, Lesi Parking aims to transform the parking landscape in Sri Lanka, offering a convenient, efficient, and sustainable alternative to traditional parking systems. With a clear emphasis on user satisfaction and operational efficiency, the system is positioned to play a pivotal role in improving the parking experience while contributing to the development of smarter urban environments.

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