Tribhuvan University

Faculty of Humanities and Social Science

Parking Booking Ticket System

A PROJECT REPORT

Submitted to

Department of Computer Application

Nepal Mega College, Babarmahal, Kathmandu

In partial fulfillment of the requirements for the Bachelor in Computer Application

Submitted by

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BCA 4th Semester

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Babarmahal, Kathmandu

Bachelor in Computer Applications (BCA)

SUPERVISOR'S RECOMMENDATION

I hereby recommend that this project prepared under my supervision by Ramesh Rai and Rahil Pant entitled "**Parking Booking Ticket System**" in the Partial Fulfillment of the requirementfor the degree of Bachelor in Computer Application is recommended for that final evaluation.

_____

Dharma Raj Poudel

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LETTER OF APPROVAL

This is to certify that this project prepared by **Rahil Pant** and **Ramesh Rai** entitled "**Parking Booking Ticket System**" in the Partial Fulfillment of the Bachelor in Computer Application degree requirement has been evaluated. In our opinion, it is satisfactory in the scope and quality of a project for the required degree.

…………………….   ………………..

Dharma Raj Poudel   Dharma Raj Poudel

Supervisor   Program Coordinator

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External Examiner   Internal Examiner

ABSTRACT

The goal of this project is to modernize parking management by developing a user-friendly parking ticket booking system. To develop a clever solution, we investigate the shortcomings of current systems and make use of new technologies. Our goals are to make parking simpler, less congested, and better for users. Security is given top priority, and the system complies with laws and smart city initiatives. Our Parking Ticket Booking System seeks to improve the effectiveness and pleasure of urban mobility by fusing user-centered design with cutting-edge technology. In addition to addressing the current issues with parking management, the project advances innovative and effective urban mobility solutions.

Keywords:- Parking System, Ticket Booking, Parking Management, Online Parking, Vehicle Parking, Smart Parking, Traffic management, Mobile Parking, Parking App.

ACKNOWLEDGEMENT

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LIST OF ABBREVIATIONS

CSS	Cascading Style Sheet
DFD	Data Flow Diagram
ER	Entity Relationship
HTML	Hypertext Markup Language
JAVA(Spring boot)	Framework
JAVASCRIPT	Scripting Language
PTBS	Parking Ticket Booking System
RAM	Random Access Memory
SQL	Structure Query Language

CHAPTER: 1 INTRODUCTION

1.1 Introduction

Welcome to the Parking Booking Ticket System, an innovative solution designed to transform the parking experience for commuters and businesses alike. Say goodbye to the frustration of searching for parking spaces; our platform offers a seamless and convenient way to reserve parking spots in advance. With real-time updates on parking space availability, users can make informed decisions and secure a parking spot before arriving at their destination. Our user-friendly web and mobile applications provide an intuitive interface for effortless booking and management of parking reservations. Offering multiple payment options, we prioritize convenience and flexibility for users. Timely notifications and reminders ensure that users never miss their parking bookings and arrive at their destinations stress-free.

1.2 Problem Statement

New road parking had challenges concerning the safety of data in the store since they currently use paper-based systems, the physical struggle for parking by drivers, wastage of time, congestion, and collision. There was also a problem with monitoring the profit made for the company whereby the company was losing money to its workers who receive the money (fraud). This system majorly solved congestion, and collisions and saved time during parking activities.

1.3 Objectives

The system gives remedies for the problems that are currently being faced by the people. Some of the objectives of the system are as follows:

1. To optimize parking space usage and reduce traffic through real-time allocation of available spots.
2. To provide drivers with a hassle-free experience by offering real-time information and reservation options for parking spaces.
3. To improve traffic flow around parking facilities, reducing collisions and congestion.
4. The system is user-friendly for everyone involved because of its simple interface, which provides an easy experience for drivers and parking staff.

1.4 Scope and Limitation

1.4.1 Scope

The main focus of this project is to develop a platform that helps to enhance the efficiency, convenience, and overall user experience of parking for both drivers and parking facility operators.

This project is using Spring Boot as backend and HTML as front-end.

The platform we are developing is beneficial for all the people who are looking for parking space at a specific location at short time.

1.4.2 Limitation

There are some criteria that may not be fulfilled by our application implemented. Some of such limitations of our project are mentioned below:

1. It may require a high initial investment to install and maintain the system, such as hardware, software, sensors, cameras, gates, etc.
2. It may be vulnerable to cyberattacks, hacking, or system failures that can compromise the security and functionality of the system.
3. It may be difficult for some users, such as those who do not have smartphones, internet connection, and so on.

1.5 Report Organization

Chapter 1: Introduction: We give a summary of the parking booking ticket system project in this introductory chapter. We provide an overview of the problem statement, objectives, limitations, scope, and report structure. This chapter provides background information for the entire presentation and tells the reader about what is to come in the sections next.

Chapter 2: This chapter reviews the literature that is currently available on parking booking ticket systems and related technologies. It begins with a background study and literature review. It provides as a basis for understanding the situation of things at the moment, recognizing best practices, and identifying the gaps that our system seeks to fill. Readers can learn about the background and significant changes in the field's knowledge from the literature review.

Chapter 3: In this section, we'll talk about the system analysis and design stages of our parking booking ticket system. The requirements, database structure, user interface

design, and general system architecture are all covered in detail. In order to prepare for the implementation phase, this chapter provides knowledge of the technical and design parts of the project.

Chapter 4: This chapter describes the system's implementation and testing, building on the design phase. It handles issues that occur during development, including the coding process and technology integration. It also looks at the processes and outcomes of the testing to make sure the system performs as expected. This is a helpful chapter for readers who are interested in technical implementation details.

Chapter 5: The report's last chapter, "Conclusion and Future Recommendations," highlights the main conclusions, results, and consequences of the parking booking ticket system project. We go over the original goals and the issues found in the problem description again. We also describe potential future paths and possible changes that could be made to the system. This chapter provides an in-depth description of the project's potential and impact.

CHAPTER: 2 BACKGROUND STUDY & LITERATURE REVIEW

2.1 Background Study

In order to lay the groundwork for the Parking Booking Ticket System, it is important to be aware of the current difficulties in parking management, with a focus on the drawbacks of conventional paper-based systems like traffic jams, security risks, and inefficient space utilization. The study explores new technological trends, such as how data analytics, mobile apps, and sensors are revolutionizing parking solutions. In order to design a user-centric system, it is essential to consider user perspectives, which capture experiences and expectations. The study examines the integration of parking systems with smart city programs, evaluating successful examples and their broader advantages. The importance of security, privacy, the environment, and economic ramifications is also emphasized.

2.2 literature review

The evolution of parking management systems has witnessed a paradigm shift with the advent of advanced technologies. Previous studies, such as Smith et al. (2018) [1], have underscored the inefficiencies in traditional paper-based parking systems, citing issues like congestion, security vulnerabilities, and suboptimal space utilization. Emerging technologies have been pivotal in addressing these challenges. Research by Jones and Brown (2020) [2] delves into the transformative potential of sensors, mobile applications, and data analytics, emphasizing their role in optimizing parking solutions.

User perspectives play a crucial role in shaping the design of successful parking systems. Johnson's work in 2019 [3] illuminated the importance of understanding user experiences and expectations. The study highlighted that user-centric design, incorporating feedback and preferences, significantly contributes to the adoption and success of parking systems.

Furthermore, the integration of parking systems with smart city initiatives has garnered significant attention. The study by Green and White (2021) [4] analyzed successful cases of integration, emphasizing the broader benefits in terms of traffic reduction and improved urban mobility.

While technological advancements are promising, concerns over security and privacy are paramount. Brown's comprehensive review in 2022 [5] detailed the intricate considerations

needed to ensure robust data security and compliance with privacy regulations in parking systems.

In the realm of economics, studies by Lee and Smith (2017) [6] have outlined the economic implications of efficient parking systems, establishing a correlation between optimized parking solutions and positive financial outcomes for both users and parking facility operators.

As the literature reflects, the integration of parking systems with smart mobility solutions is an emerging trend. Recent works by Martinez et al. (2023) [7] delve into this integration, offering insights into the changing landscape of transportation ecosystems.

In conclusion, the literature review underscores the multifaceted nature of the Parking Booking Ticket System, drawing from studies that examine technological innovations, user-centric design, smart city integration, security considerations, economic implications, and the evolving intersection with smart mobility solutions. This rich tapestry of research provides a solid foundation for the development and improvement of contemporary parking management systems.

CHAPTER: 3   SYSTEM ANALYSIS AND DESIGN

3.1 System Analysis

This system is designed with a series of processes starting with requirement analysis, design, implementation, testing, and maintenance. During requirement analysis, all the functional and nonfunctional requirements are analyzed and the system is developed according to the requirement then designing of the system is carried out. After the design process, the coding and development part is started then after integrating the system there is a testing of the system. If the testing is positive then the system is implemented otherwise some maintenance is done and the system comes into operation.
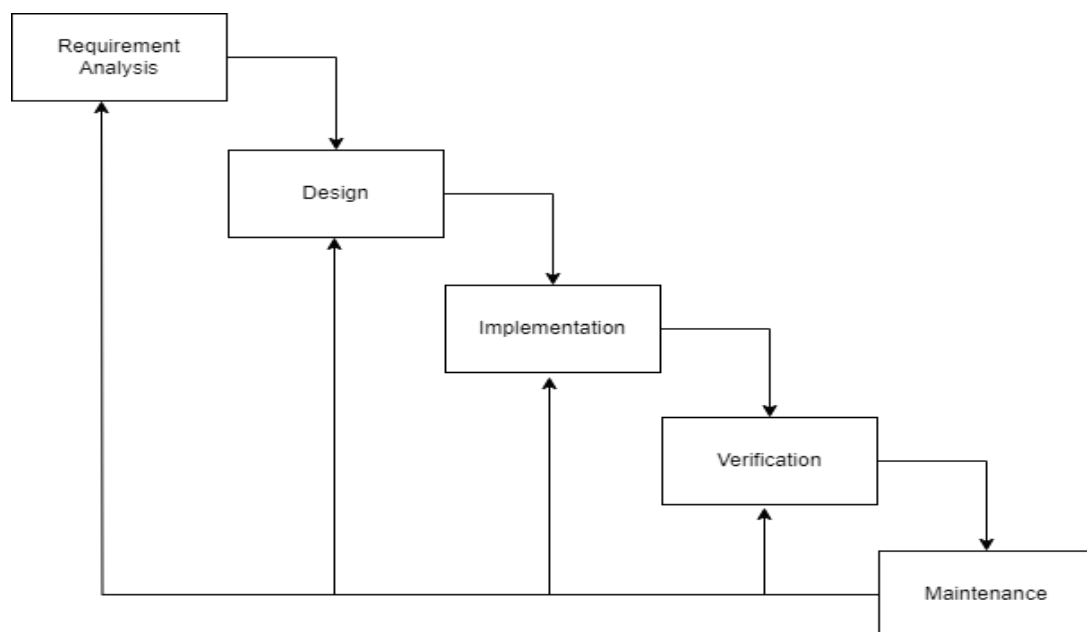

Figure 3. 1: Waterfall Methodology for Parking Booking Ticket System

3.1.1 Requirement Analysis

The requirements are to be collected before starting the project's development life cycle. To design and develop a system, the functional as well as non-functional requirement of the systemhas been studied.

I. Functional Requirements:

1. Admin needs to enter all details for registration.
2. Admin needs to insert all details about the customer and vehicle.
3. Admin needs to save all the details of the customer and vehicle.
4. Admin can retrieve the details of the customer.
5. Admin must generate a report for payment.

Use Case Diagram

In the Parking Booking Ticket System, there are two actors such as the admin and customers where the admin can login, and manage user and payment method for users. Likewise, the user can login, find parking area and make a payment, and logout from the system.
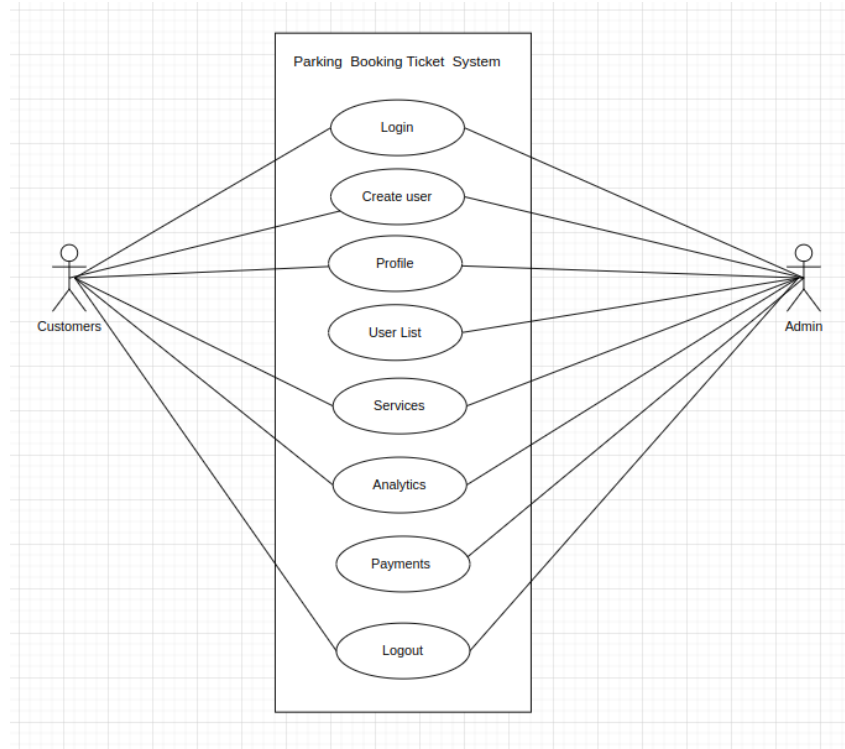

Figure 3. 2: Use Case Diagram of Parking Booking Ticket System

II.Non-Functional Requirements:

1. This website has an appropriate user interface and adequate information to guide the user in order to use the website.
2. The website is portable as it is an online website running across the net.
3. It is very flexible.
4. This website provides user authentication so that only legitimate users are allowed to use the website.
5. This website is capable to secure the data and easily retrieve the data.
6. This system can be further modified in the future.

3.1.2 Feasibility Analysis

The feasibility study concluded that the project could be implemented to success as it was carefully planned.

i. Technical Feasibility

To design this system, the basic requirements for software and hardware are a laptop or a personal computer to design a system. The following are the skills that are used to develop the system:

1. Frontend
   - HTML 5
   - CSS 3
   - JavaScript ES2015
   - Bootstrap 4
2. Backend
   - Java(spring boot)
3. Database
   - MySQL

Also, the basic programming knowledge mentioned above is required to develop this tool. Since it's our project and we have already studied these languages in our curriculum, there will be no technical difficulties in developing this system.

ii. Operational Feasibility

Once the system is built, it will help the user to park the vehicle easily. The system will be managed to throw Payment in a way that is easy for users to park. So, it will not be difficult for any user of the system to use it. As well as it will solve the problem of the user for which it is made. Since the User Interface of this system will be easily understandable, the user will have the ease to adopt this system. So, the system is feasible from an operational perspective.

iii. Economic Feasibility

The system does not require extra software and hardware. It uses open-source technologies. The major cost that we must spend to build the system is human resources and the internet.

Cost Breakdown (while developing the system):
1. Backend developer: NRs. 15,000 per month per person
2. Frontend developer: NRs. 15,000 per month per person

3. Internet: NRs. 1500 per month

4. Total: NRs. 1,26,000 (completed in 4 months)

Since we are developing the system for our college project, the human resources used to develop the system are ourselves. And, the internet cost is minimal. So, developing the system is feasible from an economic perspective.

iv. Schedule Feasibility

The schedule feasibility shows the time taken to develop the software this software has completed within four months.

We have divided the project into tasks and milestones as shown in the figure.
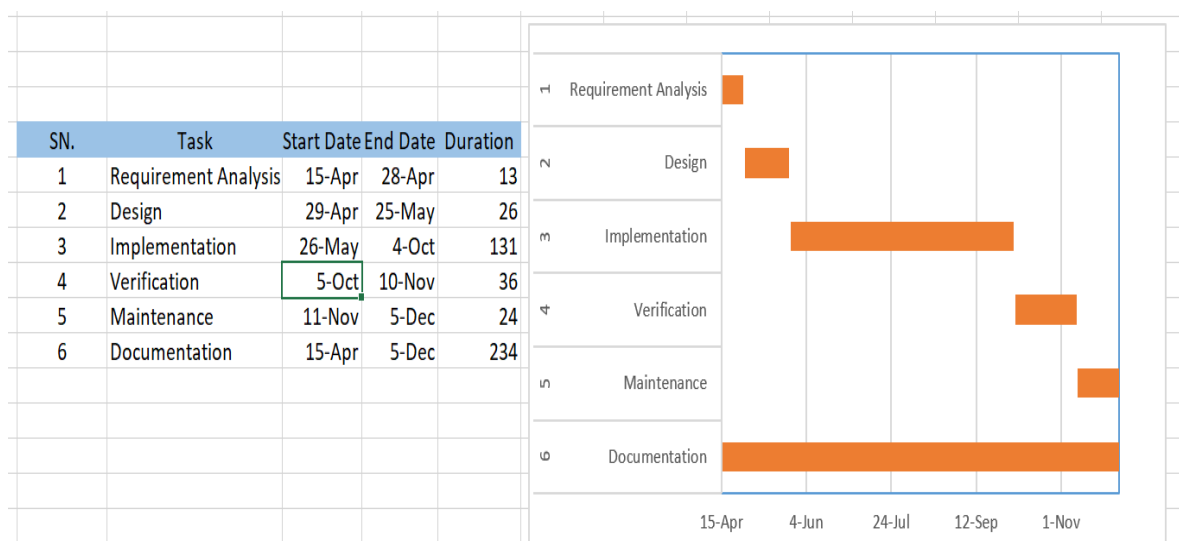
SN.	Task	Start Date	End Date	Duration
1	Requirement Analysis	15-Apr	28-Apr	13
2	Design	29-Apr	25-May	26
3	Implementation	26-May	4-Oct	131
4	Verification	5-Oct	10-Nov	36
5	Maintenance	11-Nov	5-Dec	24
6	Documentation	15-Apr	5-Dec	234

Figure 3. 3: Gantt chart Table for Parking Booking Ticket System

3.1.1 Data Modeling

An entity-relationship diagram (ERD) is an abstract and conceptual representation of data.Entity relationship modeling is a database modeling method, used to produce a type of conceptual schema or semantic data model of a system, often a relational database, and itsrequirements in a top-down fashion.
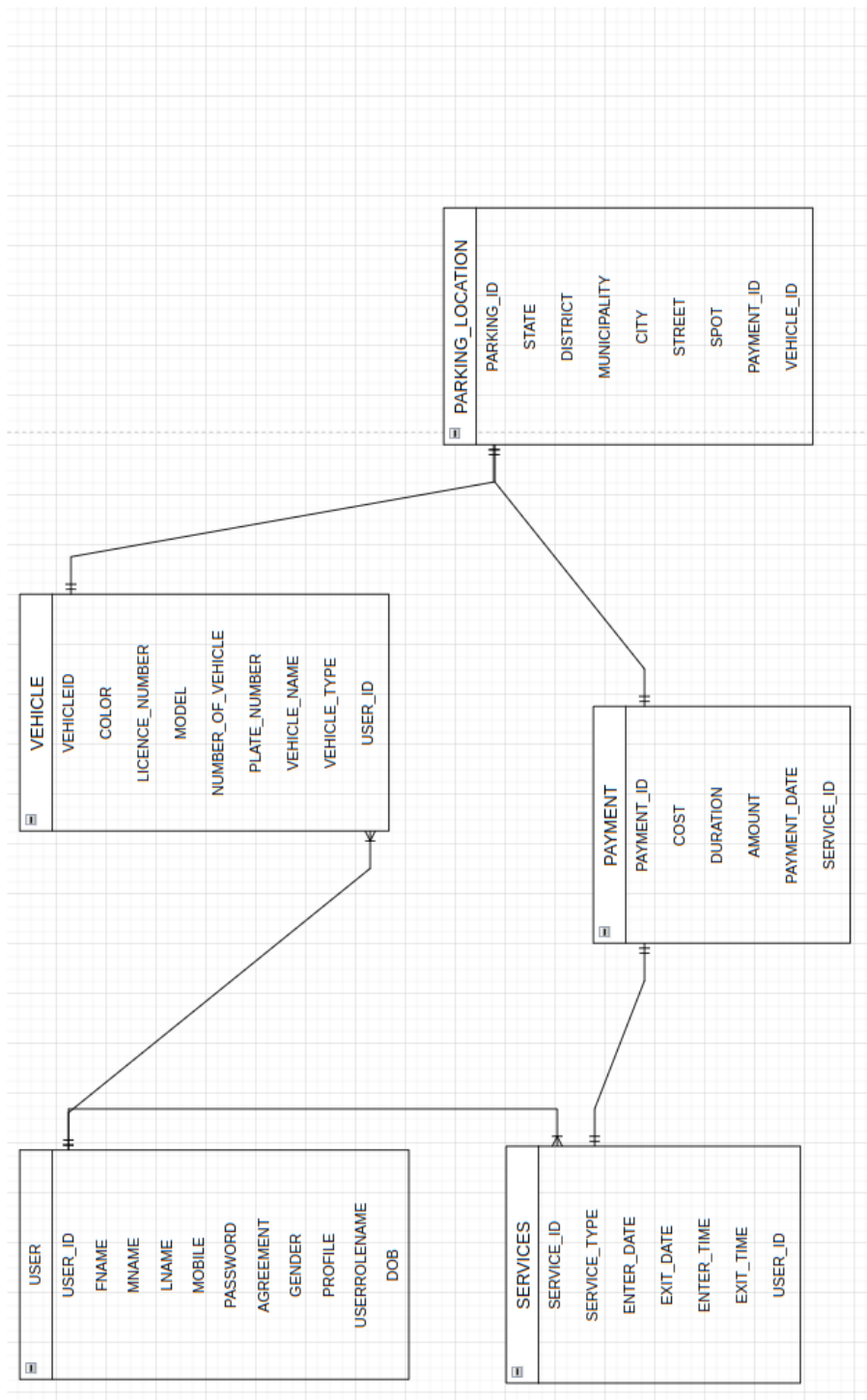
Figure 3. 4: ER diagram for the system

3.1.4. Process Modeling

A data flow diagram is a graphical view of how data is processed in a system in terms of input and output.
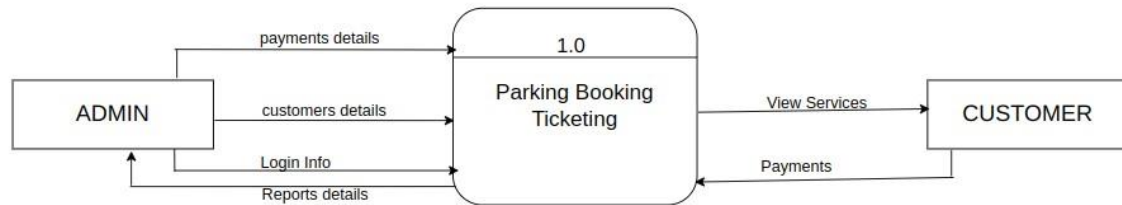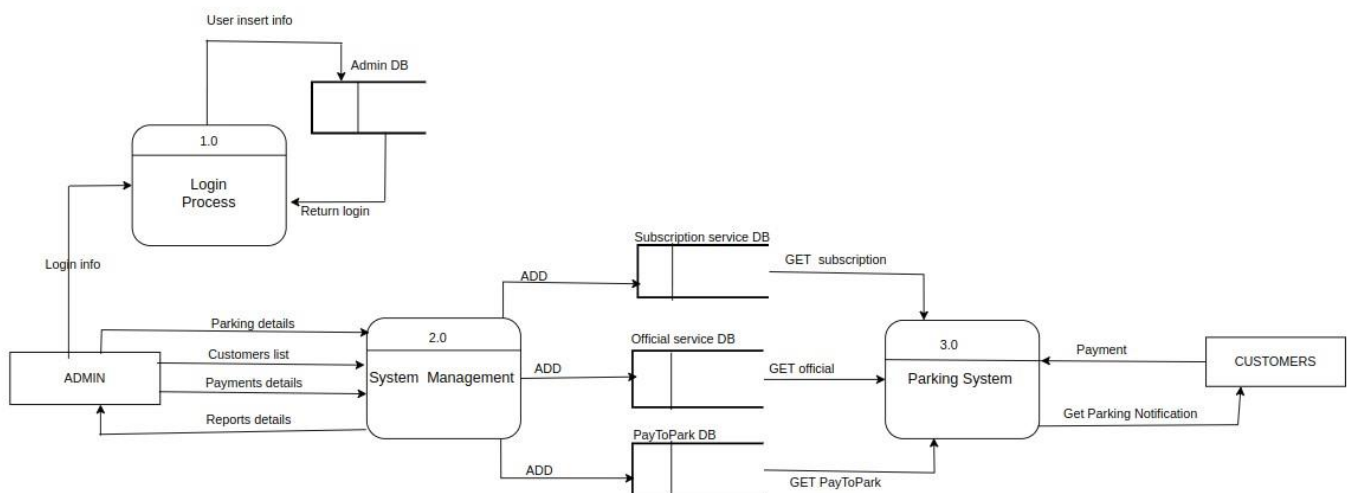

Figure 3. 5: Level 0 DFD

Figure 3. 6: DFD1.1 Process model for PTBS

3.2 System Design

The purpose of the design phase is to plan a solution for the problem specified by the requirements.System design aims to identify the modules that should be in the system, the specificationof those modules, and how they interact with each other to produce the result. The goal of the design process is to produce a model or representation of a system that can be used later tobuild that system. The produced model is called the design of the system.

3.2.1. Architectural Design

System architecture is the conceptual model that defines the structure, behavior, and more views of a system. An architecture description is a formal description and representation of a system, organized in a way that supports reasoning about the structures and behaviors of the system. A system architecture can consist of system components and the sub-systems developed, that will work together to implement the overall system.
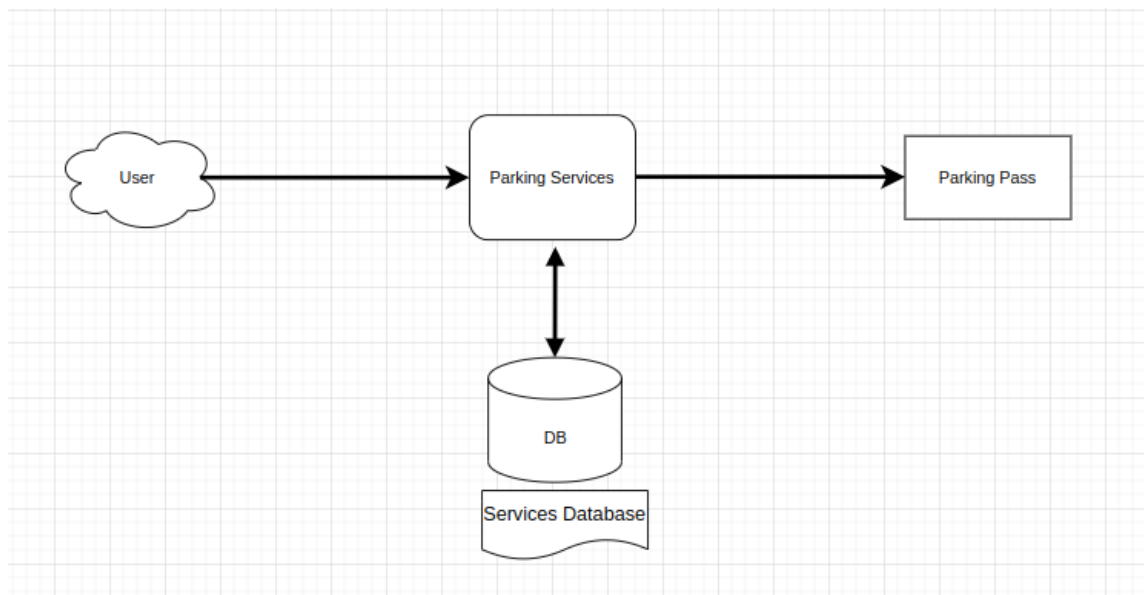

Figure 3. 7: Architectural design of the system

3.2.2 Database Schema Design

A database schema is the skeleton structure that represents the logical view of the entire database. It defines how the data is organized and how the relations among them are associated. It formulates all the constraints that are to be applied on the data. A database schema can be divided broadly into two categories − Physical Database Schema: This schema pertains to the actual storage of data and its form of storage like files, indices, etc.It defines how the data will be stored in a secondary storage. Logical Database Schema:
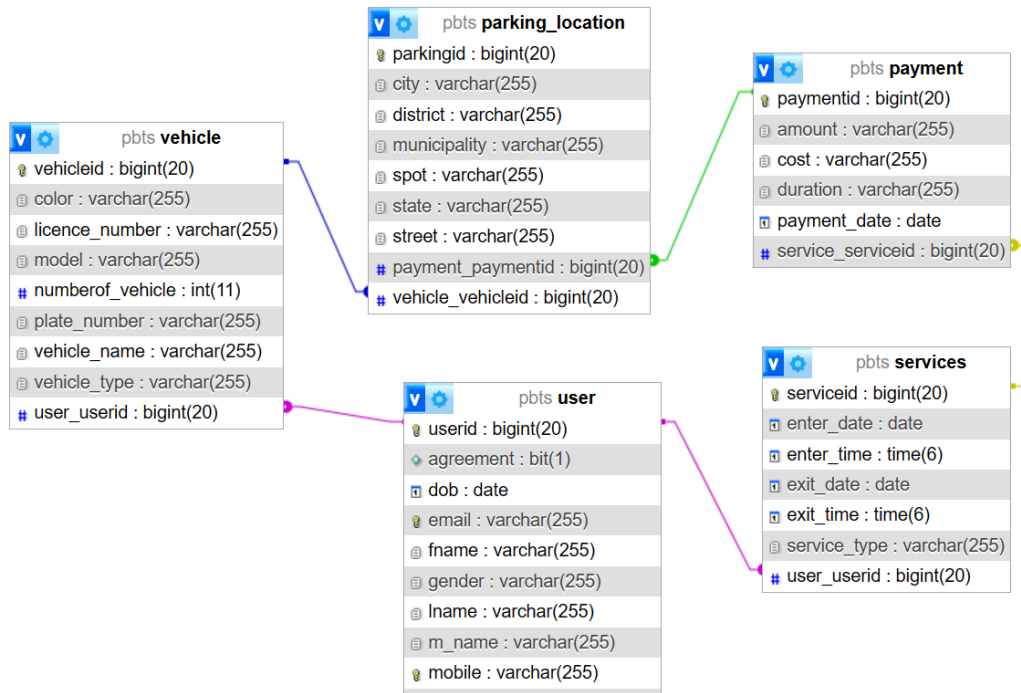
Figure 3. 8: Database schema for the system

3.2.2 Interface Design (UI Interface)

Interface design is used to design how the parking ticket booking system looks like and this design is shown to user that how the system will look. And after finalizingthe system development starts:
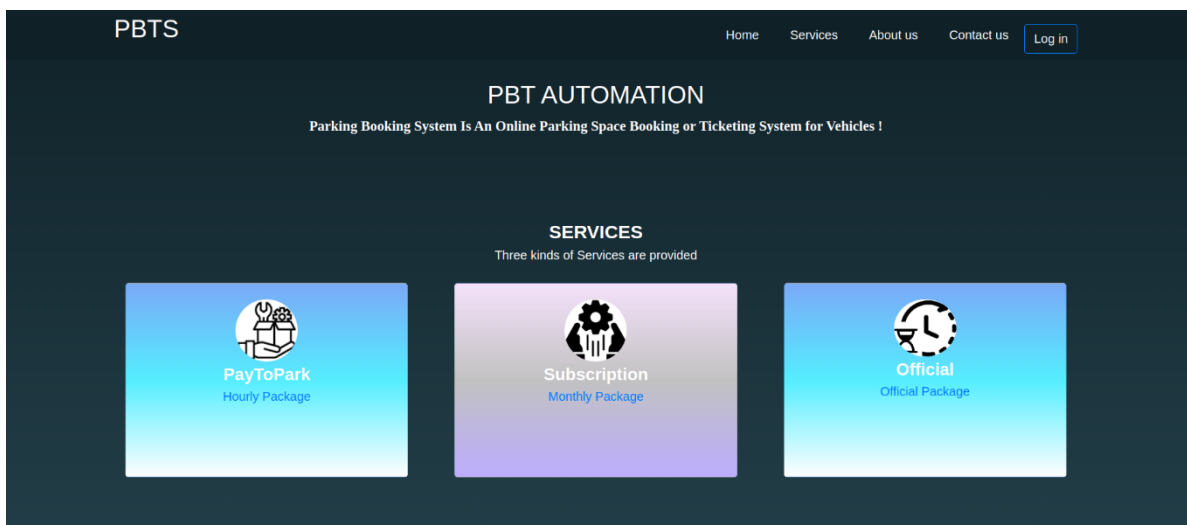

Figure 3. 9: Home page

Figure 3. 10: Register page
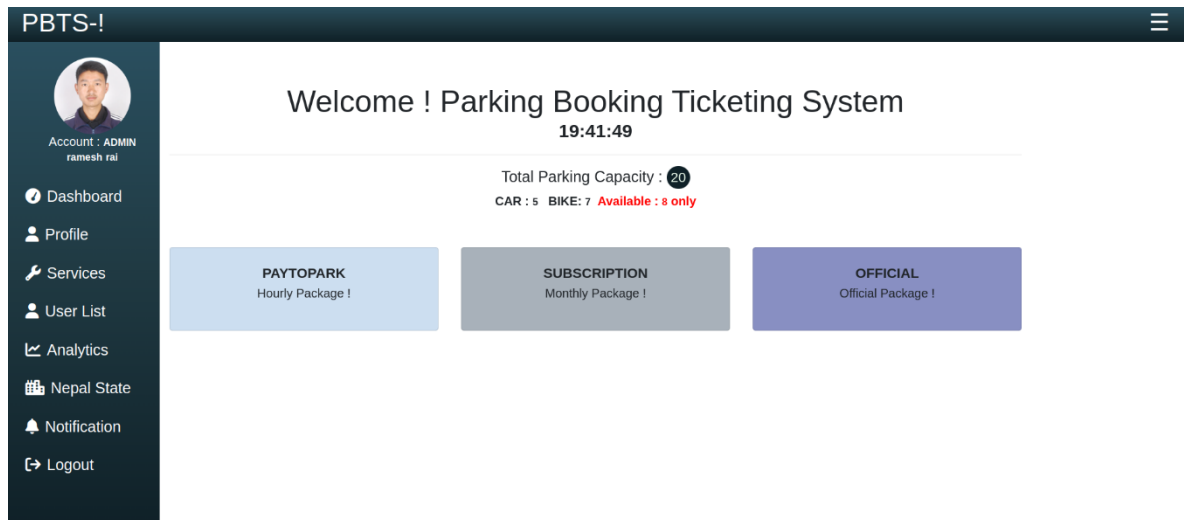

Figure 3. 11: Login page
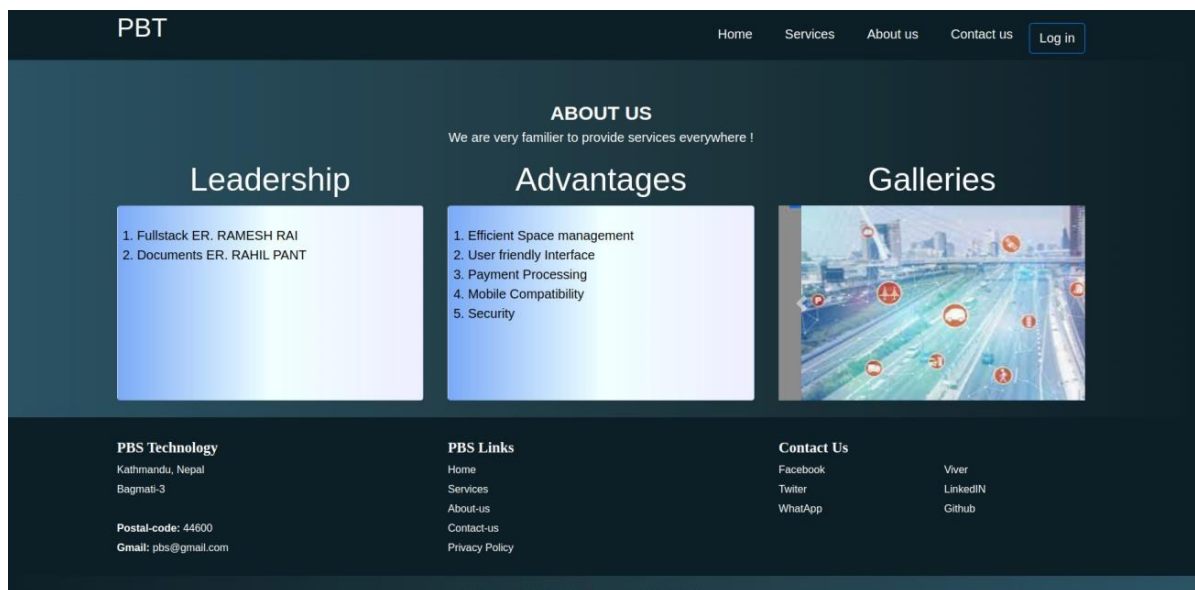
Figure 3. 12: Admin Dashboard page

Figure 3. 13: About us page

CHAPTER: 4 IMPLEMENTATION AND TESTING

4.1. Implementation

4.1.1 Tools Used (CASE tools, Programming language, Database platforms)

Following are the tools and framework used for the accomplishment of this project:

Front End Tools

- **HTML**

  In Parking Ticket Booking System, html is used for creating differentwebpage and sites. It is used to create and structure sections, headings, links, paragraphs using various tags and elements. We also define headers,paragraphs, links, and images of blood donation management system by using html.

- **CSS**

  In Parking Ticket Booking System, CSS is used for designing different tags of html. It is also used to design different component by the help of class and id. Different CSS are used such as inline CSS, internal CSS, and external CSS to design this system. It is used for defining the styles for web pages. By using CSS,we can control the text color, font style, spacing between paragraphs, sizing ofcolumns, layout designs, and many more.

- **JS**

  JavaScript is used in Parking Ticket Booking System to improve the user experience of the web page by converting it from a static page into an interactive one.

- **BOOTSTRAP**

  Bootstrap is a popular CSS framework used to design the project Parking Ticket Booking System. It helps to build web pages faster.

Back End Tools

- **Spring Boot**

  We used Spring Boot for the backend when developing our parking ticket booking system. It enabled us to quickly transform concepts into a functional backend. We were able to organize various components with Spring Boot and didn't require additional setup thanks to its built-in server. Auto-configuration sped up the process and made testing simple. It worked well with Spring Security for user security. Setting adjustments was easy, and the supportive Spring Boot community made

them even easier. Overall, Spring Boot made it simple and strong to build our backend.

Server

- **Tomcat**

Apache Tomcat served as the server for our parking ticket booking system. This decision facilitated user requests, streamlined deployment, and helped create a reliable, effective backend thanks to community support. We had an easy time developing thanks to Tomcat's embedded server feature.

Database

- **MYSQL**

MySQL is used for storing all the information required for the database in the parking ticket booking system. It is used for performing CRUD operations such as creating, deleting, and updating data from the database as requested by the user.

Documentation Tools

- **MS word**

This is used for writing and editing the documentation of Parking Ticket Booking System.

- **Draw.io**

This is used to generate diagrams for system analysis and design of the parking ticket booking system. Diagrams were created using this tool in order to save time since all components are available with drag-and-drop functions.

4.1.2 Implementation Details of Modules (Description of procedures/functions)

Different modules of this system are described below:

1. **Admin:**

- The person who is able to control the whole system.

Options given to admin are:

- Login
- Create User
- User List
- Parking Area
- Payments

- Payments Receipts
- Logout

2. Customer:

- The person who is looking for parking space.

Options given to each customer are:

- Login
- Parking Area
- Payments
- Payments Receipts

4.2. Testing

System testing is done by giving different training and testing datasets. This test is done toevaluate whether the system is providing an accurate summary or not. During the phase of the development of the system, our system is tested time and again. The series of testing conducted are as follow:

4.2.1 Test Cases for Unit Testing

Unit testing is a way of developing software programs in which the smallest testable components of an application, known as units, are individually and independently examined for correct operation. The following are multiple tables for various test cases:

Table 4. 1: A test case for login.

Step	Test Steps	Expected Results	Actual Results	Remarks
1	Access to Login Page	Login Page should open	User is able to access to login page	User is able to access login page of Parking Booking Ticket System.
2	Valid password but invalid username	The user can't login	As expected,	User is not able to access services.
3	Valid username but invalid password	The user can't login	As expected,	User is not able to access services.
4	Correct username and password	User login successfully	As expected,	User is able to access services.

Table 4. 2: A test case for sign up.

Step	Test Steps	Expected Result	Actual Result	Remarks
1	Access to Sign up Page	Sign Up Page should open	User is able to access to sign up page	User is able to access sign up page of Parking Booking Ticket System.
2	Correct username and password	User sign up successfully	As expected,	User is able to access services.
3	Invalid email	The user can't sign up	As expected,	User is not able to access services
4	Invalid password	The user can't sign up	As expected,	User was not able to access services

Table 4. 3: A test case for admin.

SN.	Test Case	Input Data	Expected Outcomes	Result
1	Admin login	Enter login information	login successful	Pass
2	Admin Dashboard	Admin Dashboard should be visible.	Admin dashboard should be viewed	Pass
3	View registered users	Click on user list from admin dashboard	Registered user must be shown	Pass
4	Update user	Select a user from dashboard and enter updated information	User data should be updated successfully	Pass
5	Delete user	Select a user and click on delete	User should be successfully deleted	Pass
6	Admin log out	Click on logout button	Admin should be successfully logged out	Pass
7	User login	Input the login info	User must login	Pass
8	User logout	Click on log out button	User should be successfully logout	Pass
9	Register as a new user	Enter all the information in the fields	User should be successfully registered	Pass

4.2.2 Test Cases for System Testing

System testing is the process of testing how the various components of an application interact together in a fully integrated system or application. It verifies that an application performs tasks as designed.

Table 4. 4: A test case for whole system.

SN.	Test Case Name	Test Case Description	Step	Expected Result	Actual Result	Result
1	Security Testing	Checking Security to access system	Login with your registered username and password	Successful Login led to User dashboard.	Successful Login led to User dashboard.	Pass
2	Security Testing	Checking Security to access system	Try Login with unauthorized email and password	An error message "Invalid credentials" must be displayed.	An error message "Invalid credentials" displayed.	Pass
3	Usability Testing	Eliminate Duplicate email data on registration	User registration with already available email	Message displayed "Email already exists."	Message displayed "Email already exists."	Pass
4	Load Testing	Testing Load of system	For demo test 5 users were added	System performs well	System performs well	Pass

Chapter 5: CONCLUSION AND FUTURE RECOMMENDATIONS

5.1 Lesson Learnt/ Outcome

This project will be beneficial for all the people who are searching for parking space in a specific area in a short time.

5.2 Conclusions

Hence, we can say this project is a simple parking space finder system where users provide all the details along with their current location and contact number. And using that information the website can search the parking space at your location.

5.3. Future Recommendations

The development project could have been more efficiently handled with regards to design and development. The documentation process might have been better programming the project prior to any documentation. The system can be updated based on the user's requirements recommendation. The page load and server load speed might be improve.

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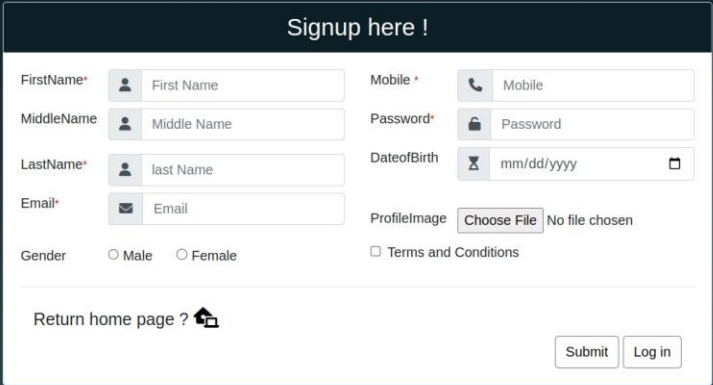
APPENDICES
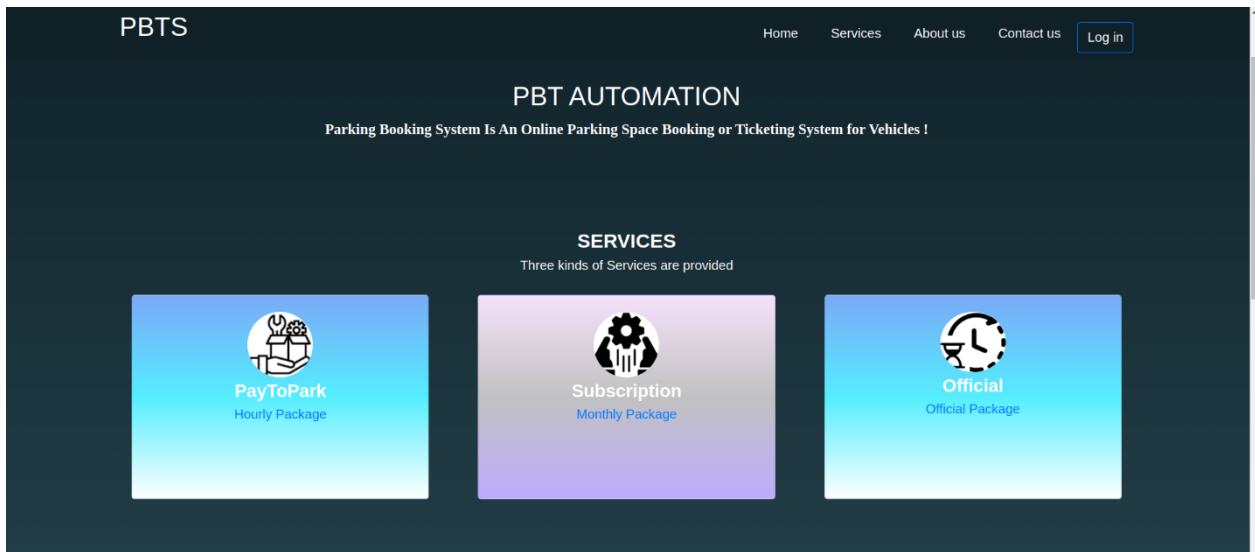
Figure 1: Home page
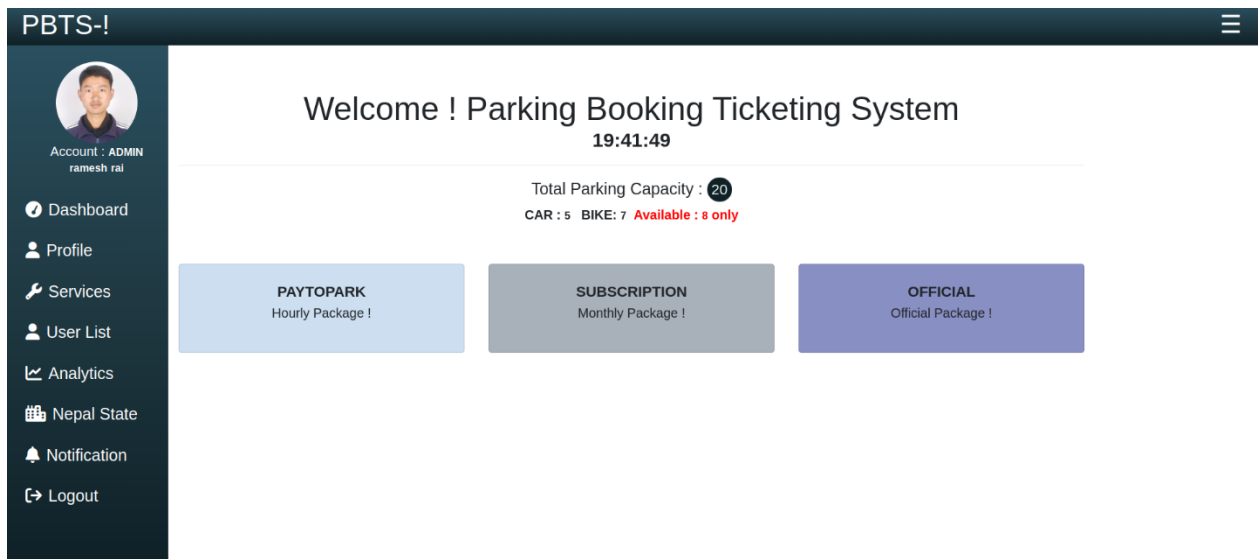

Figure 2: About us page

Figure 3: Login page

Figure 4: Signup page

Figure 5: Admin Dashboard page