**PARKING BOOKING SYSTEM**

**INTRODUCTION**

The proposed project is a smart parking booking system that provides

customers an easy way of reserving a parking space online. It overcomes the problem of finding a parking space in commercial areas that unnecessary consumes time. Hence this project offers a web based reservation system where users can view various parking areas and select the space to view whether space is available or not. If the booking space is available then he can book it for specific time slot. The booked space will be marked red and will not be available for anyone else for the specified time. This system provides an additional feature of cancelling the bookings. User can cancel their books space anytime. Users can even make payment online via credit card. After making payment users are notified about the booking via email along with unique parking number.

**Modules:**

* **Admin Login:** The system is under supervision of admin who manages the bookings made.
* **User login/registration:** Users have to first register themselves to login into the system.
* **Parking availability check:** User can click on spaces to view the availability. If the space is already booked it will be marked yellow and the available ones will be seen in normal color.
* **Parking booking online for date and time:** Users can book parking space for their required date and time.
* **Automatic cost calculation:** The system calculates the total cost incurred for parking based on the time that user has asked for booking.
* **Parking cancellation:** User may even cancel their bookings by login into the system anytime.
* **Email on successful parking booking:** When user is successful in parking the space, system sends a confirmation and 'thank you' email regarding the space booked.

**User side functionality:**

* Book parking space
* Cancellation
* Receipt Print

**Admin side functionality:**

* Administers parking booked
* Cancellation
* View User Data

**Advantages:**

* Users can get learn about parking areas for particular locations.
* It saves user time in search of parking space available in such a long parking area.
* The system provides a graphical view of the parking spaces.
* User can pay online on the spot and confirm their space.
* It excludes the need of human efforts for managing parking spaces.
* The system generates online bill for requested time and even sends an email.
* Cost-effective.

**Disadvantages:**

* It requires an internet connection.
* It requires large database.

**Applications:**

* The project can be implemented in commercial areas for employee parking.
* It can be utilized by companies and organizations (hospitals, schools, colleges) to automate their parking system.
* The system can also be used in public places for public parking like in malls, station, and so on.

**SOFTWARE REQUIREMENT SPECIFICATION (SRS)**

**1.SRS**

**1.1 Introduction(about SRS)**

The Software Requirement Specification (SRS) is a document that outlines the detailed description of a software system. In the case of the “Parking Booking System”, the SRS serves as a comprehensive guide that describes the requirements and functionalities of the system. It acts as a reference for both the development team and stakeholders involved in the project.

**1.2 Overall Description**

**1.2.1 Product Perspective**

The Parking Booking System is a software application designed to streamline and simplify the process of reserving spaces. It provides a convenient solution for both parking lot owners and users, offering a range of features and benefits.

For parking lot owners, the system offers a centralized platform to manage and monitor their parking spaces. They can easily set up their parking lot details. The system allows them to track reservations, view occupancy rates, and generate reports for better analysis and decision-making. Additionally, the system provides a secure payment gateway to ensure seamless transactions with customers.

For users, the parking booing system offers a hassle-free way to find and reserve parking spaces. They can search for available parking lots based on their date, time. The system provides real-time availability updates, allowing users to make informed decisions. Users can also view parking lot details, to ensure they choose the best option for their needs. The system offers a simple booking process, allowing users to reserve and pay for their parking space with just a few clicks.

Overall, the parking booking system aims to improve the parking experience for both parking lot owners and users. It simplifies the process of finding and reserving parking spaces, reduces the need for manual coordination, and enhances efficiency. With its user-friendly interacts and comprehensive features, the system provides a convenient solution for all parties involved.

**1.2.2 Product Functions**

Product functions are the specific capabilities and features that the Parking Booking System provides to users and administrators to facilitate parking space reservation and management.

* **User Registration and Authentication:** Users can create accounts and securely log in to access the system, ensuring personalized and secure access to booking features.
* **Parking Space Management:** Administrators can add, remove, and modify parking spaces within the system, ensuring accurate and up-to-date availability for users.
* **Booking Management:** Users can search for available parking spaces based on criteria such as location, date, and time, and book them seamlessly through the system.
* **Reservation Management:** Users have the ability to view, modify, or cancel their parking reservations as needed, providing flexibility and convenience.
* **Payment Processing:** The system facilitates secure online payments for parking reservations, supporting various payment methods to ensure a smooth transaction process.
* **Notification System:** Automated notifications are sent to users, informing them of booking confirmations, reminders, and any updates or changes to their reservations.
* **Admin Panel:** An intuitive interface is provided for administrators to manage users, parking spaces, reservations, and system settings efficiently and effectively.
* **Mobile Accessibility:** The system is designed to be accessible via mobile devices, allowing users to book parking spaces conveniently while on the go, enhancing user experience and accessibility.

**1.2.3 User Characteristics**

* **Drivers:** These users are the primary target audience of the Parking Booking System. They are individuals who own or operate vehicles and require parking spaces for various durations, such as commuters, shoppers, or event attendees.
* **Administrators:** These users are responsible for managing the Parking Booking System. They include parking lot owners, facility managers, or system administrators who oversee the administration, configuration, and maintenance of the system.
* **Parking Lot Owners/Operators:** Another important group of users for a parking booking system are the parking lot owners and operators. These individuals or organizations provide the parking spaces that are made available for reservation.

**1.2.4 General Constraints**

* **Technical Constraints:** 
  + Compatibility: The system must be compatible with various web browsers and mobile devices to ensure accessibility for users.
  + Scalability: The system should be scalable to accommodate increasing numbers of users and parking spaces over time.
  + Security: The system must adhere to industry-standard security practices to protect user data and payment information.
* **Regulatory Constraints:**
  + Compliance: The system must comply with local regulations and ordinances related to parking, data privacy, and online payments.
  + Accessibility: The system should adhere to accessibility standards to ensure equal access for individuals with disabilities.
* **Budgetary Constraints:**
  + Cost: Development and maintenance costs must align with the allocated budget for the project.
  + Resource Constraints: Limited resources, such as time and manpower, may impact the scope and timeline of the project.
* **Operational Constraints:**
  + Availability: The system should have minimal downtime to ensure uninterrupted access for users.
  + Performance: The system must perform efficiently, with fast response times and minimal latency, even during peak usage periods.
  + Reliability: The system should be reliable, with robust backup and recovery mechanisms to prevent data loss and ensure continuity of service.
* **Environmental Constraints:**
  + Infrastructure: The availability of physical infrastructure, such as parking lots equipped with necessary technology, may influence system implementation.
  + Geographic Constraints: The system may need to consider geographic factors such as location-specific parking regulations and availability.
* **Integration Constraints:**
  + Integration with Existing Systems: The system may need to integrate with existing parking management systems, payment gateways, or third-party services.

**1.2.5 Assumptions**

* Users are expected to have reliable internet connectivity to access the system for booking parking spaces.
* The payment processing system is assumed to function smoothly, provided users input accurate payment information.
* Users rely on the accuracy of parking space availability information provided by the system, with occasional discrepancies possible due to real-time factors.
* Users are responsible for adhering to terms of service, rules, and regulations set by the Parking Booking System and associated parking facilities.
* The Parking Booking System is assumed to prioritize security measures to protect user data and payment information.

**1.3 Special Requirements**

**1.3.1 Software Requirements**

* Web and Mobile Application.
* Browsers such as Internet Explorer, Google Chrome, Mozilla Firefox etc.
* Payment Gateway Integration.
* Notification System.
* Database Management System.

**1.3.2 Hardware Requirements**

* Server and Data Storage.
* Mobile Device Connectivity.
* Network Infrastructure.

**1.3.3 Communication Interface**

* The project must use the HTTP protocol for communication over the internet and for the internet communication will be through TCP/IP protocol suite.
* The user must connect to the internet to access the website.

**1.4 Functional Requirements**

**1.4.1 ADMIN**

An administrator (admin) is a user with privileged access rights responsible for managing and overseeing the operation of the Parking Booking System.

* **Parking Space Management:** Admins add, modify, and remove parking spaces.
* **Reservation Management:** Admins view, modify, and cancel reservations.
* **User Management:** Admins view, modify, suspend, or delete user accounts.
* **Reporting and Analytics:** Admins generate reports on system usage, revenue, etc.
* **System Settings:** Admins configure system settings such as pricing and notifications.
* **Payment Gateway Management:** Admins manage integration with payment gateway and transaction settings.
* **Notification Management:** Admins customize and monitor automated notifications sent to users.

**1.4.2 USER**

A user is an individual who interacts with the Parking Booking System to search for and reserve parking spaces.

* **User Registration and Authentication:** Users create accounts and log in securely to access the system.
* **Parking Space Search and Booking:** Users search for available parking spaces based on location, date, and time.Users select and book parking spaces for specific dates and times.
* **Reservation Management:** Users view, modify, or cancel their parking reservations as needed.
* **Payment Processing:** Users make secure online payments for parking reservations using various payment methods.
* **Notification System:** Users receive automated notifications confirming booking, reminding of upcoming reservations, and providing updates.
* **Mobile Accessibility:** Users access the system conveniently via mobile devices for on-the-go booking.

**1.5 Design constraints:**

Design constraints refer to limitations or restrictions imposed on the design of a system, often stemming from technical, regulatory, or practical considerations. These constraints influence design decisions and shape the overall architecture and functionality of the system.

* **User Interface Consistency:** Ensure uniformity in the design elements such as buttons, fonts, and colors throughout the system to provide a cohesive user experience.
* **Responsive Design:** Design the system to adapt seamlessly to various screen sizes and resolutions, ensuring optimal user experience across devices.
* **Cross-Browser Compatibility:** Ensure that the system functions correctly and displays consistently across different web browsers to accommodate users' preferences.
* **Accessibility Compliance:** Design the system in accordance with accessibility standards to ensure it is usable by individuals with disabilities, including features such as screen reader compatibility and keyboard navigation.
* **Performance Optimization:** Optimize the system's performance to minimize loading times and provide a smooth user experience, even under high traffic conditions.
* **Scalability:** Design the system architecture to accommodate growth in user base and parking space inventory without sacrificing performance or stability.
* **Data Security:** Implement robust security measures to safeguard user data, transactions, and system integrity from unauthorized access, breaches, or data loss.

**1.6 System attributes:**

System attributes are the characteristics or qualities that define the behaviour, performance, and overall quality of the Parking Booking System. These attributes guide the design, development, and evaluation of the system to ensure it meets the needs and expectations of users and stakeholders.

* **Reliability:** The system's ability to perform consistently and accurately, ensuring users can rely on it for booking parking spaces without unexpected failures or errors.
* **Availability:** The system's ability to be accessible and operational when needed, ensuring users can access and use it whenever they require parking reservations.
* **Scalability:** The system's ability to accommodate increasing user demand and parking space inventory over time, ensuring it can scale effectively without sacrificing performance or stability.
* **Performance:** The system's responsiveness and efficiency in processing user requests, search queries, and payment transactions, providing a seamless and fast user experience.
* **Security:** The system's measures to protect user data, payment information, and system integrity from unauthorized access, breaches, or vulnerabilities, ensuring confidentiality, integrity, and availability.
* **Usability:** The system's ease of use, intuitive interface, and user-friendly design, ensuring users can navigate, search for parking spaces, and make reservations with minimal effort and training.
* **Maintainability:** The system's ease of maintenance, updates, and troubleshooting, ensuring it can be efficiently managed and enhanced over time to address evolving user needs and technology changes.
* **Flexibility:** The system's ability to adapt to changing requirements, regulations, or technological advancements, ensuring it remains relevant and effective in meeting user needs in dynamic environments.

**SYSTEM DESIGN**

**2. SYSTEM DESIGN**

**2.1 Introduction (about System Design)**

System design refers to the process of defining the architecture, components, modules, interfaces, and data flows of a software system to meet specified requirements and objectives. It involves translating the system requirements into a detailed blueprint that guides the implementation, testing, and deployment phases of the software development lifecycle. The system design encompasses both the high-level architectural design and the detailed design of individual components, ensuring that the system is scalable, reliable, maintainable, and meets the needs of its users and stakeholders.

**2.2 Assumption and Constraints**

**Assumptions:**

1. Users have reliable internet access.

2. Users provide accurate payment details.

3. Parking space availability information is generally accurate.

4. Users adhere to system regulations.

5. Security measures protect user data effectively.

**Constraints:**

1. The system's UI must adhere to accessibility standards.

2. Scalability is essential to handle increased demand.

3. Compliance with data privacy regulations is mandatory.

4. Integration with external services may impose technical constraints.

5. Limited resources such as time, budget, and manpower may impact project scope.

**2.3 Functional Decomposition**

**2.4 Description of Programs**

**2.4.1 Context Flow Diagram (CFD)**

A Context Flow Diagram (CFD), also known as a Level 0 DFD (Data Flow Diagram), provides a high-level overview of the entire system, showing the interactions between the system and external entities. In the context of the Parking Booking System, the CFD illustrates how users interact with the system to book parking spaces and how the system interacts with external entities such as payment gateways and administrative interfaces.

ADMIN

CUSTOMER

**DATABASE**

**2.4.2 Data Flow Diagram (DFD)**

A Data Flow Diagram is a graph showing the flow of data values from their sources in through processes that transform them to their destination in other object.

A DFD also known as "bubble chart", has the purpose of clarifying the system require and identifying major transformations that will become programs system design. So, it is for starting to the design phase that functionally decomposes the requirements specifications down to the lowest level of detail. A DFD consists of series of a bubbles joined by lines. The bubbles represent data transformations and lines represent data flows in system.

**2.4.2.1 DFD Symbols**

|  |  |  |
| --- | --- | --- |
| Name | Notation | Description |
| Process |  | Represents a function or process that transforms input data. It is denoted by a rectangle with rounded corners. |
| External entity |  | Represents entities outside the system boundary that interact with the system. It is denoted by a square. |
| Data flow |  | Represents the flow of data between processes, data stores and external entities. It is denoted by an arrow. |
| Data source |  | Data stores are repositories of data in the system. They are sometimes also referred to as files. |

**2.5 Description of Components**

**2.5.1 Functional Component 1: ADMIN**

**- Dashboard:** Provides administrators with an overview of system activities, including the number of bookings, revenue generated, and system health indicators.

**- Manage Parking Spaces:** Allows administrators to add, modify, or remove parking spaces from the system, including details such as location, capacity, and availability.

**- View Reservation Logs:** Enables administrators to view logs of all parking reservations, including booking details, user information, and payment status.

**- Manage User Accounts:** Allows administrators to manage user accounts, including creating new accounts, updating user information, and suspending or deleting accounts as needed.

**- System Settings:** Provides administrators with access to system settings, allowing them to configure parameters such as pricing, notification preferences, and integration with external services.

**2.5.2 Functional Component 2: USER**

**- Search for Parking Spaces:** Allows users to search for available parking spaces based on location, date, and time preferences.

**- Book Parking Space:** Enables users to select and reserve a parking space for a specific date and time duration.

**- View Reservation Details:** Allows users to view details of their existing parking reservations, including booking dates, times, and parking space information.

**- Modify/Cancel Reservation:** Provides users with the ability to modify or cancel their parking reservations if necessary, with appropriate notifications sent to affected parties.

**DATABASE DESIGN**

**3. DATABASE DESIGN**

**3.1 Introduction (about Database Design)**

The database design plays a crucial role in storing, managing, and retrieving data related to parking spaces, reservations, users, and system configurations. A well-designed database ensures data integrity, efficiency, and scalability, facilitating seamless operation and optimal performance of the system.

**3.2 Purpose and Scope**

**Purpose:**

The purpose of the Parking Booking System is to provide a convenient and efficient platform for users to search for, book, and manage parking spaces. It aims to streamline the process of parking reservation, reduce parking congestion, and improve overall user experience by offering a user-friendly interface, real-time availability updates, and secure payment processing. The system also serves to optimize parking space utilization, increase revenue for parking facility owners, and enhance administrative efficiency through centralized reservation management and reporting capabilities.

**Scope:**

**1. User Interface:** Providing an intuitive and user-friendly interface for users to search for available parking spaces, make reservations, and manage bookings.

**2. Reservation Management:** Allowing users to view, modify, and cancel parking reservations, as well as receive automated notifications regarding booking status.

**3. Payment Processing:** Integrating with secure payment gateways to facilitate online payments for parking reservations, ensuring a seamless and secure transaction process.

**4. Administrative Interface:** Providing administrators with tools to manage parking spaces, reservations, users, and system settings, as well as access reporting and analytics features.

**5. Data Management:** Storing and managing data related to parking spaces, reservations, users, and system configurations in a centralized database, ensuring data integrity and security.

**6. Integration:** Integrating with external services such as mapping APIs, traffic data providers, and payment gateways to enhance system functionality and user experience.

**7. Security:** Implementing robust security measures to protect user data, payment information, and system integrity from unauthorized access, breaches, and vulnerabilities.

**3.3 Table Definition**

|  |  |
| --- | --- |
| **Fields** | **Data type** |
| Vehicle Type | Varchar |
| Date | Date |
| Start Time | Date |
| End Time | Date |
| isOccupied | Boolean |

**Booked Slots:**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Vehicle Type** | **Date** | **Start Time** | **End Time** | **isOccupied** |
| Car | 22-04-2024 | 05:30 | 07:30 | True |
| Bike | 24-04-2024 | 02:30 | 05:30 | True |

**3.4 ER Diagram**