ONLINE PARKING BOOKING SYSTEM

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***Abstract*:** The Online Parking Booking System is a web-based application developed using Java to facilitate convenient and efficient parking reservations for users. The system aims to eliminate the hassle of finding parking spaces in crowded areas and provide a user-friendly platform for reserving parking slots in advance. This abstract provides an overview of the key features and functionalities of the Java-based Online Parking Booking System. The system allows users to register and create their accounts. Registered users can log in securely using their credentials to access the parking booking functionalities. Users can browse through available parking spaces based on location, date, and time preferences. The system presents a user-friendly interface to view parking options, including details such as location, availability, and pricing. Once users select a suitable parking space, they can proceed to book it for a specific date and time. The system handles reservation requests and ensures that bookings do not overlap, preventing double bookings. The application integrates a secure payment gateway to handle online transactions for parking reservations. Users can make payments using various payment methods, ensuring a seamless booking experience.

  Keywords: Parking Booking System, Urban Mobility, Sustainable Transportation, Copenhagen, Energy Efficiency.

INTRODUCTION:

The proposed project is a smart parking booking system that provides institutes students an easy way of reserving a parking space online using web portal . It overcomes the problem of finding a parking space in universities/institute areas that unnecessary consumes time. Hence, this project offers a web application based reservation system where students can view various parking spaces and select nearby or specific area of their choice to view whether space is available or not If the booking space is available, then student can book it for specific time slot .The booked space will be marked and will not be available for anyone else for the specified time. This system provides an additional feature of cancelling the bookings. Students can cancel their reserved space any time. Students can also view previous parking booking details using the web portal.

PARKING SYSTEM DESIGN:

The proposed parking booking system utilizes a AES algorithm to create a transparent and tamper-proof ledger of parking transactions. Each parking space is represented as a unique digital asset on allowing users to book and pay for parking in real-time. Smart contracts govern the terms of parking transactions, ensuring that payments are securely processed and parking availability is accurately tracked. Moreover, the decentralized nature of the network enhances system resilience and eliminates single points of failure.

ADDRESSING ENERGY CONSUMPTION:

While technology offers numerous benefits for parking management, concerns about its environmental impact, particularly in terms of energy consumption, remain significant. To address this issue, the proposed system adopts energy-efficient consensus mechanisms, such as proof-of-stake or delegated proof-of-stake. By prioritizing sustainability, the system aims to minimize its carbon footprint while maintaining the integrity and security of parking transactions.

EVALUATION AND FUTURE DIRECTIONS:

The paper evaluates the performance of the parking booking system through simulation and real-world testing in the municipality of Copenhagen. Preliminary results demonstrate the system's effectiveness in improving parking efficiency, reducing transaction costs, and enhancing user experience. Furthermore, the paper discusses potential extensions and future research directions, including integration with smart city infrastructure, optimization of resource allocation, and scalability enhancements.

2.1 LITERATURE SURVEY:

TITLE: Novel vehicle booking system using IOT

AUTHOR: A. Sivanesh Kumar, B. Balakiruthiga, S.Vidhya Sagar

YEAR: 2017

ABSTRACT:

This paper aims to manage automatic car parking system with reservation to the next level in IOT. As there is an enormous increase of vehicle usage in each and every place where human lives all over the world makes the scarcity of the parking place for vehicle is increasing rapidly and unavailable. So we have proposed micro- controller based parking lots and GSM is used for monitoring the available spaces through which the reservation is made with the help of android application for the users. The system which we made is very less cost when compared with other parking systems and it's very easy to be managed and used by everyone.

TITLE: A Reservation-based Smart Parking System for Urban Areas

AUTHOR: Md. Manjurul Gani , Md. Ataur Rahman, Md. Mejbaul Haque

YEAR: 2023

ABSTRACT:

Parking a car has become a matter of great concern in the modern world. Searching for parking spaces is a major reason for traffic jams and environmental contamination. This problem is becoming more prevalent throughout the world. A system with the help of the Internet of Things (IoT) consisting of sensors, processing capability, and software that connects and shares data through the Internet can be developed to solve parking problems. So, we designed a smart parking system by connecting the parking place with a data server and apps over the internet. The parking space status is updated regularly on the server, and the mobile application can read the parking slot status and request a slot. There are two kinds of slots. One is for

instant parking and one is for reservation. Users need to pay a specific amount of money in case of pre-booking reservation. Pay-as-you-go for instant parking has been incorporated. Users can recharge their online wallets from mobile banking options. For the anti-theft purpose, we offered an alert and notification feature. Latency tests of different components are measured. Their averages are 5.24s for parking data update, 3.98s for unparking data update, 6.7s for OTP matching and gate open. 3.64s for anti-theft notification and 5.21s for alarm triggering. Quantitative evaluation and black box tests are done to measure the efficiency of the system. By conducting a quantitative evaluation, we got an accuracy of 96.67%.

TITLE: Fuzzy based automatic multi-level vehicle parking using lab view

AUTHOR: N. Senthil Kumar , E Jennifer ElizabethBelinda , G. Sai Deepthi, K. Prema , K. A. Sunitha

YEAR: 2011

ABSTRACT:

This paper introduces a method of automatic multilevel car parking system that parks the vehicle in reduced space using the conditions based on fuzzy logic controller. It possibly controls the traffic and avoids traffic congestion. This automatic multi-level vehicle stacking system also has online access to book the parking slot in advance which is interfaced with the LabVIEW. The vehicle placed at the entrance point is parked automatically according to the availability of slots. The car park consists of number of slots based on three different sizes. The car is moved to the particular slot with help of an elevator placed at the centre of the parking system. The elevator consists of an arm that moves along the vertical axis and can rotate along the multi stack parking system. LabVIEW is used to check the availability of slots, total number of cars parked the movement of the elevator and the position of the arm. The programming software tracks the location of the vehicle and returns the vehicle on request from the patron by the access system installed. Thus the paper shows the description of the automatic multi-level vehicle stacking with microcontroller and fuzzy mechanism using Lab VIEW to achieve conventional parking system.

3.1 HARDWARE REQUIREMENTS:

The hardware requirements may serve as the basis for a contract for the implementation of the system and should therefore be a complete and consistent specification of the whole system. They are used by software engineers as the starting point for the system design. It shows what the system does and not how it should be implemented
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- PROCESSOR   : DUAL CORE 2 DUO
- RAM   : 2 GB DD RAM
- HARD DISK   : 250 GB

4.1 EXISTING PROJECT:

Before the development of the Online Parking Booking System, traditional parking management relied heavily on manual processes and physical infrastructure. In most cases, users had to physically search for available parking spaces, often resulting in frustration and wasted time, especially in high-demand areas like university campuses or busy city centers. Parking facilities typically employed attendants or ticketing systems to manage entry and exit, which could lead to long queues and delays during peak hours.

Moreover, the lack of real-time information about parking availability often resulted in inefficient use of parking spaces, with many spaces remaining empty while others were fully occupied. This inefficiency

contributed to traffic congestion and pollution as drivers circled in search of parking, adding to their frustration and the overall environmental impact.

Furthermore, the payment process for parking was often cumbersome, requiring users to carry cash or use outdated payment methods like parking meters or paper tickets. This manual payment process was not only inconvenient but also prone to errors and fraud.

Overall, the existing parking management systems lacked convenience, transparency, and efficiency, leading to a poor user experience and contributing to urban mobility challenges.

5.1 PROPOSED SYSTEM:

The proposed Online Parking Booking System leverages Java's versatility and robustness to deliver a feature-rich platform for users. The use of AES encryption ensures that sensitive data such as user credentials and transaction details are protected from unauthorized access. Additionally, SQL techniques are employed for efficient storage and retrieval of parking-related information, optimizing system performance.

Furthermore, the system's intuitive user interface allows users to easily navigate through available parking options, select their preferred location, date, and time, and complete the booking process seamlessly. The incorporation of AES encryption provides an added layer of security, safeguarding user data and transactions against potential threats.

6.1 SYSTEM ARCHITECTURE:

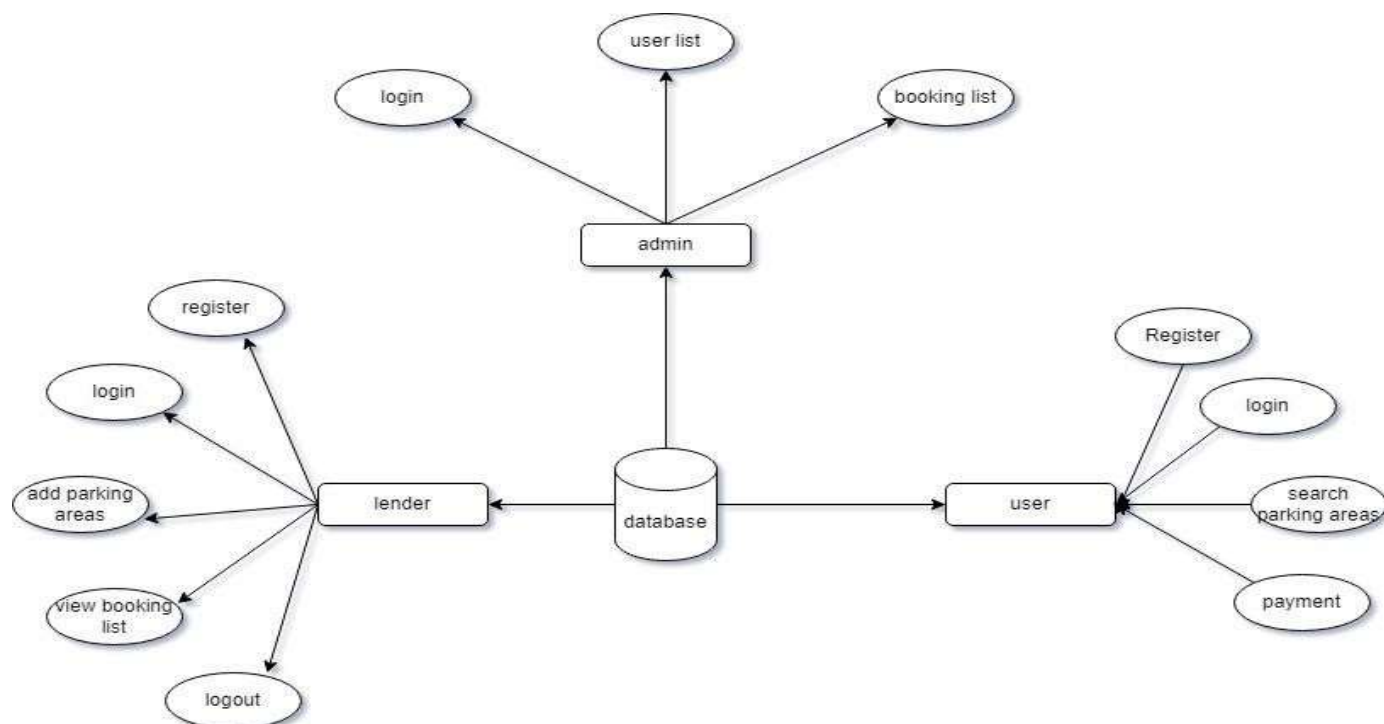The proposed Online Parking Booking System consists of several key components, including:

User Interface: A web-based interface developed using Java technologies allows users to register, log in, and browse available parking spaces.

Blockchain Network: A decentralized blockchain network is utilized to store parking transaction data securely. Smart contracts govern the terms of parking reservations, ensuring transparency and immutability.

Backend Services: Backend services implemented in Java handle user authentication, parking space management, and transaction processing.

Database: A relational database management system (RDBMS) is employed to store user data, parking space information, and transaction records.
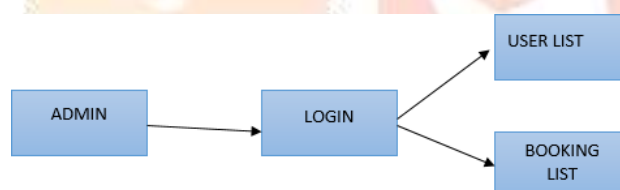
MODULES:

- **Admin:**

The Admin module provides administrative functionalities for managing the entire system. Admins have privileged access to system settings, user management, and overall system configuration.
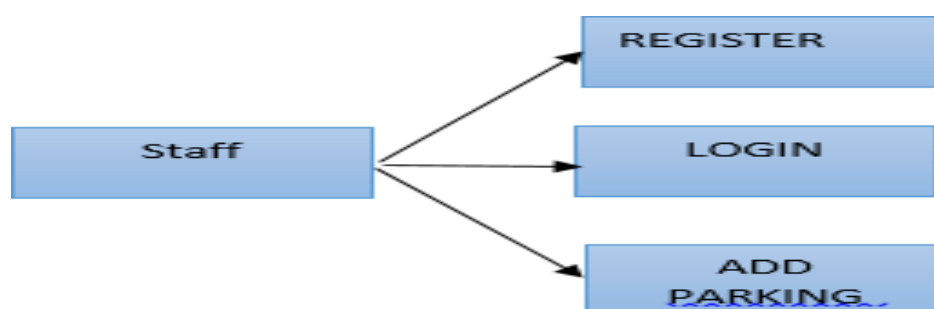

KEY FEATURES OF THE ADMIN MODULE MAY INCLUDE:

- **User Management:** Admin can create, edit, delete, andmanage user accounts within the system
  .

- **Content Management:** Admin can manage and update content displayed on the system, such as announcements,notifications, and FAQs.

- **System Configuration:** Admin can configure system settings, including security parameters, email templates, and other customizable options.

- **Reporting and Analytics**: Admin can generate reports and analyze system usage data to gain insights into user behavior, system performance, and other metrics.

- **Role-Based Access Control:** Admin can define roles and permissions for different user groups, controllingaccess to specific features and functionalities.

- **LENDER:**

The Lender module is responsible for managing lending activities within the system. Lenders are entities or individuals who offer goods or services for rent or loan through the platform.
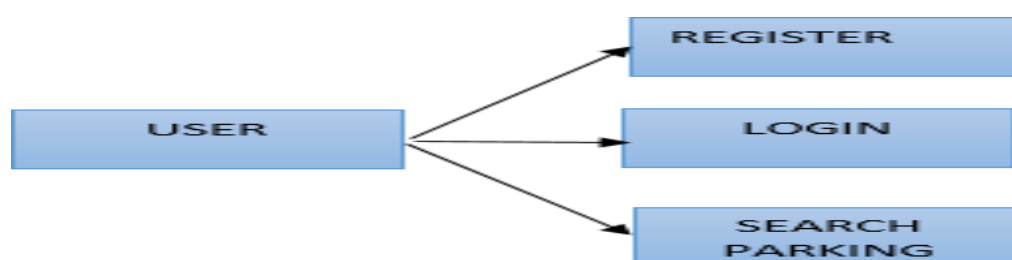

KEY FEATURES OF THE LENDER MODULE MAY INCLUDE:

- **Product Management:** Lenders can list, update, and manage their inventory of available items or services for lending.

- **Booking Management:** Lenders can view and manage booking requests from users, including accepting, rejecting, or modifying bookings.
- Pricing and Availability: Lenders can set pricing,availability, and rental terms for their products or services, including rental duration, deposit requirements,and cancellation policies
- .**Communication:** Lenders can communicate with users regarding booking inquiries, rental agreements, and otherrelated matters.
- **Payment Processing:** Lenders can handle payment transactions securely, including processing rental fees, deposits, and refunds.
    - **USER:**

The User module represents the end-users or customers who utilize the system to search for, book, and borrow items or services offered by lenders.

KEY FEATURES OF THE USER MODULE MAY INCLUDE:

Search and Browse: Users can search for and browse available items or services based on various criteria suchas category, location, availability, and price.

Booking and Reservation: Users can make booking requests for desired items or services, specifying rental dates, quantities, and other relevant details
.

Payment and Checkout: Users can securely process payments for rental fees, deposits, and other chargesusing integrated payment gateways.

Communication: Users can communicate with lenders regarding booking inquiries, rental agreements, and pickup/delivery arrangements.

Rating and Feedback: Users can provide ratings and feedback on their rental experiences, helping to build trustand transparency within the system.

Each module plays a crucial role in the overall functionality and operation of the system, catering to different user roles and responsibilities to ensure a seamless and efficient experience for all stakeholders involved.

KEY COMPONENTS:

User Registration and Authentication: Users can register for an account securely and log in using their credentials.

Parking Space Management: The system provides a comprehensive database of parking spaces, including location, availability, and pricing information.

Booking and Payment: Users can select a parking space, specify the date and time of reservation, and make payments securely using integrated payment gateways.

Blockchain Integration: Blockchain technology ensures the integrity and transparency of parking transactions, enabling users to verify the authenticity of their bookings.

METHODOLOGY

This section outlines the methodology used to review and evaluate software testing techniques in the context of Online Parking Booking Systems. The methodology encompasses the selection criteria for testing techniques,data collection procedures, and analysis methods.

SELECTION CRITERIA FOR TESTING TECHNIQUES:

Relevance: Testing techniques were selected based on their relevance to the specific requirements and characteristics of Online Parking Booking Systems.

Industry Standards: Techniques widely recognized and recommended by industry standards and best practices were prioritized.

Applicability: The suitability of each technique to address common challenges and scenarios encountered inOnline Parking Booking Systems was considered.

Comprehensiveness: A diverse range of testing techniques covering different aspects of software functionality, performance, and usability was included.

DATA COLLECTION PROCEDURES:

Literature Review: A comprehensive review of academic journals, conference papers, textbooks, and industry reports was conducted to gather information on software testing techniques.

Expert Consultation: Discussions and consultations with software testing experts and practitioners were conducted to gain insights into the practical application of testing techniques in real-world scenarios

.

Case Studies: Case studies and examples of testing techniques applied to Online Parking Booking Systems were examined to understand their effectiveness and implications.

Documentation Analysis: Documentation and guidelines provided by software testing organizations and standards bodies were analyzed to identify recommended practices and methodologies.

ANALYSIS METHODS:

Qualitative Analysis: The characteristics, objectives, methodologies, advantages, and limitations of each testing technique were qualitatively analyzed to provide a comprehensive understanding.

Comparative Analysis: A comparative analysis of testing techniques was conducted to evaluate their relative strengths and weaknesses in the context of Online Parking Booking Systems.

Synthesis: Key findings and insights from the literature review, expert consultations, and case studies were synthesized to formulate recommendations and conclusions.

VALIDATION:

Peer Review: The methodology and findings of the study were subjected to peer review by experts in the field of software engineering and testing to ensure rigor and validity.

Feedback Incorporation: Feedback received from peer reviewers was incorporated into the methodology and analysis to address any potential limitations or gaps.

By employing a systematic and comprehensive methodology, this study aims to provide valuable insights into the selection and application of software testing techniques for Online Parking Booking Systems, contributing to the enhancement of system reliability, functionality, and user satisfaction.

9.1 IMPLEMENTATION DETAILS:

The system is implemented using Java programming language for both frontend and backend development. The frontend user interface is developed using JavaServer Pages (JSP) and Java Servlets, while the backend services are implemented using Java EE (Enterprise Edition) technologies. The blockchain integration is achieved using a suitable blockchain platform, such as Ethereum, which supports smart contracts and decentralized storage of data.
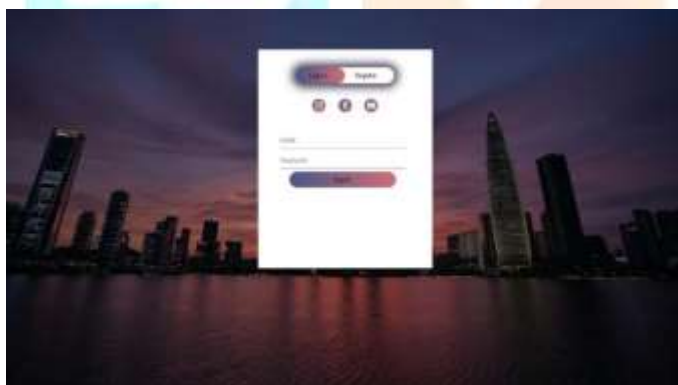
10.1 TESTING:

Testing of Online Parking Booking Systems is essential for ensuring their reliability, functionality, and performance. By leveraging a combination of White Box Testing, Black Box Testing, Unit Testing, Functional Testing, Performance Testing, Integration Testing, Validation Testing, System Testing, Output Testing, and User Acceptance Testing, developers and testers can identify and address defects early in the development lifecycle, resulting in high-quality, user-friendly Parking Booking Systems. Through this comprehensive review, software professionals gain insights into selecting and implementing appropriate testing methodologies to enhance the quality and usability of Online Parking Booking Systems, ultimately contributing to improved user experiences and overall system reliability.

Fig 10.1 Home Page

FIG 10.2 USER REGISTER AND LOGIN PAGE:

Fig 10.3 User Home page :

CONCLUSION:

In conclusion, the modular design of the Online Rental Management System offers a robust and efficient solution for facilitating rental transactions between Admin, Lenders, and Users. By breaking down the system into distinct modules, each catering to specific functionalities and user roles, we achieve a highly scalable, flexible, and maintainable platform.

The Admin module empowers system administrators with comprehensive control over user management, content management, and system configuration, ensuring smooth operation and adherence to organizational policies. The Lender module enables individuals or entities to efficiently manage their inventory, bookings, pricing, and communication with users, optimizing the rental process. The User module provides a seamless experience for end-users, allowing them to search, book, and borrow items or services with ease, enhancing user satisfaction and engagement.

The modular architecture fosters loose coupling and high cohesion between components, facilitating independent development, testing, and deployment. Leveraging modern web technologies for implementation ensures compatibility, performance, and scalability.

Future enhancements may include mobile compatibility, integration with external APIs for expanded functionality, and additional user features to further enhance the rental experience. Overall, the modular approach to online rental management lays a solid foundation for the continued evolution and success of the system in meeting the needs of diverse stakeholders in the rental ecosystem.

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