

Comprehensive Review on Web-based Hotel Management System

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Abstract—Adopting cutting-edge technologies has become essential in the ever-changing hotel sector to ensure smooth and effective operations. The development and effects of web-based hotel management systems (WBHMS) on the hospitality industry are examined in this review study. The report compiles the most recent research to offer a thorough grasp of the salient characteristics, benefits, and difficulties related to these systems. Web-based hotel management systems use the Internet's capabilities to automate several hotel functions, such as customer relationship management, reservations, room management, and billing. The revolutionary benefits of WBHMS on improving revenue generation, visitor experience, and operational efficiency are explored in depth in this article. Additionally, it examines how emergent technologies are integrated, including artificial intelligence, data analytics, and mobile applications within these systems, shaping the future landscape of hotel management.

Keywords— Hotel Management, Data, Security, Database

I. INTRODUCTION

The web-based Hotel Management System represents a vital technological stride within the realm of hospitality. This application serves as an indispensable tool for hotel managers, offering a dynamic and user-friendly graphical user interface (GUI) that empowers them to oversee a multitude of hotel operations efficiently. Recognizing the relentless demands on a hotel manager's time, this digital system provides the essential flexibility and convenience to replace manual, paper-based management methods. Through this platform, the hotel manager can consolidate the entire spectrum of responsibilities into a singular online hub. This Hotel Management Project encompasses pivotal features such as room booking and staff management, addressing the core necessities of hotel administration. Its functionality extends to the posting of available rooms, which prospective customers can access and reserve through an online interface. The system also affords the manager the authority to approve or disapprove customer booking requests, further streamlining the reservation

process. Additionally, customers can explore a range of supplementary hotel services and make bookings accordingly. Thus, this system offers a versatile solution that benefits both customers and hotel managers, facilitating the efficient management of hotel activities on a portable, digital platform.

The remaining sections of the paper are arranged as follows. Section II describes the related work done on Hotel Management. The problem statement is provided in Section III. Section IV provides information regarding the architecture of the hotel management framework in detail, which also includes the frontend, backend, and database management system. Section V presents the proposed model. Various critical challenges faced by hotel management systems are presented in Section VI. Finally, the conclusion and future work are presented in Section VII.

II. LITERATURE REVIEW

A key technical development in the hospitality sector is the hotel management system. It improves and streamlines many facets of hotel operations. This system guarantees a flawless guest experience by effectively managing reservations, check-ins, check-outs, and invoicing procedures. Additionally, it makes inventory management easier, enabling hotels to maximize room occupancy and pricing plans. Personalized services are made possible by the storage of guest profiles and preferences. Decision-makers are empowered with useful information from real-time reporting and analytics technologies to improve resource allocation and customer satisfaction. To fulfill the expanding requirements of today's tech-savvy travelers, hotels must, however, adapt to shifting technological trends, such as smartphone check-ins and contactless payments, in order to remain competitive. Internet marketing has been viewed as a very successful strategy to stand out as distinctive in the industry, especially given the current situation of the economy and the fierce competition in the hotel industry. Leaving aside the complexity in hotels, Srinivasa R. (2014) asserts that the majority of modern hotel management is done via an internet-based system [1]. The internet, smartphones, and other modern technology comforts are available in the majority of the world's areas. Customers can order their preferred meals

and beverages at any time, reserve a hotel room, and more using the internet just by doing a few easy online actions. Customers would enjoy this because it saves their important time. In 2021, Avneesh Pathak et.al gave a succinct description of a hotel management system that uses software engineering techniques for needs analysis, performance analysis, and design [2]. The entire system is broken down into discrete modules that each introduce a function, a set of requirements, and the logical structure of the database used for data management.

A crucial component of the customer-oriented service model is the CRM (Customer Relationship Management) system. The individualized demands of clients are becoming more and more important in the increasingly tough commercial competition. The market for the hotel industry will expand steadily as reform and economic transformation continue to deepen. Yaqiong Yu (2023), suggests building a CRM hotel management system using an algorithm based on machine learning. While many consumers continue to have a positive attitude toward the CRM hotel management system, most customer scores fall between three and five points. [3]. Modern hotels frequently serve numerous purposes, including lodging, dining, displays, seminars, entertainment, etc., and consequently consume a lot of energy. The article [4] has established a more comprehensive energy monitoring, forecasting, and evaluation system by analyzing the data mining status of hotel energy consumption, organizing concepts and technical support conditions, among other things. This has expanded the scope of the current hotel energy management research system and has strong theoretical significance. In 2022 Zhichen Zhong designed a hotel management system based on Big Data. The system's composition and operation are examined. The management of hotel reservations, customer statistics, and other modules are deemed to be suitable for the system. It is capable of automation and intelligence, offering consumers quick and effective hotel services [5].

Researchers have proposed various solutions and innovations for hotel management systems to enhance efficiency, customer experience, and overall operations. Mobile apps and self-service kiosks have been suggested as solutions to empower guests with self-check-in and check-out capabilities. This reduces wait times, enhances convenience, and allows guests to customize their stay. Utilizing big data analytics, researchers have recommended extracting insights from guest data to personalize services, optimize pricing strategies, and forecast demand accurately. The Internet of Things (IoT) and smart room technologies have been proposed to create intelligent hotel rooms. These systems can control lighting, climate, and entertainment preferences based on guest preferences and presence, leading to energy savings and guest satisfaction.

Managing and enhancing online reputation through sentiment analysis and feedback analytics has been proposed to improve guest trust and attract more bookings. Responding to online reviews and addressing issues promptly is

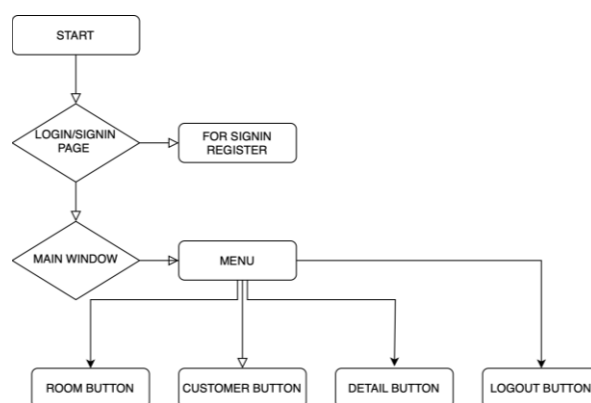
crucial. Researchers have suggested sustainable practices in hotel management, such as energy-efficient designs, waste reduction, and eco-friendly amenities. Sustainability not only reduces costs but also appeals to environmentally conscious guests. Implementing blockchain technology [7] for security and transparency in transactions, reservations, and guest identity verification has been recommended to protect guest data and prevent fraud. AI-driven chatbots and virtual assistants can enhance guest interactions by providing quick responses to inquiries, room service requests, and local recommendations, improving efficiency and guest satisfaction [6].

Sophisticated revenue management systems have been proposed to dynamically adjust room rates based on demand, competitor pricing, and market conditions. This helps maximize revenue and occupancy rates.

III. PROBLEM STATEMENT

The problem is that the current hotel management system lacks the necessary features and capabilities to efficiently manage hotel operations and provide an exceptional guest experience. It faces several key challenges. The current system is broken, leading to inefficiencies in managing reservations, check-ins, billing, and housekeeping. This results in delays, errors, and increased operational costs. Guests often face long check-in/check-out queues and limited self-service options. This negatively impacts guest satisfaction and can result in lost bookings. The current system lacks robust security measures, putting guest data at risk and potentially leading to breaches and fraudulent activities. The online reputation is suffering due to inconsistent feedback handling and delayed responses to guest reviews. This affects the ability to attract new guests. Staff training and engagement are challenging with the current system. This affects the quality of guest interactions and the overall guest experience.

IV. ARCHITECTURE



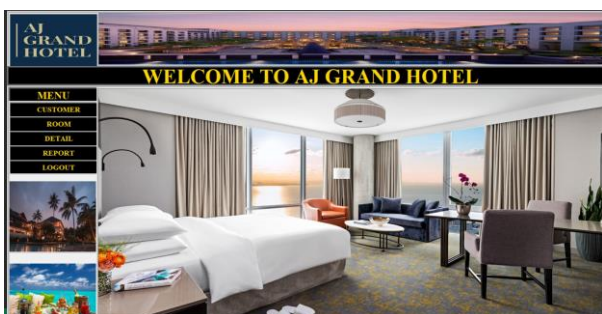
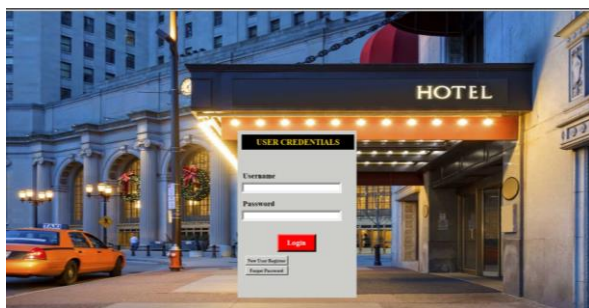
FRONT END

In the front end phase of the hotel management system, it is designed and implemented for user interface with the help of Tkinter python library, which will allow hotel staff to interact with the system efficiently. Here are some key elements and features you should consider when designing the frontend of hotel management system:

User Authentication makes a secure login and registration system for hotel staff, managers and for customers also. The dashboard provides an overview of essential information, such as room availability, room reservations, food menu and bills. Room Management allows users to view and manage room information which includes room type, availability, status, and pricing.

Guest Check-In/Check-Out interface is made to record guest information, payments, and room status. Billing and Payment Processing system is generated for invoices and process payments. Providing the total bill which includes food bill, room bill etc. Search options is to help staff quickly find guest information, reservations, or specific rooms.

Multilingual and Multi-device Support is accessible on various devices (desktop, tablet, mobile) which will be easily used. The data will also be stored at the backend of a database that can be easily used to find someone's profile or for some other purpose.



V. BACK END

The backend of a hotel management system is a crucial component that underpins the overall functionality and effectiveness of the system. It plays a fundamental role in managing and processing data, implementing business logic, and ensuring the security and reliability of the system. Here are some key points highlighting the importance of the backend in a hotel management system developed in Python:

1. Data Management:

Database Interaction: The backend is responsible for interacting with the database to store, retrieve, and update data. This includes critical information such as guest profiles, reservations, room availability, billing records, and more.

Data Integrity: It ensures data integrity and accuracy, enforcing rules and validations to prevent errors, duplication, or inconsistencies in the data.

2. Business Logic:

Reservation Management: The backend handles reservation requests, checks room availability, calculates pricing, and manages booking conflicts. It enforces business rules to make sure reservations are valid and adhere to hotel policies.

Billing and Finance: It calculates and processes guest bills, handles financial transactions securely, and generates invoices. This is critical for revenue management and financial accountability.

Guest Services: The backend manages various guest services, including check-in and check-out procedures, requests for room service or maintenance, and communication channels between guests and staff.

In summary, the backend of a hotel management system in Python is the backbone of the entire system. It manages data, enforces business rules, ensures security, and facilitates the seamless operation of the system. A well-designed backend contributes to the efficiency, reliability, and scalability of the hotel management system, ultimately enhancing the guest experience and the hotel's operational effectiveness.

VI.DATABASE

A database plays a critical role in a hotel management system by providing a structured and organized way to store, manage, and retrieve data related to various aspects of the hotel's operations. Here's how a database helps in the hotel management system.

The database stores guest information, including personal details, contact information, and all essential information. The data is essential for data reservation, check-ins, and providing

personalized services. The database stores information about guest's requests, complaints, and feedback,

allowing the hotel to provide a higher level of service. Historical data in the database is used for generating reports and performing data analysis.

Selecting a database system like MySQL for storing critical data in a hotel management system, including guest information, room availability, and transactions, can be a well-informed decision for various reasons. MySQL is a widely used relational database management system, and its suitability depends on various factors like Data integrity, performance, scalability, security, data redundancy, etc. In summary, a well-designed and properly maintained database is the backbone of a hotel management system. It centralizes data security and facilitates efficient operations, ultimately leading to improved guest experiences and streamlined hotel management.

V. PROPOSED MODEL

Proposed model for a hotel management system:

User Management efficiently manages different user roles, including administrators, staff, and guests, with varying levels of access and permissions. Reservation Management streamline the reservation process, allowing guests to check room availability, make, modify, or cancel reservations, and set pricing rules for different seasons and discounts. Room Management categorize rooms, allocate and assign them to guests, track room status, and manage room pricing and inventory.

Check-In and Check-Out simplify the check-in and check-out processes, generate key cards, create invoices, and collect guest feedback. Billing and Invoicing automatically calculate room charges, add extra charges, and generate invoices and receipts, accommodating various payment methods. Housekeeping Management schedule cleaning services, monitor room cleaning status, and report maintenance issues for quick resolution. Restaurant and Room Service facilitate restaurant reservations, room service orders, and billing for restaurant services to the room.

Reporting and Analytics generate financial reports, analyze guest preferences, and track staff performance for data-driven decision-making. Security and Access Control ensure data security through access controls, encryption, and compliance with data protection regulations. Mobile App Integration offer mobile check-in, check-out, and service request options for guest convenience. Online Booking and Channel Management seamlessly integrate with online booking platforms and manage room availability and rates across multiple channels. Task Management assign tasks to staff, track progress, and enhance operational efficiency. Notification and Alerts automatically send alerts and notifications to guests, such as check-out reminders and room readiness notifications. Multi-language and Multi-Currency Support cater to international guests with support for various languages and currencies.

Integration with Key System connects with key card systems for room access and accounting software for financial management. Data Analytics and AI utilize AI for demand forecasting and pricing optimization and leverage data analytics for making informed decisions. Compliance and Security ensure full compliance with data protection regulations and implement robust security measures to safeguard guest information.

VI. CRITICAL CHALLENGES

Hotel management systems face several critical challenges that can impact their efficiency, guest satisfaction, and overall success.

Protecting guest information is most important. Hacking and cyber threats pose a significant challenge. Hotel management systems must have strong security measures to safeguard sensitive data. Hotels use a variety of software systems for different functions (e.g., reservations, accounting, guest services). Integrating these systems seamlessly can be challenging to ensure smooth operations. As hotels expand or change, their management systems must be able to scale to accommodate the increased workload and the addition of new features.

Guests have high expectations for a seamless experience, from booking to check-out. Meeting these expectations in terms of mobile check-in, keyless entry, and other technologies can be a challenge. Hotel management systems, both hardware and software, require constant maintenance and updates to remain efficient and secure. This can be time-consuming and costly. Hotel staff often need to be trained to use the system effectively. High turnover rates in the hospitality industry can make this a recurring challenge.

Online reviews and reputation management are vital. Managing online feedback and ensuring a positive online presence can be challenging. Hotels are increasingly expected to adopt eco-friendly practices. Implementing and managing sustainable technologies can be a challenge. International hotel chains need systems that can handle multiple languages, currencies, and regional preferences. This can be challenging when dealing with diverse global markets.

VI. CONCLUSION

In this article, if the project is used effectively, it will save time, lower labor costs, and enhance the caliber of the company's performance management system. The system ought to be a vital instrument for enhancing hotel management performance and efficiency. This system offers a number of security features, improved handling of financial information. This system is easy to use. Since each user has their own user ID and password, there is no possibility of any unwanted access, making this system totally safe. It is simpler to use with online booking, payment, and cancellation options. Therefore, implementing this technology will aid in labor reduction and offer additional amenities to encourage guests to enjoy hotels and return time and time again.

Provide ongoing training and support for hotel staff to ensure they can effectively use the system and maximize its benefits. Consider adapting the system to support multiple languages and cater to international guests.

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