iJRASET
International Journal For Research in Applied Science and Engineering Technology



INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 13 **Issue:** IV **Month of publication:** April 2025

DOI: https://doi.org/10.22214/ijraset.2025.68464

www.ijraset.com

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International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.538
Volume 13 Issue IV Apr 2025- Available at www.ijraset.com

Online Hotel Reservation System

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Abstract: ***The Online Hotel Reservation System streamlines the booking process by allowing users to check room availability, make reservations, process payments, and manage cancellations efficiently. Guests can search for rooms, select their preferred options, and receive instant booking confirmations. The system also includes a chatbot to assist users with common queries, enhancing the overall experience. In addition to guest functionalities, the system provides an admin panel where hotel staff can manage room availability, bookings, and cancellations. Automated notifications and reminders ensure smooth communication between the hotel and its guests. The system is designed to be user-friendly, reducing manual effort and improving operational efficiency for hotel management.***
Keywords: Chatbot, Online Hotel Reservation, Operational efficiency, Availability, Integration.

I. INTRODUCTION

The hotel industry has always been a significant player in the global economy, catering to travellers and tourists by offering a range of accommodations and services. Traditionally, hotel management involved manual processes for handling reservations, check-ins, billing, and customer service. These methods, while effective, were often time-consuming, prone to human error, and limited by geographical constraints. Hotels relied heavily on physical booking systems, telephone reservations, and in-person interactions, which often led to inefficiencies and challenges in providing seamless customer experiences. With the rapid advancement of the internet and technology, the hotel industry began to embrace digital transformation, leading to the rise of online hotel services. This shift allowed hotels to reach a wider audience, offering their services beyond local and regional boundaries. Online hotel reservation systems became a game-changer by enabling travellers to search for available rooms, compare prices, and make bookings without needing to call or visit the hotel. As a result, hotels could better manage room availability, optimize pricing, and serve guests from around the world, 24/7.

The development of these online booking systems also brought significant improvements in operational efficiency. Automated features, such as real-time room availability updates, booking confirmations, and instant modifications or cancellations, reduced the need for manual intervention and helped eliminate human errors. Hotels could now offer a more streamlined and user-friendly experience, ensuring that customers could easily make reservations and receive timely updates. Moreover, the systems often included additional features like email notifications, allowing guests to receive booking confirmations, reminders, and even promotional offers directly to their inbox. As a result, the integration of online hotel reservation systems has become an essential component of modern hotel operations.

By leveraging a combination of front-end technologies like HTML, CSS, Bootstrap and JavaScript, alongside secure back-end systems built with PHP and MySQL, hotels can deliver an efficient, reliable, and seamless experience for both guests and administrators. This digital transformation has not only improved customer satisfaction by offering convenience and flexibility but also streamlined hotel management, driving better operational outcomes and enhancing the overall hospitality experience.

II. LITERATURE SURVEY

To understand the advancements in hotel reservation systems, several existing technologies and frameworks have been explored, each offering unique features, benefits, and limitations.

Modern AI-based systems like *MyStay* integrate artificial intelligence and cloud computing to provide dynamic pricing, real-time user behavior adaptation, and automated customer interaction through AI chatbots [2]. These systems significantly enhance customer satisfaction but come with challenges like bias in decision-making, high operational costs, and dependency on skilled AI experts. Similarly, platforms combining Spring Boot and ReactJS demonstrate the use of modern full-stack technologies in achieving responsive UI and robust backend functionality [12].

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DevOps-enabled systems, such as those built using the MERN stack along with Docker and Jenkins, simplify software deployment and maintenance using containerization and CI/CD pipelines [1][11]. These systems offer flexibility, scalability, and rapid development cycles, but they also demand technical expertise and introduce complexities in setup and real-time system updates.

IoT-integrated frameworks and generative AI-based hotel systems bring smart automation to operations through room condition monitoring, dynamic energy management, and personalized recommendations using collaborative filtering [3]. These models employ Hadoop for scalable processing and generative neural networks for predictions. However, they introduce risks concerning data privacy, algorithmic transparency, and the accuracy of predictions based on biased or incomplete data.

Traditional systems implemented using JavaScript, Node.js, or SOA architecture provide practical functionalities such as room booking, inventory management, and centralized admin control [4][5][6]. While relatively easier to develop and maintain, they often lack features like integrated payment gateways, are prone to internet connectivity issues, and require strong security protocols. Other open-source platforms like QloApps, Easy!Appointments, Alf.io, and Cal.com have contributed to modular and customizable solutions in scheduling and reservations [7][8][9][10], but their adaptation in large hotel chains may still require significant integration efforts.

III. SYSTEM ARCHITECTURE

The system architecture of the Online Hotel Reservation System is designed to provide a secure, user-friendly, and efficient booking experience through a modular workflow from user login to session termination. It incorporates real-time room availability checks, secure payment integration, and automated confirmation processes to streamline operations for both users and administrators. The system also ensures scalability and consistent data management through a centralized database. The overall architecture is illustrated in Figure 1.

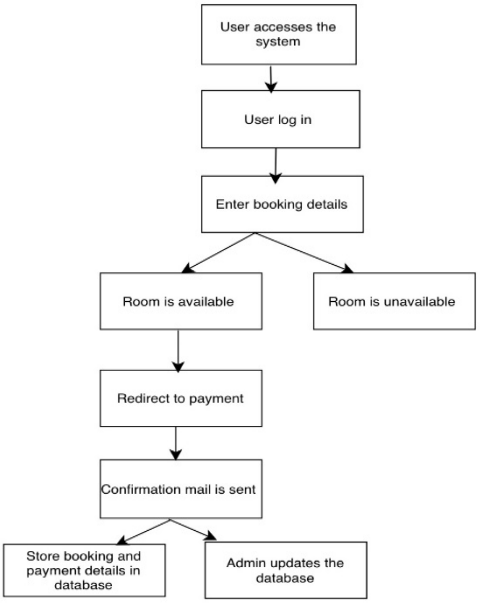


Figure. 1 System Architecture of Online Hotel Reservation System

A. User Access & Authentication

Users log in securely using their credentials. The system verifies the user and grants access based on their role (user/admin). After successful login, users are directed to the homepage. Multi-factor authentication can be added for enhanced security. This ensures that only authorized users access the system.

B. Booking Details Submission

Users provide booking details such as check-in/check-out dates, number of guests, and room preferences. The system checks room availability and displays matching options. Users review and submit their choices. Input validation ensures accuracy. This step initiates the booking process.

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C. Admin Confirmation & Updates

Admins receive the booking request and verify room availability. Upon confirmation, the system updates room status, assigns staff, and logs the payment status. Special requests are forwarded to relevant departments. This ensures smooth backend coordination and reservation tracking.

D. Payment Processing

Users are redirected to a secure payment gateway to complete the transaction. Multiple payment options are supported, and encryption ensures secure data handling. Payment success or failure is communicated instantly. Receipts are generated and recorded. This step confirms the booking financially.

E. Booking Confirmation & Email Notification

After successful payment, the system sends an automatic confirmation email to the user. The email contains reservation details and booking ID. Notifications may also be sent via SMS or app. This provides proof of booking and keeps the user informed.

F. Database Storage

All booking and transaction data is stored securely in a centralized database. The system supports encrypted storage and regular backups. Admins can access this data for reporting and analysis. This ensures data integrity and future reference.

G. Logout & Completion

Once the process is complete, users can securely log out. The session is terminated to protect user data. Reservation details remain accessible for modifications or cancellations. This marks the end of the booking cycle while keeping user options open.

IV. FEATURES AND IMPLEMENTATION

A. Data Management and Storage

The Online Hotel Reservation System utilizes a structured relational database implemented with MySQL, providing a reliable and scalable approach to store and manage hotel-related data. The User Table captures essential user details such as name, age, contact information, and login credentials. The Room Table stores data on room types, availability, occupancy limits, and pricing. The Booking Table manages reservation records, including booking dates, duration, cost, and assigned rooms. A dedicated Cancellation Log keeps track of cancelled reservations, while the Payment Table stores transaction details and modes of payment. These components collectively ensure smooth handling of user bookings, data integrity, and efficient information retrieval.

B. Intelligent Assistance and User Interaction

The system offers a clean and intuitive interface built with HTML, CSS, JavaScript, and Bootstrap, making it user-friendly and responsive across devices. Users can register, log in, search room availability, view details of deluxe, standard, or luxury rooms, and make reservations in a few simple steps. The system includes a dynamic cost calculator based on the number of people, room type, and number of days. A simple chatbot integrated within the interface guides users through the reservation process and answers basic queries. Upon successful booking, a confirmation message is displayed, and users can later initiate cancellation requests through a dedicated form for quick processing.

C. Booking Confirmation and Room Availability

Real-time room availability checks ensure that users can only book from available rooms, thus preventing double bookings. The booking process is streamlined and includes a backend check for room occupancy limits — restricting bookings to a maximum of 2 adults and 3 children per room. Users receive a visual summary of their reservation details before confirmation. In case all rooms of a selected type are occupied, the system notifies the user of unavailability. A reminder feature also logs the actual date of booking, which can be enhanced in the future with automatic reminders via email or SMS.

D. Authentication and Access Control

User authentication is handled via PHP sessions, ensuring secure access to booking-related features. Registered users can log in with a username and password to access their bookings or initiate cancellation requests.

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Volume 13 Issue IV Apr 2025- Available at www.ijraset.com

The system does not currently support OTP or email verification, keeping it lightweight and straightforward for a demo environment. A password reset feature allows users to set a new password directly from the forgot password page, without needing phone or email verification.

E. Core Technologies Used

- HTML/CSS/JavaScript: For building the structure, styling, and interactive behaviour of the website.
- Bootstrap: Ensures responsive design and cross-device compatibility.
- PHP: Handles server-side logic, data processing, and user authentication.
- MySQL: Stores all reservation, user, and room-related data in a structured format.
- XAMPP/Apache Server: Provides a local server environment to test and deploy the PHP and MySQL-based application.

Algorithm-1: Booking Confirmation & Availability Checking Algorithm Our Online Hotel Reservation System uses a smart booking confirmation algorithm that checks real-time room availability, validates guest details, and confirms bookings through a secure backend process. The algorithm verifies room type, occupancy (with a maximum of 2 adults and 3 children per room), and booking dates before updating the reservation table in the database. It also handles edge cases such as double booking, invalid dates, or full occupancy. Once validated, it sends a confirmation message to the user and updates the room status accordingly.

Implementation Example:

```
</script>
<?php
if ($_SERVER['REQUEST_METHOD'] == 'POST' && isset($_POST['guestdetailsubmit'])) {
    $Name = isset($_POST['Name']) ? htmlspecialchars($_POST['Name']) : '';
    $Email = isset($_POST['Email']) ? filter_var($_POST['Email'], FILTER_VALIDATE_EMAIL) : '';
    $Country = isset($_POST['Country']) ? htmlspecialchars($_POST['Country']) : '';
    $Phone = isset($_POST['Phone']) ? htmlspecialchars($_POST['Phone']) : '';
    $cin = isset($_POST['cin']) ? $_POST['cin'] : '';
    $cout = isset($_POST['cout']) ? $_POST['cout'] : '';
    $numRooms = isset($_POST['numRooms']) ? (int)$_POST['numRooms'] : 0;

    if (!$Email) {
        echo "<script>swal({ title: 'Invalid Email', icon: 'error' });</script>";
    } elseif (strtotime($cin) < strtotime(date('Y-m-d'))) {
        echo "<script>swal({ title: 'Invalid Check-In Date', icon: 'error' });</script>";
    } elseif (strtotime($cin) >= strtotime($cout)) {
        echo "<script>swal({ title: 'Check-Out must be after Check-In', icon: 'error' });</script>";
    } else {
        $allBookingsSuccessful = true;
        $totalBookingCost = 0;
        // $sid = uniqid();
        $sid = bin2hex(random_bytes(10));
```

Figure 4.1: PHP Code for Booking Details Validation and Submission.

As illustrated in Figure 4.1, his snippet checks and sanitizes user input for the booking form. It validates the email format, ensures that the check-in date is not in the past, and verifies that the check-out date is after the check-in date. If all inputs are valid, the script prepares for further booking processing such as calculating cost and generating a booking ID.

Algorithm-2: Email Notification & Booking Cancellation Algorithm This algorithm handles both confirmation and cancellation of bookings. On successful booking, it retrieves user details from the database and triggers an automated email confirmation. For cancellations, the user submits a form with booking ID and registered email. The system verifies the data and updates the booking status to "Cancelled", followed by sending a cancellation confirmation email.

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Implementation Example:

```php
if (isset($_GET['email']) && isset($_GET['amount'])) {
    $userEmail = $_GET['email'];
    $userName = $_GET['Name'];
    $refundAmount = $_GET['amount'];

    $mail = new PHPMailer(true);

    try {
        // SMTP Configuration
        $mail->isSMTP();
        $mail->Host       = 'smtp.gmail.com';
        $mail->SMTPAuth   = true;
        $mail->Username   = 'kgnssamhita@gmail.com'; // Change to your email
        $mail->Password   = 'lfottgktqfvaipww'; // Use App Password if using Gmail
        $mail->SMTPSecure = 'tls';
        $mail->Port       = 587;

        // Email Details
        $mail->setFrom('kgnssamhita@gmail.com', 'Hotel Management');
        $mail->addAddress($userEmail);
        $mail->isHTML(true);
        $mail->Subject = 'Payment Cancellation and Refund Confirmation';
        $mail->Body    = "
            <h3>Payment Cancellation Successful</h3>
            <p>Dear $userName,</p>
            <p>Your payment has been successfully cancelled, and the refunded amount of <strong>₹$refundAmount</strong> will be credited back
            <p>Thank you for choosing our service.</p>
            <br>
            <p>Best Regards,</p>
            <p>Your Hotel Name</p>";

        $mail->send();
        echo "<script>alert('Refund confirmation email sent successfully.'); window.location.href='history.php';</script>";
    } catch (Exception $e) {
        echo "<script>alert('Cancellation successful, but email could not be sent. Error: {$mail->ErrorInfo}'); window.location.href='history.
    }
```

Figure 4.2: Code snippet for sending confirmation and cancellation emails.

As shown in Figure 4.2, the system ensures that users are kept informed of their booking status without manual follow-ups.

V. RESULTS AND DISCUSSIONS

The Hotel Reservation System successfully streamlines the booking process, allowing users to search for room availability, book accommodations, and receive confirmation instantly. The system's user-friendly interface ensures seamless navigation, while automated features such as email notifications and booking reminders enhance customer experience. Through rigorous testing, the system demonstrated efficient data handling, with accurate record-keeping and real-time updates on room availability. The chatbot integration further improved user interaction by providing instant assistance and resolving common queries.

In terms of performance, the system effectively handles multiple user requests simultaneously, ensuring no double bookings or errors in reservations. The database management proved reliable in storing user details, booking history, and payment records securely. The implementation of an intuitive cancellation process allowed users to modify or cancel their reservations effortlessly, reducing administrative workload. The integration of secure payment processing ensured smooth transactions, adding a layer of trust to the system.

Overall, the project successfully met its objectives by offering a robust, efficient, and user-friendly reservation system. Compared to traditional booking methods, the online system significantly reduces manual effort, improves accuracy, and enhances customer satisfaction. The analysis indicates that implementing such a system in real-world hotel operations can improve overall efficiency, reduce human errors, and increase operational transparency. Future enhancements could include AI-driven recommendations and further automation to optimize hotel management further.

VI. CONCLUSION

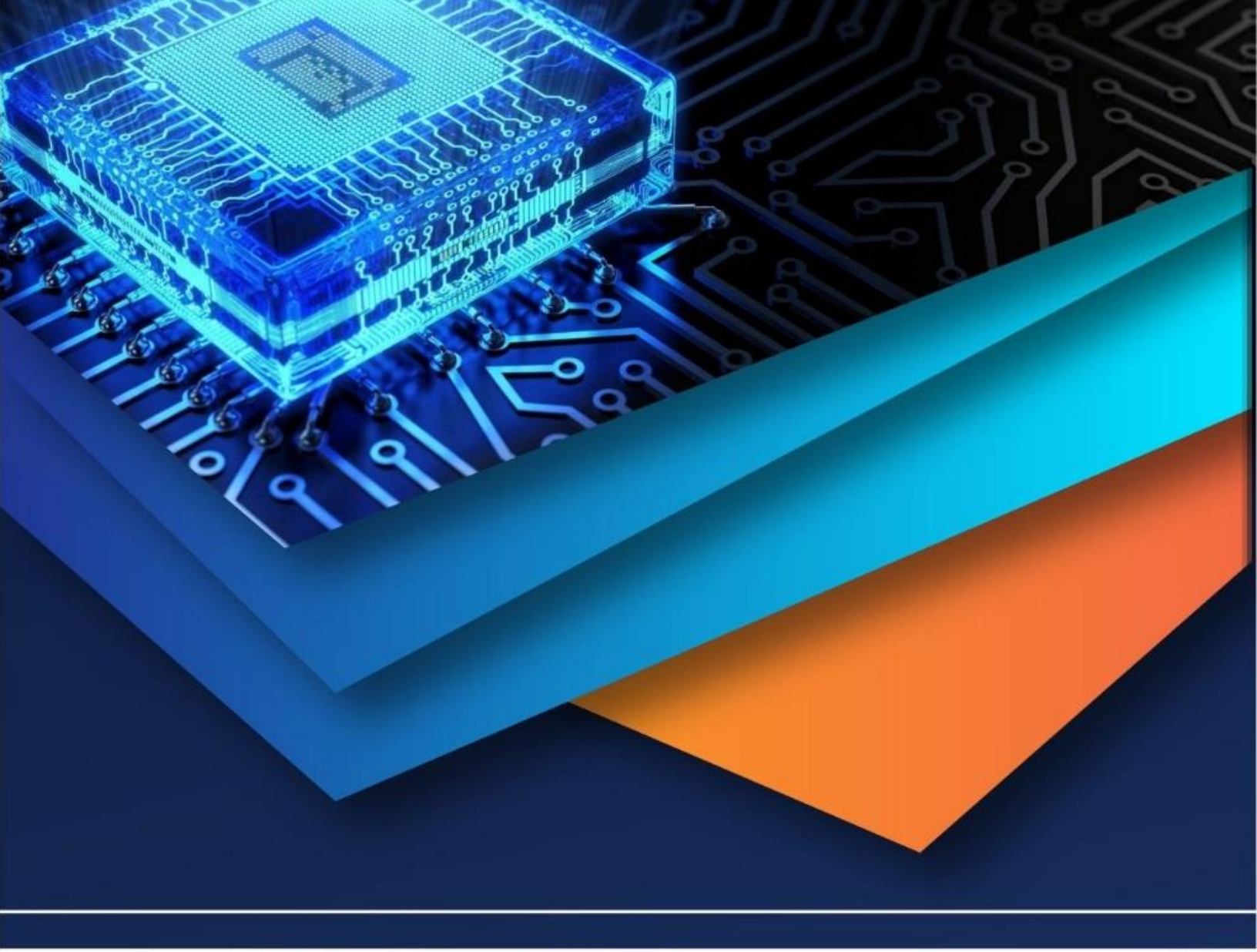
The project Hotel Reservation System provides an efficient and user-friendly platform for managing hotel bookings. It simplifies the reservation process for users by allowing them to check room availability, book accommodations, and receive instant confirmation. With an intuitive interface, users can complete their bookings without complications, ensuring a smooth and hassle-free experience. For administrators, the system offers an effective way to manage bookings, track room availability, and process payments. The centralized database ensures that all booking records are stored securely, reducing errors and improving efficiency. This helps hotel staff focus more on customer service rather than manual record-keeping. The system also enhances security by ensuring that user data and payment transactions are handled safely. By incorporating authentication measures and secure payment processing, it minimizes the risk of unauthorized access and fraud. This ensures that both hotel management and guests can trust the platform. Additionally, automation plays a key role in improving operational efficiency. From booking confirmations to payment status updates, automated notifications help users stay informed about their reservations. This reduces manual intervention, leading to faster processing times and fewer delays. Overall, the hotel reservation system addresses many challenges faced by traditional booking methods. It streamlines hotel operations, enhances the user experience, and ensures secure transactions. With further improvements and scalability, the system can be expanded to accommodate more advanced features, making it an essential tool for modern hotel management.

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