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Event Ticketing Platform Supporting Secure Payments Tickets Categories Booking Management

Gujja Chandu, Munukuntla Hymavathi*
Vaagdevi Engineering College, Warangal, 506005, Telangana, India.
*Correspondence: Munukuntla Hymavathi

ABSTRACT

The rapid expansion of online event services has transformed the way users discover, book, and manage event participation. However, conventional ticket booking systems often rely on manual processes, resulting in inefficient ticket management, booking errors, delayed updates, and limited flexibility for cancellations or schedule modifications. This research presents a Web-Based Event Ticket Booking and Rescheduling System (ETBRS) that streamlines event management through an integrated and automated digital platform. The system enables organizers to create events, define ticket pricing, monitor ticket availability, and efficiently manage event schedules. Users can browse event details, including venue, date, time, and ticket price, and securely reserve tickets through an interactive interface. The application automatically calculates booking costs based on the selected number of tickets and updates ticket availability in real time, thereby preventing overbooking and improving operational efficiency. A key feature of the platform is its support for booking cancellations and event rescheduling. When users cancel reservations, ticket availability is automatically restored, while rescheduling requests are processed through organizer approval workflows based on predefined policies and seat availability. The system can also apply additional rescheduling charges whenever applicable. The application follows a layered architecture comprising a Frontend (UI), Backend (Server-Side Logic), and Database Management System (DBMS) to ensure scalability, maintainability, secure data handling, and reliable performance. The proposed solution enhances user convenience, optimizes organizer operations, improves booking transparency, and provides an efficient, secure, and scalable platform for modern event ticket management.

Keywords: Event Management, Online Ticket Reservation, Booking Cancellation, Event Rescheduling, Real-Time Ticket Availability, Web Application, Database Management System (DBMS), User Authentication, Secure Transaction.

1. INTRODUCTION

Global air passenger demand is increasing annually, and this growth is expected to continue rising steadily in the future as air travel becomes more accessible due to economic development. The International Air Transport Association (IATA) predicts that the number of air travelers will surpass pre-COVID-19 levels in 2024 [1], and is projected to reach 8.2 billion by 2037. However, the construction or expansion of significant infrastructure, such as airports, can take many years. If airports fail to keep up with the growing passenger demand, travelers may face unprecedentedly long waiting times at airports. In response to the heightened awareness of aviation security following the 9/11 terrorist attacks, airports have implemented more comprehensive security protocols to ensure safety, including more rigorous screening procedures. Additionally, the occurrence of pandemics, such as COVID-19, has further complicated airport security screening procedures. For example, the United States Department of Homeland Security has introduced

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new entry requirements for international visitors to mitigate the spread of the disease [2].

As the level of security has increased, the time required for security screening has also increased, leading to issues such as longer waiting times for passengers. The duration of waiting at security screening checkpoints is a crucial factor in determining passenger satisfaction. To address the pressing issue of passenger congestion, various approaches are being actively researched to enhance passenger satisfaction [3]. Ongoing studies focus on the integration of diverse technologies to tackle airport-related challenges and devise innovative solutions using new technologies. For example, certain airports are implementing millimeter wave imaging, computerized tomography scanners, and facial recognition systems to expedite security screening procedures [4].

However, it is important to note that these advancements primarily pertain to hardware improvements. While they alleviate congestion, further innovations at airports can be achieved through breakthroughs in software and policy implementation. The model focuses specifically on improving airport security screening procedures, which are known as the primary bottleneck processes at airport passenger terminals [5]. Due to the inherent unpredictability of human behavior, the proposed model adopts a dynamic rescheduling strategy to accommodate uncertainties in the passenger handling process and adaptively update the operational plan, while also considering the frozen period

2. LITERATURE SURVEY

Enciso, et al. [6] investigated passenger movement within airport terminals by analysing passenger flow under different terminal layouts and service configurations using Discrete Event Simulation (DES). The study incorporated passenger behavioral patterns, terminal infrastructure characteristics, and service processes to evaluate congestion levels and operational efficiency. The simulation results provided valuable insights into optimizing terminal layouts, reducing passenger waiting times, and improving the overall travel experience. The research demonstrated that simulation-based modelling can effectively support airport planners in designing more efficient passenger processing systems. Wang, et al. [7] proposed an optimization framework for minimizing passenger waiting times at airport security checkpoints by integrating queueing theory with Monte Carlo simulation techniques. The proposed model evaluated multiple gate configurations and estimated both the average waiting time and its variability under different passenger arrival scenarios. The framework enabled airport authorities to optimize security checkpoint operations, improve passenger throughput, and enhance resource utilization while maintaining service quality. Anagnostopoulou, et al. [8] demonstrated the effectiveness of mobile application-guided passenger routing strategies for reducing terminal congestion and improving passenger movement throughout airport facilities. Using simulation-based analysis, the study showed that providing real-time navigation and routing guidance enables passengers to distribute more evenly across terminal spaces, thereby reducing bottlenecks, improving operational efficiency, and enhancing passenger convenience. Ebert, et al. [9] proposed a likelihood-free parameter inference framework for dynamic queueing networks using Approximate Bayesian Computation (ABC). The proposed approach enabled accurate simulation-based inference for complex airport queueing systems without requiring explicit likelihood functions. The framework supported efficient resource allocation, operational planning, and data-driven decision-making, ultimately contributing to

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improved passenger satisfaction and airport service performance.

Guo, et al. [10] developed a two-phase real-time prediction framework for forecasting airport transfer passenger flows using operational airport data. The proposed system was successfully implemented at Heathrow Airport and demonstrated superior prediction accuracy compared to conventional time-series forecasting techniques and existing operational systems. Accurate passenger flow prediction enabled airport authorities to proactively allocate resources, optimize transfer operations, and reduce passenger congestion. de Queiroz, et al. [11] proposed a dynamic scheduling framework originally developed for emergency healthcare environments that combined urgent-level-based patient queues, variable neighborhood search optimization, and scenario-based planning techniques. The framework dynamically adjusted scheduling decisions by anticipating future events, thereby minimizing overall service delays and improving operational efficiency. The optimization methodology demonstrates significant potential for adaptation to other scheduling-intensive environments requiring real-time resource allocation. Schmitt, et al. [12] proposed a two-stage optimization framework to simultaneously minimize passenger check-in processing time and conveyor belt degradation within airport baggage handling systems. The framework employed a Mixed Integer Linear Programming (MILP) model for initial passenger assignment followed by a dynamic optimization heuristic that continuously reallocated passengers based on baggage weight and arrival patterns. Experimental evaluation demonstrated improvements in baggage handling efficiency, reduced operational costs, and enhanced passenger processing performance.

Veelenturf, et al. [13] investigated railway service recovery strategies through train rerouting techniques aimed at reducing service cancellations and operational delays. The study highlighted that conventional recovery approaches often focus primarily on train punctuality while overlooking important passenger-centric performance indicators such as increased travel time, missed transfers, and trip failures. Consequently, improvements in operational performance may not necessarily translate into higher passenger satisfaction. Binder, et al. [14] further emphasized that traditional disruption management approaches, including experience-based manual rescheduling and train-oriented optimization models, may unintentionally increase passenger congestion, route deviations, and overall societal costs despite reducing delays. The study advocated the integration of passenger-oriented performance measures into transportation optimization frameworks to achieve balanced operational and service quality improvements. Zhang, et al. [15] proposed a multistage decision-making framework incorporating compensation mechanisms to address disruptions within transportation networks. Unlike existing studies that primarily focus on isolated disruption events, the proposed framework considered multiple correlated disruptions, resource conflicts, and transfer passenger interactions simultaneously. The model improved decision-making by coordinating recovery strategies across interconnected transportation resources, thereby enhancing operational resilience, minimizing service disruptions, and improving overall passenger experience.

3. PROPOSED METHODOLOGY

This research is a web-based application designed to automate and streamline the process of event management and ticket booking. The system is developed using React.js for the frontend to ensure a responsive and user-friendly interface, while Django REST Framework powers the

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backend to handle business logic and secure API communication. A MySQL database is used to store user details, event information, bookings, and reschedule requests in a structured manner. The platform supports role-based access for organizers and users, enabling controlled operations such as event creation, booking approval, and user management. Users can browse events, book tickets, cancel bookings, and request rescheduling with transparency. Organizers can monitor ticket availability, manage bookings, and handle reschedule requests efficiently, as shown in fig 1. The system enhances reliability, flexibility, and scalability in modern event ticket management.

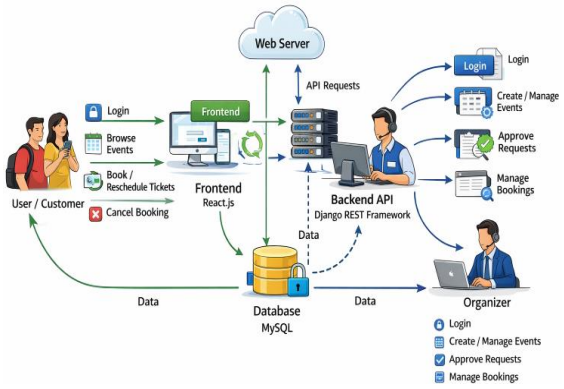

Fig. 1: Proposed system architecture of ETRP.

User Interface (Web Browser – React.js): The user interacts with the system through a browser-based graphical interface developed using React.js, which provides a clean, responsive, and intuitive user experience. Features such as user registration, login, browsing events, ticket booking, cancellation, and reschedule requests are designed for easy navigation. Users and organizers access separate dashboards based on their roles. Every user interaction, such as booking tickets or submitting reschedule requests, is converted into secure Hypertext Transfer Protocol (HTTP) API requests and sent to the backend server for processing.

Backend Server (Django REST Framework): The backend server acts as the core processing unit of the system and is implemented using Django REST Framework. It handles authentication, role-based access validation, approval checks, and routing of requests to appropriate services. Business logic such as event management, ticket availability control, booking validation, cancellation handling, and reschedule approval is executed at this layer. The backend ensures secure communication between the frontend and database while maintaining system integrity.

Database Layer (MySQL): The MySQL database serves as the persistent storage layer for the entire platform. It stores structured information related to users, roles, approval status, events, bookings, ticket availability, cancellations, and reschedule requests. Relational design enables efficient querying, fast data retrieval, and accurate updates. This layer ensures data consistency, integrity, and reliable storage across all event ticketing operations.

User Registration and Approval Flow: When a user registers on the platform, their details are validated and stored in the database with a pending approval status. This controlled access mechanism prevents unauthorized usage of the system. The organizer reviews user details and approves legitimate accounts. Once approved, users gain access to their dashboards and are allowed to book, cancel, or reschedule event tickets.

Organizer Management Module: The organizer functions as the system administrator and manages critical platform operations. Organizers can approve user registrations, add new events, remove events, monitor all bookings, and process reschedule requests. Acceptance or rejection of reschedule requests ensures controlled event modifications. This module helps maintain accurate ticket availability and smooth event coordination.

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User Ticket Booking and Reschedule Module: Approved users can browse available events, book tickets based on availability, and view booking details. The system automatically updates ticket counts to prevent overbooking. Users can cancel bookings and submit reschedule requests by selecting alternative events. Additional reschedule charges are calculated automatically, ensuring transparent billing and fair pricing.

Cancellation and Refund Management: Users are provided the option to cancel booked tickets when required. Upon cancellation, tickets are restored to the event inventory automatically. This ensures correct ticket availability for other users and maintains database accuracy without manual intervention.

End-to-End Operational Flow: All actions performed by users and organizers follow a structured workflow from the React frontend to the Django REST backend and MySQL database. Each request is validated, processed, and stored securely with proper role-based authorization. The integrated system architecture ensures automation, transparency, real-time updates, and efficient management of event ticketing and reschedule operations.

4. RESULTS AND DISCUSSION

The system is implemented as a web-based event ticketing application that automates event management, ticket booking, and reschedule processing. The frontend is developed using React.js to provide a responsive and interactive user interface for users and organizers. The backend is implemented using Django REST Framework, which handles authentication, role-based access control, and business logic execution. A MySQL database is used to store user details, event information, bookings, and reschedule requests in a structured format. Secure RESTful APIs enable seamless communication between the frontend and backend components. The modular design ensures scalability, reliability, and ease of maintenance.

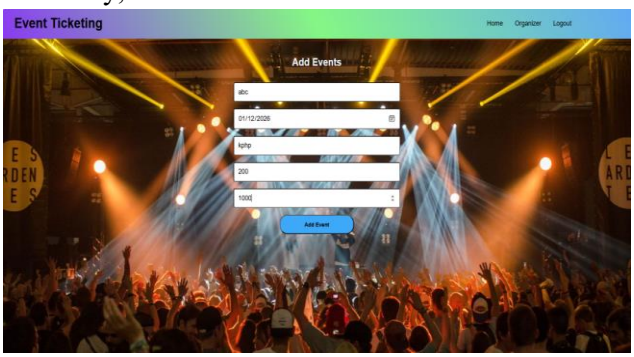

Fig. 2: Add event list out page.

Fig. 2 enables the organizer to create and publish new events within the system. It provides a structured form to enter essential details such as event name, event date, venue, ticket price, and available ticket count. Upon submission, the entered information is validated and stored in the database through the backend. This page allows organizers to efficiently manage upcoming events and ensure accurate event listings for users.

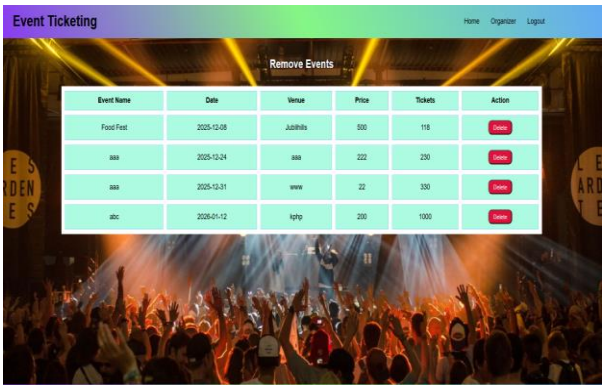

Fig. 3: Remove events page.

Fig. 3 allows the organizer to view all existing events in a structured tabular format. It displays key event details such as event name, date, venue, ticket price, and available tickets. Each event includes a delete option that enables the organizer to remove cancelled or expired events from the system. This page helps maintain an up-to-date event list and ensures accurate ticket availability for users.

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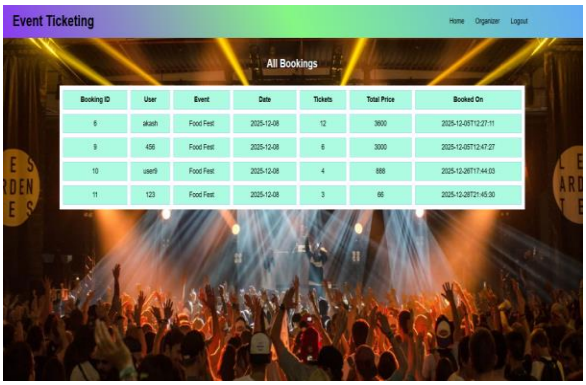

Fig. 4: View all bookings page.

Fig. 4 provides the organizer with a comprehensive view of every ticket booking made by users. It displays essential booking details such as booking ID, user name, event name, event date, number of tickets booked, total price, and booking timestamp. This tabular representation helps organizers track booking activity and monitor ticket sales efficiently. The page supports effective event management and operational transparency.

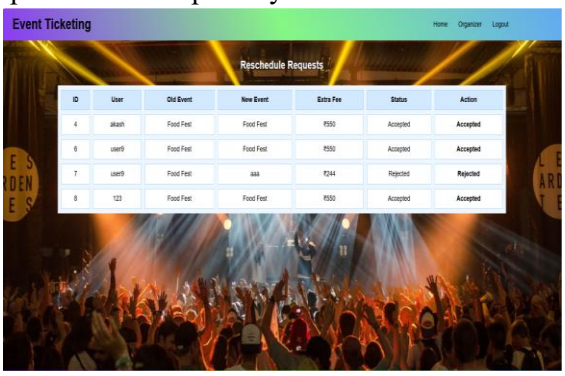

Fig. 5: Reschedule request page.

Fig. 5 allows the organizer to view and manage all ticket rescheduling requests submitted by users. It displays detailed information such as request ID, user name, original event, new event, applicable extra fee, and current request status. Organizers can review each request and approve or reject it based on event availability and policy rules. This page ensures controlled rescheduling, transparency, and accurate update of booking records.

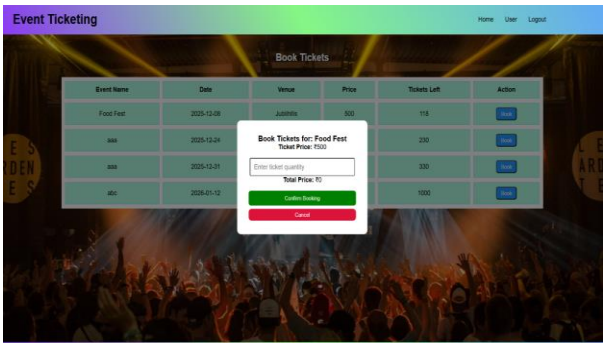

Fig. 6: Book tickets page.

Fig. 6 allows users to browse all available events in a structured table with details such as event name, date, venue, ticket price, and remaining ticket count. Users can initiate booking by selecting an event, which opens a confirmation window to enter ticket quantity and view the total price dynamically. The system validates ticket availability before confirming the booking. This page ensures a smooth and transparent ticket purchasing experience for users.

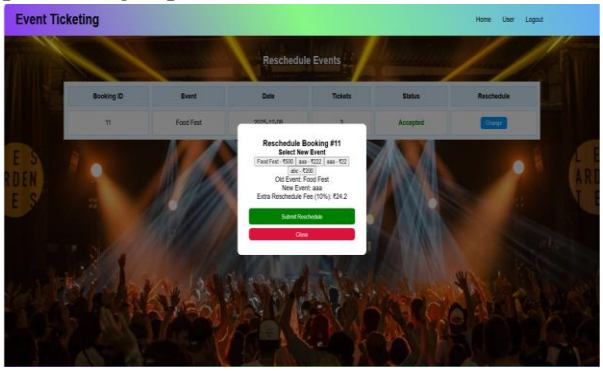

Fig. 7: Reschedule event page.

Fig. 7 allows users to modify their existing ticket bookings by selecting a new event. It displays current booking details such as booking ID, event name, date, ticket count, and status. A reschedule dialog enables users to choose an alternative event and view the calculated extra reschedule fee before submission. This page ensures a transparent and controlled rescheduling process with organizer approval.

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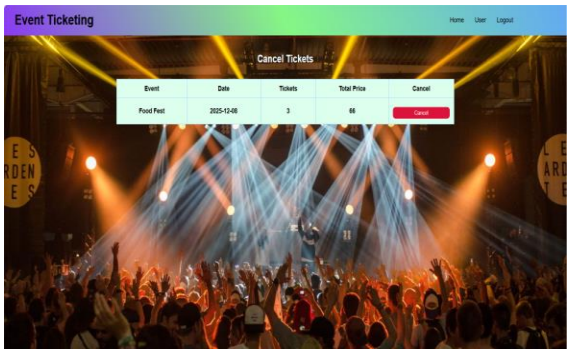

Fig. 8: Cancel tickets page.

Fig. 8 allows users to view their existing event bookings in a simple tabular format. It displays essential details such as event name, event date, number of tickets booked, and total price. Users can cancel a booking using the cancel option, after which the system updates ticket availability automatically. This page provides flexibility to users while maintaining accurate booking records in the system.

5. CONCLUSION

This research successfully delivers a robust and efficient web-based solution for managing events and ticketing activities. By integrating React.js, Django REST Framework, and MySQL, the system ensures smooth interaction between users and organizers with reliable backend support. The application improves performance by enabling real-time ticket availability updates, reducing page reloads, and minimizing server overhead through RESTful APIs. Automated booking, cancellation, and reschedule workflows eliminate manual effort and reduce processing delays. Role-based access control enhances security while preventing unauthorized operations. Efficient database design and optimized queries ensure fast data retrieval and accurate record management. The system supports multiple concurrent users without performance degradation. Automated ticket count updates prevent overbooking and maintain inventory accuracy. The system can be enhanced by integrating online payment gateways for secure digital transactions. Real-time notifications through email or SMS can be added for booking confirmations and reschedule updates. Advanced analytics and reporting features can help organizers analyze event performance. The platform can also be extended to support mobile applications for wider accessibility.

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