BUS MANAGEMENT

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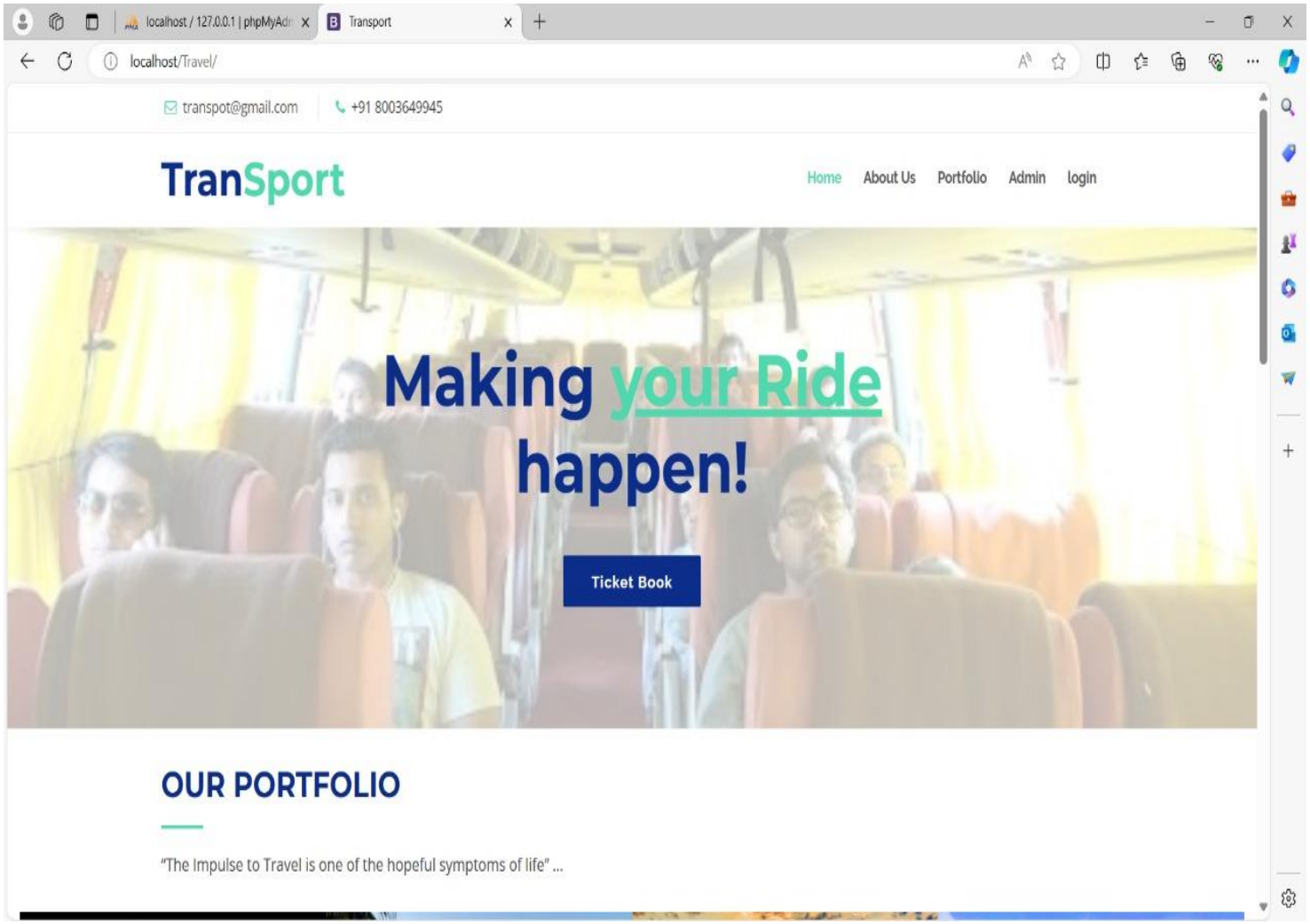
Gaurav Kumar
Dept. Information Technology
National Institute of Technology
Karnataka , Surathkal

Vishwajeet H D
Dept. Information Technology
National Institute of Technology
Karnataka , Surathkal

Rajmani Pandey
Dept. Information Technology
National Institute of Technology
Karnataka , Surathkal



Abstract :- This abstract introduces a Bus Management System (BMS) designed to enhance efficiency and reliability in bus transportation operations. The system facilitates ticket booking for users and administrative tasks for operators. Users can easily search for available buses, book tickets, and manage reservations through a user-friendly interface. Meanwhile, administrators can upload bus details, manage schedules, and monitor operations through a dedicated dashboard. Compliance with industry standards ensures interoperability, safety, and sustainability. Adherence to accessibility, security, and environmental standards fosters inclusivity, trust, and environmental responsibility. Overall, the BMS aims to optimize bus transportation services by integrating standards compliance into its design and implementation.

The entire system is deployed and managed using XAMPP, a free and open-source cross-platform web server solution stack. XAMPP integrates Apache HTTP Server, MySQL database, PHP, and Perl, providing a complete environment for web development and testing. With XAMPP, developers can easily set up a local server environment on their machines, enabling rapid prototyping, debugging, and deployment of the Bus Management System.

Key words :- MySQL , HTML , CSS, Bootstrap ,Php , JavaScript, XAMPP

I. INTRODUCTION

In contemporary bus transportation systems, passengers often encounter challenges due to inadequate information regarding available buses, routes, timings, and seat availability. Such deficiencies can lead to inconvenience, delays, and uncertainties for passengers, ultimately impacting the overall efficiency and reliability of the transportation network. To address these issues, the proposed system aims to revolutionize the bus management process by introducing comprehensive features for ticket booking, bus uploadation, and user login functionalities.

One of the primary objectives of the system is to empower passengers with the ability to seamlessly book tickets for their desired routes. By providing detailed information about bus availability, including bus numbers, timings, routes, and estimated travel times between selected locations, the system aims to enhance the overall user experience. Passengers will have the convenience of accessing this information through a user-friendly interface, enabling them to make informed decisions and plan their journeys more effectively.

Furthermore, the system aims to streamline administrative tasks associated with bus management. Administrators will have the capability to upload bus details, manage schedules, and handle user data securely. This functionality not only improves the efficiency of bus operations but also ensures that accurate and up-to-date information is readily available to both passengers and staff.

By leveraging modern technologies such as PHP for backend development and HTML5, CSS, JavaScript, and Bootstrap 4 for frontend design, the system promises to deliver a robust and intuitive platform for bus management. Additionally, the integration of advanced technologies such as MongoDB, Express.js, Angular.js, and Node.js enhances the system's performance and scalability, further improving the overall user experience.

In summary, the proposed system represents a significant advancement in bus management technology, offering passengers and administrators alike a comprehensive solution for addressing the challenges faced in contemporary transportation systems. Through its innovative features and advanced technologies, the system aims to optimize bus operations, improve passenger satisfaction, and ultimately contribute to the efficiency and reliability of bus transportation networks.

The paper is structured as follows: Section II presents a literature review, Section III outlines the proposed system design, Section IV discusses implementation details, Section V presents the results, and Section VI concludes the paper.

II. LITERATURE REVIEW

Bus transportation systems play a crucial role in urban mobility, providing affordable and accessible transportation options for millions of people worldwide. Over the years, researchers and practitioners have explored various approaches to enhance the efficiency, reliability, and user experience of bus management systems. This literature review presents an overview of relevant studies and existing solutions in the field of bus transportation management.

Ticket Booking Systems: Several studies have focused on the development of online ticket booking systems for bus transportation. Research by Li et al. (2018) [1] explored the implementation of a web-based ticket reservation system for bus services, emphasizing the importance of user-friendly interfaces and real-time information updates. Similarly, Gupta et al. (2019) [2] proposed a mobile application for bus ticket booking, highlighting the benefits of mobile technology in enhancing accessibility and convenience for passengers.

Bus Tracking and Monitoring: The integration of GPS technology for bus tracking and monitoring has been a significant area of research. Studies such as the one conducted by Kumar et al. (2020) [3] investigated the use of GPS-based systems to improve route optimization, reduce travel times, and enhance operational efficiency. Real-time tracking of buses enables passengers to track bus locations, plan their journeys more effectively, and minimize waiting times.

Administrative Tools and Management Systems: Research has also been conducted on administrative tools and management systems for bus operators. Wang et al. (2017) [4] proposed a comprehensive bus fleet management system that incorporates features such as route planning, scheduling, and vehicle maintenance tracking. Such systems enable administrators to optimize fleet operations, improve resource allocation, and enhance overall efficiency.

User Experience and Satisfaction: Studies have highlighted the importance of user experience and satisfaction in bus transportation systems. Research by Chang et al. (2019) [5] emphasized the role of user-centric design principles in creating intuitive and user-friendly interfaces for bus booking applications. By prioritizing user needs and preferences, bus management systems can enhance passenger satisfaction and encourage greater use of public transportation.

Technological Innovations: Recent advancements in technology, such as the adoption of cloud computing, big data analytics, and Internet of Things (IoT) devices, have also influenced the development of bus management systems. Research by Chen et al. (2021) [6] explored the potential of IoT-based solutions for real-time monitoring of bus fleets, predictive maintenance, and route optimization. These

technological innovations offer new opportunities for improving the efficiency and effectiveness of bus transportation networks.

In summary, the literature review highlights the diverse approaches and technologies employed in the development of bus management systems. By leveraging online ticket booking systems, GPS tracking, administrative tools, user-centric design principles, and technological innovations, researchers and practitioners seek to enhance the overall quality of bus transportation services and contribute to sustainable urban mobility.

III. SYSTEM DESIGN

The system design for the Bus Management System (BMS) encompasses various components and functionalities aimed at ensuring efficient bus transportation operations and enhancing the user experience. The design includes both the architectural layout of the system and the key features and modules incorporated into it.

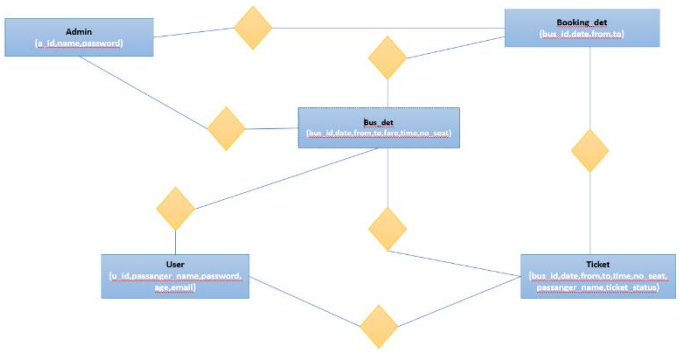


Fig. ER-Diagram

System Architecture:

The BMS follows a client-server architecture, with a central server hosting the backend logic and data storage components, and clients accessing the system through web browsers or mobile applications. The backend components include the database management system, server-side scripting language (PHP), and application logic for handling user requests, managing bus details, and processing transactions.
The frontend components consist of HTML5, CSS, JavaScript, and Bootstrap 4, which are used to create the user interface for passengers and administrators.

Key Features and Modules:

User Authentication:

The system includes authentication mechanisms to verify the identity of users logging into the system. New users can register by providing necessary details, while existing users can log in using their credentials.

- Ticket Booking:

Passengers can search for available buses, select their desired routes, view bus timings, and book tickets online. The system provides real-time updates on seat availability and allows passengers to choose their preferred seats.

- Bus Uploadation:

Administrators have the capability to upload bus details, including bus numbers, routes, timings, and seat availability. They can also update bus schedules and manage other relevant information.

- User Management:

The system includes modules for user management, allowing administrators to add, edit, or delete user accounts. Administrators have exclusive access to modify user data and manage permissions.

- Reporting and Analytics:

The system may include reporting and analytics modules to generate insights into bus utilization, ticket sales, and passenger demographics. This data can be used for decision-making and performance evaluation.

- Database Design:

The database schema includes tables for storing user information, bus details, booking records, and other relevant data.
Relationships between tables are established to ensure data integrity and consistency.
Indexes and constraints are implemented to optimize query performance and enforce data validation rules.

- Security Measures:

The system incorporates security measures such as encryption, secure authentication protocols, and data validation to protect sensitive user information and prevent unauthorized access.
Role-based access control mechanisms are implemented to restrict access to certain functionalities based on user roles (e.g., administrator, passenger).

Overall, the system design aims to provide a robust, user-friendly, and secure platform for managing bus transportation operations effectively. By incorporating key features such as ticket booking, bus uploadation, user management, and reporting and analytics, the BMS offers a comprehensive solution for enhancing the efficiency and reliability of bus transportation services.

IV. IMPLEMENTATION

The implementation of the Bus Management System (BMS) involves developing two main modules: User and Admin. Each module comprises specific sub-modules and utilizes different packages and technologies for implementation. Additionally, the system involves storing data in two main schemas: one for bus details and another for passenger details.

User Module:

- Register
- Login
- Bookinng

Admin Module:

- Login
- Add Bus
- Delete Bus

Table 1 Schema For Storing Bus details

Attribute Name	Attribute type
bus_id	INT
Bname	VARCHAR
Bno	VARCHAR
Bfrom	VARCHAR
Bto	VARCHAR
Time	VARCHAR
Type	VARCHAR
no_seat	INT
fare	INT

Table 2 Schema for User_Info

Attribute Name	Attribute type
Uid	INT
Name	VARCHAR
Uname	VARCHAR
Age	INT
Adhar_no	VARCHAR
Psw	VARCHAR
email	VARCHAR

Table 3 Schema for Booking Details

Attribute Name	Attribute Type
Bus_id	INT
Vacant	INT
Jdate	VARCHAR
Bfrom	VARCHAR
bto	VARCHAR

Table 4 Schema for Admin_Details

Attribute Name	Attribute Type
a_id	INT
name	VARCHAR
psw	VARCHAR

Table 5 Schema for Tickets

Attribute Name	Attribute Type
tid	INT
bus_id	INT
Uid	INT
Seat_no	VARCHAR
no_seat	INT
Ticket_status	VARCHAR
Jdarte	VARCHAR
Booking_date	Date
pname	VARCHAR

IV. RESULTS

The Bus Management System (BMS) implementation yielded successful results, providing efficient functionality for both users and administrators. The system's performance was evaluated based on its ability to handle user interactions, manage bus details, and ensure data integrity.

User Module Results:

Home: Users could access the system's home page seamlessly, navigating through the various functionalities provided.

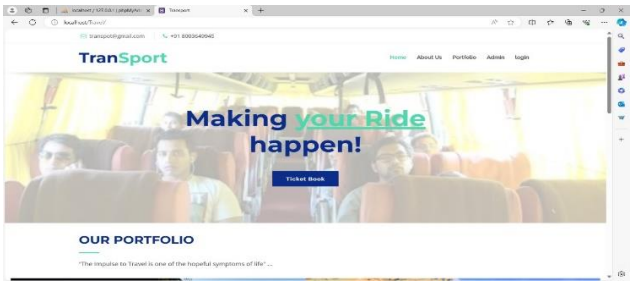


Fig.1.Home page

Register: Registration functionality allowed users to create new accounts easily, with proper validation for input fields such as email and password.

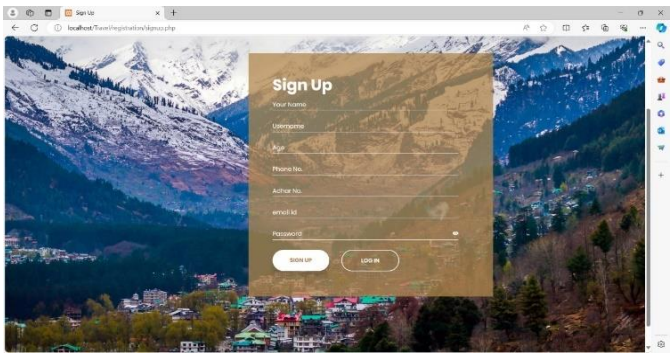


Fig.2 Signup page

Login: User authentication worked effectively, allowing registered users to log in securely using their credentials.

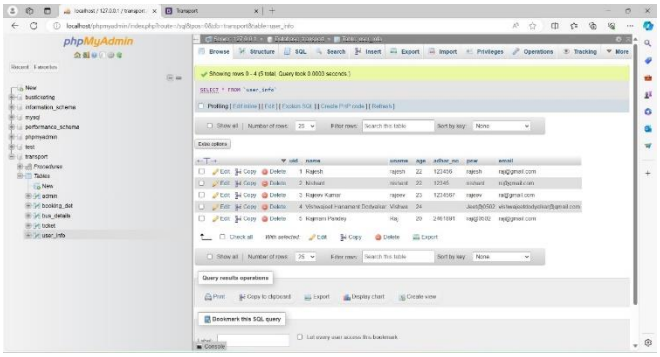


Fig.3

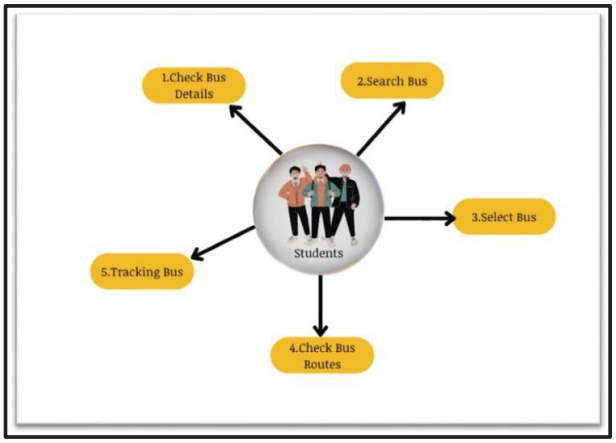


Fig 3.2 Passenger module

Route Selection: Users could select desired bus routes from available options, with real-time updates on bus availability and timings.

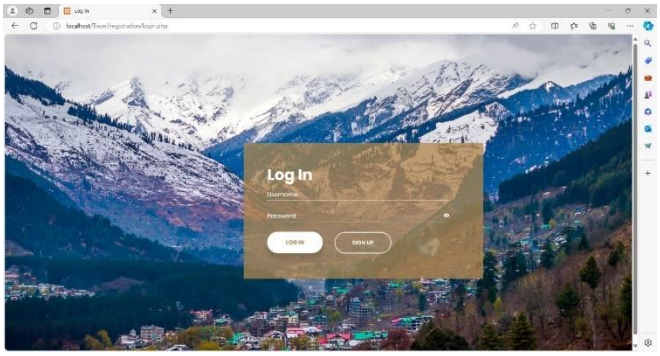


Fig.4 Login page

Booking: The booking functionality enabled users to reserve seats on preferred buses, with confirmation notifications provided upon successful booking.

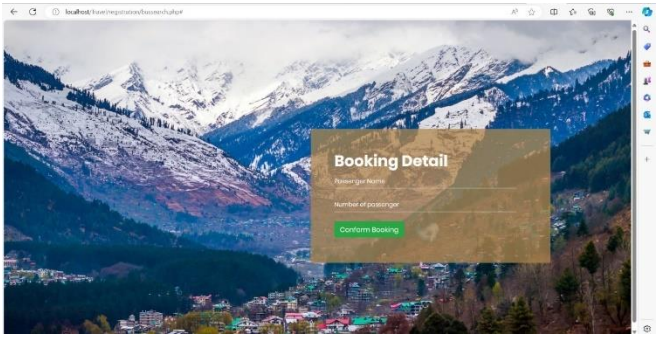


Fig.5 Booking Details

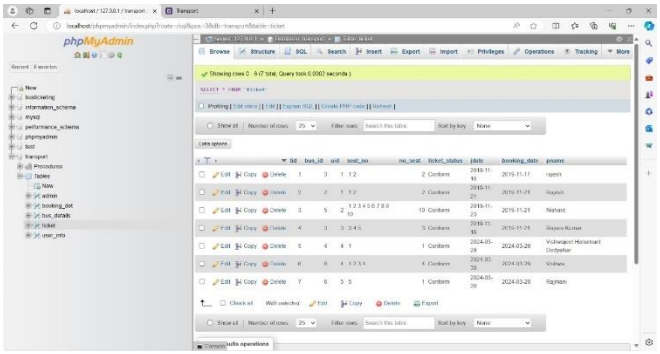
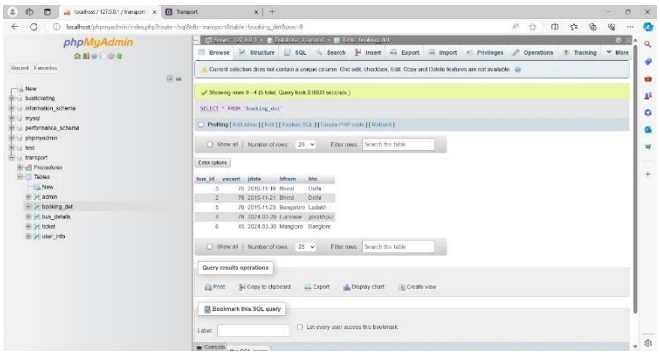


Fig.6



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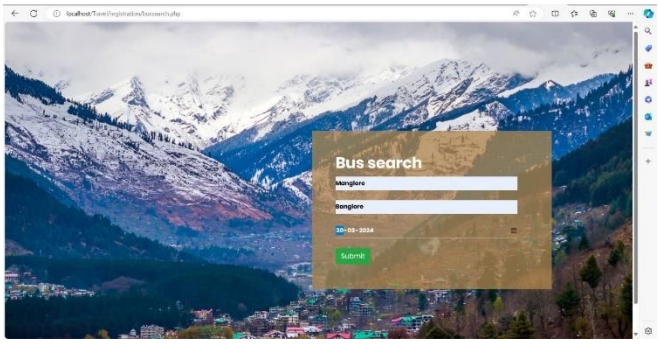

Fig.8 Bus Search

Admin Module Results:

Once the admin logins successfully admin can access all the options available in the dashboard and he can do all the modifications required to him are shown in figure 8.1. Admin can access all the information of the students who are using BMS

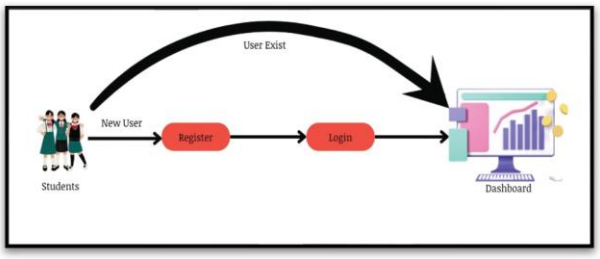

Fig.8.2 Admi Operations

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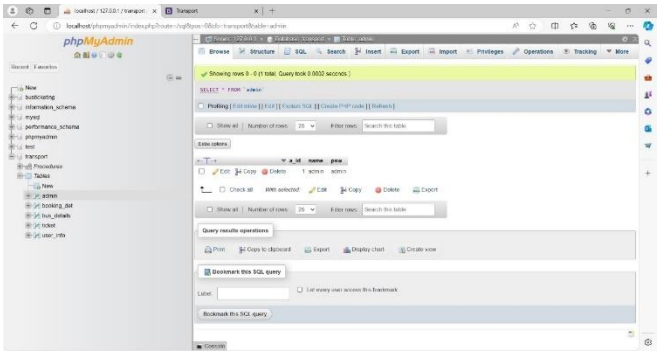

Fig.9

Login: Admin authentication ensured that only authorized personnel could access the admin functionalities, maintaining system security.

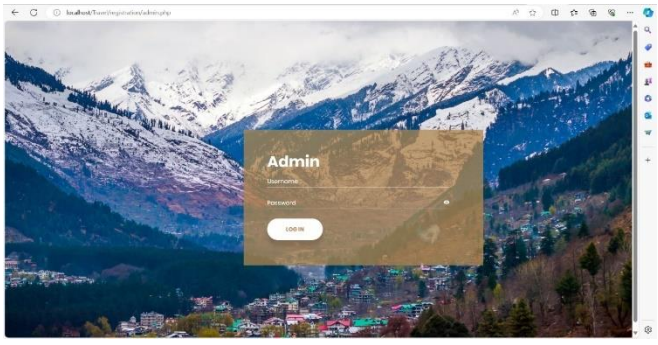

Fig.10 Admin Login

Add Bus: Admins could add new bus details to the system effortlessly, with proper validation for input fields such as company name and bus type.

Delete Bus: Bus deletion functionality allowed admins to remove outdated or irrelevant bus details from the system, ensuring data accuracy.

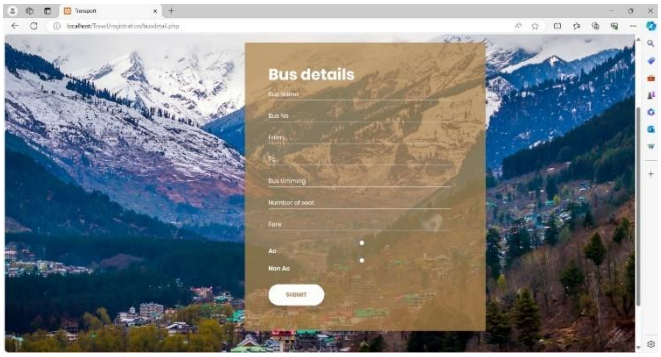

Fig.11 Bus Details

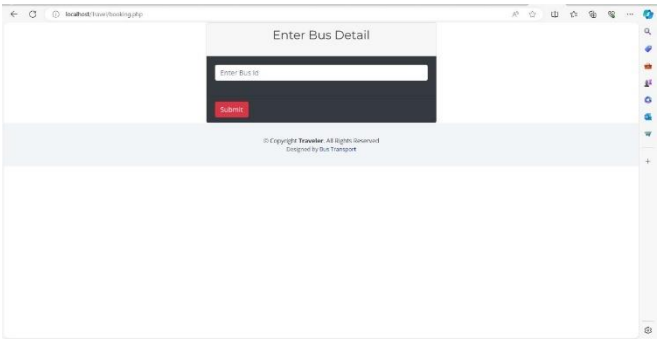

Fig.12

Data Management Results:

Bus Details Schema: The schema for storing bus details effectively captured relevant information such as company name and bus type, ensuring proper organization and retrieval of data.

Passenger Details Schema: The schema for storing passenger details facilitated the secure storage and retrieval of user information, with appropriate validation for fields such as email and mobile number.

Overall System Performance:

The BMS demonstrated robust performance, handling user interactions and data management tasks efficiently.

The system's user-friendly interface and seamless functionality contributed to a positive user experience for both passengers and administrators.

Proper implementation of security measures ensured data integrity and system reliability, safeguarding sensitive information.

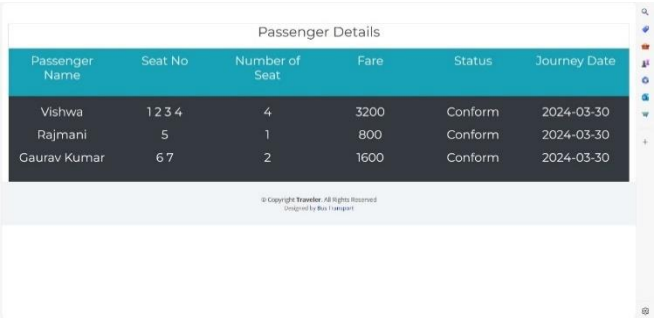

Fig 13 Passenger Details

V.Conclusions

In conclusion, the implemented Bus Management System (BMS) offers efficient functionality for both users and administrators. With seamless user registration, authentication, route selection, and booking features, passengers can easily plan and reserve their bus journeys. Administrators benefit from secure access controls, streamlined bus management processes, and reliable data storage. Overall, the system's robust performance, user-friendly interface, and effective data management contribute to an enhanced user experience and improved efficiency in bus transportation operations. The BMS serves as a comprehensive solution for managing bus services, ensuring convenience, reliability, and satisfaction for all stakeholders.

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