International Journal of Information Technology & Computer Engineering

ISSN 2347–3657

Volume 14, Issue 2, 2026

Gym Management System

G Geetha Devi[1], Balabathuni Srividya[2], Syed Muskan[3], Kanchanapally Sandhya[4]

[1]Assistant Professor; Department Of Information Technology Bhoj Reddy Engineering College For Women Hyderabad India

[2,3,4]B.Tech Student's; Department Of Information Technology Bhoj Reddy Engineering College For Women Hyderabad India

Mail Id's; sandhyakanchnapally@gmail.com

Abstract

The Gym Management System is a web-based application developed to simplify and automate the daily operations of a gym. The system focuses on managing member information, membership plans, payments, and attendance efficiently without the need for manual record-keeping. The primary objective of this project is to provide an easy-to-use platform for both administrators and members. Members can register, log in, view available membership plans, select suitable plans, make payments, Gym Assistant and mark their attendance. The administrator can manage member details, update membership plans, monitor payments. This system is developed using web technologies such as HTML, CSS, PHP, and MySQL, ensuring a user-friendly interface and reliable data storage. By eliminating manual processes, the system reduces errors, saves time, and improves overall efficiency in gym management. The project is designed without a trainer module, focusing only on core functionalities such as membership management and payment handling. It is suitable for small to medium-sized gyms and serves as a basic model for further enhancements.

Keywords: *Gym Management System, Membership registration, Workout plans, Member Management, Payment System, Gym Assistant, Admin Dashboard.*

Introduction

The Gym Management System is a web-based application developed to automate and simplify the daily operations of a gym. Traditional gym management relies on manual record-keeping, which can be time-consuming, error-prone, and difficult to maintain [12]. This project provides a digital solution to manage member information, membership plans, and payment records efficiently [3][2].The system allows members to register, log in, view available membership plans, select suitable plans, and make payments through an easy-to-use interface [1][4]. It also enables administrators to manage member details, update plans, and monitor payment transactions in a centralized system [6][5]. An important feature of this project is the Gym Assistant, implemented as a chatbot. It helps users by answering common queries and guiding them through various functionalities, thereby improving user interaction and reducing manual support [13]. In addition, the system includes a Body Mass Index (BMI) calculator that helps users evaluate their fitness level based on height and weight. Based on the BMI result, the system provides a basic diet plan to support users in maintaining a healthy lifestyle.The project is developed using HTML, CSS, PHP, and MySQL, ensuring efficient data storage and a user-friendly interface [1][2][3][4]. The system focuses on core functionalities without including a trainer module.

Related Work

Survey

In recent years, various systems have been developed to improve the management of gym and fitness centers. Traditionally, gyms relied on manual methods such as maintaining registers and physical records to handle member information, membership plans, and payment details. This approach was time-consuming, error-prone, and inefficient, especially as the number of members increased.With the advancement of technology, computerized systems were introduced to overcome these limitations. Many gym management systems now use web-based or desktop applications to store and manage data digitally. These systems provide functionalities such as member registration, login, plan management, and payment tracking, ensuring better organization and faster access to information.Some systems also focus on improving user convenience by providing online access to services. Members can view plans, update details, and make payments through digital platforms. However, many systems are limited to basic features and do not provide interactive support or intelligent assistance to users.

Recent developments have introduced chatbot-based systems that enhance user interaction by providing instant responses and guiding users.

Requirement Analysis

Functional Requirements

The Gym Management System is a web-based application developed to efficiently handle and automate gym operations. It provides a structured platform where both members and administrators can interact with the system according to their assigned

International Journal of Information Technology & Computer Engineering
ISSN 2347–3657
Volume 14, Issue 2, 2026

roles. The system incorporates secure authentication mechanisms to ensure controlled access for all users. Members are allowed to register, log in securely, view available membership plans, select suitable plans, and complete payment transactions through the system. On the administrative side, the system enables management of users, membership plans, and related operational data. In addition to these core functions, the system also integrates intelligent features such as a Gym Assistant chatbot to guide users, a Body Mass Index (BMI) calculator, and personalized diet plan recommendations, thereby improving overall user engagement and experience.

Non-Functional Requirements

The system is designed with a strong emphasis on performance, security, usability, scalability, reliability, and availability to ensure smooth and efficient operation. It provides a user-friendly interface that allows users to navigate and perform tasks easily without technical complexity. Data security is maintained through authentication mechanisms and controlled access policies to prevent unauthorized usage. The system is also designed to handle multiple users simultaneously without compromising performance. Furthermore, it ensures consistent data processing, reliable system behavior, and continuous availability of essential services, thereby supporting uninterrupted user access and operational stability.

Performance

The system is expected to deliver fast response times for user actions such as login, membership selection, and payment processing. It is designed to efficiently handle multiple concurrent users while maintaining stable performance under normal operational conditions. The overall architecture ensures that system responsiveness is not affected during routine usage.

Security

Security is a critical aspect of the system, where secure authentication mechanisms are implemented for both members and administrators. The system ensures that sensitive user information is protected from unauthorized access and misuse. Proper validation techniques are applied at various stages to maintain data integrity and prevent security vulnerabilities.

Scalability

The system architecture is designed to support future expansion in terms of both users and data volume. It allows integration of additional features and modules without requiring major structural modifications. Even as the system grows, performance efficiency is maintained through scalable design principles.

Computational Resources

Software Requirements

The system is developed using standard web technologies, where the frontend is implemented using HTML, CSS, and JavaScript to build the user interface. The backend logic is handled using PHP, while MySQL is used as the database management system for storing and managing all system data. The development process is carried out using Visual Studio Code as the primary code editor.

Hardware Requirements

The system requires a minimum hardware configuration consisting of an Intel i5 or higher processor, at least 8 GB RAM, and a minimum of 500 GB hard disk storage to ensure smooth development, testing, and deployment.

Design

Architecture

System Architecture

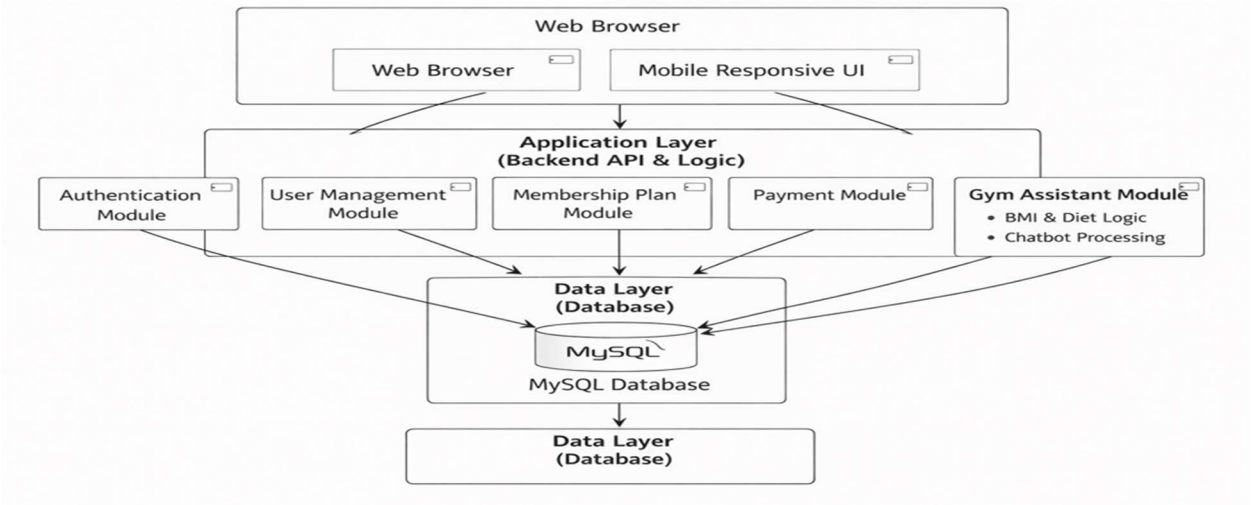

Fig. 1 System Architecture

International Journal of Information Technology & Computer Engineering
ISSN 2347–3657
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The Gym Management System is designed based on a three-tier architecture that divides the system into presentation, application, and database layers. This layered approach improves modularity, enhances security, and simplifies system maintenance and future upgrades. Each layer performs a specific function and communicates with the others to ensure smooth system operation. The presentation layer represents the user interface of the system and is developed using HTML, CSS, and JavaScript. It provides an interactive platform through which both members and administrators can access system functionalities such as registration, login, browsing membership plans, selecting subscriptions, and making payments. This layer also includes a chatbot interface that assists users by answering queries and guiding them through the system. The focus of this layer is to ensure usability, responsiveness, and a seamless user experience. The application layer, developed using PHP, serves as the core processing unit of the system. It handles business logic and processes all requests received from the presentation layer. This includes validating user credentials, managing member data, handling membership plans, processing payments, calculating BMI, and generating personalized diet recommendations. It also manages chatbot logic and ensures secure execution of all system operations. The database layer is implemented using MySQL and is responsible for storing and managing all system data, including user profiles, membership details, payment records, and related information. It supports efficient data operations such as insertion, retrieval, updating, and deletion while maintaining data consistency and integrity. The application layer interacts with the database layer to execute these operations effectively. Communication between the layers follows a structured flow where user requests from the presentation layer are processed by the application layer, which then interacts with the database layer. The processed results are finally returned to the presentation layer for display to the user.

Technical Architecture

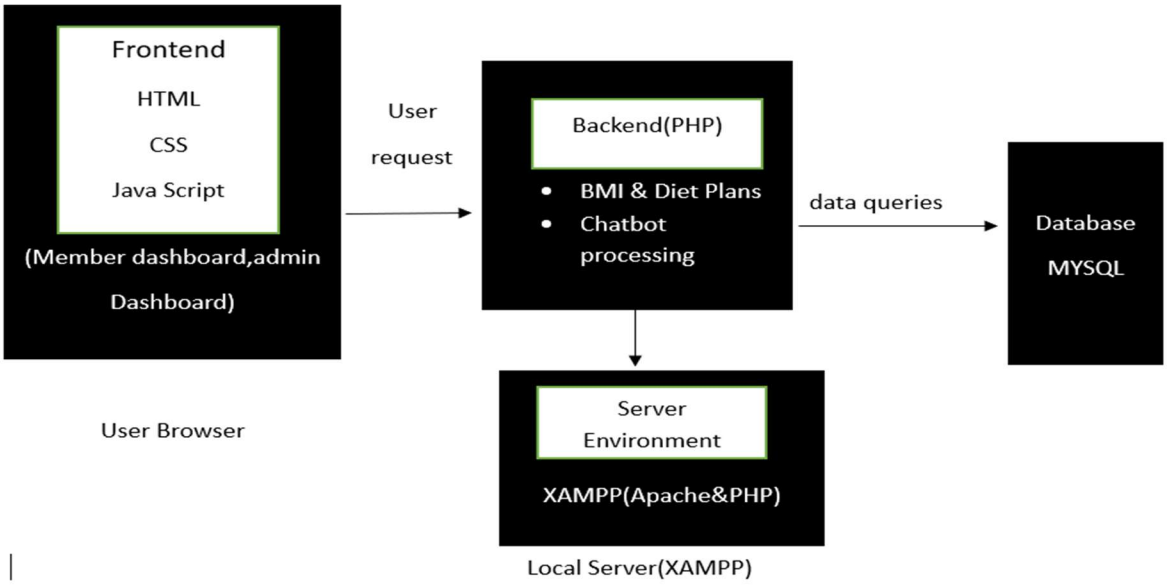

Fig. 2 Technical Architecture

The system follows a client-server architecture model to ensure efficient communication between the user interface, backend processing, and database system. This architecture enhances scalability, maintainability, and security while supporting seamless integration of multiple technologies. The frontend layer is developed using HTML, CSS, and JavaScript, which define the structure, design, and interactivity of the web application. It allows users to perform key operations such as registration, login, viewing workout plans, selecting memberships, making payments, and interacting with the chatbot. This layer ensures a responsive and user-friendly experience across different devices and browsers. The backend layer is implemented using PHP, which handles the core logic of the system. It processes user requests, validates input data, manages sessions, and executes business operations. Additionally, it supports functionalities such as profile updates, membership management, BMI calculation, and personalized diet plan generation. It acts as a bridge between the frontend and the database. MySQL is used as the database management system to store structured data such as user information, payment records, membership plans, workout schedules, and diet details. It ensures data integrity, consistency, and efficient retrieval through optimized queries. The system is deployed using XAMPP, which integrates Apache, PHP, and MySQL

International Journal of Information Technology & Computer Engineering
ISSN 2347–3657
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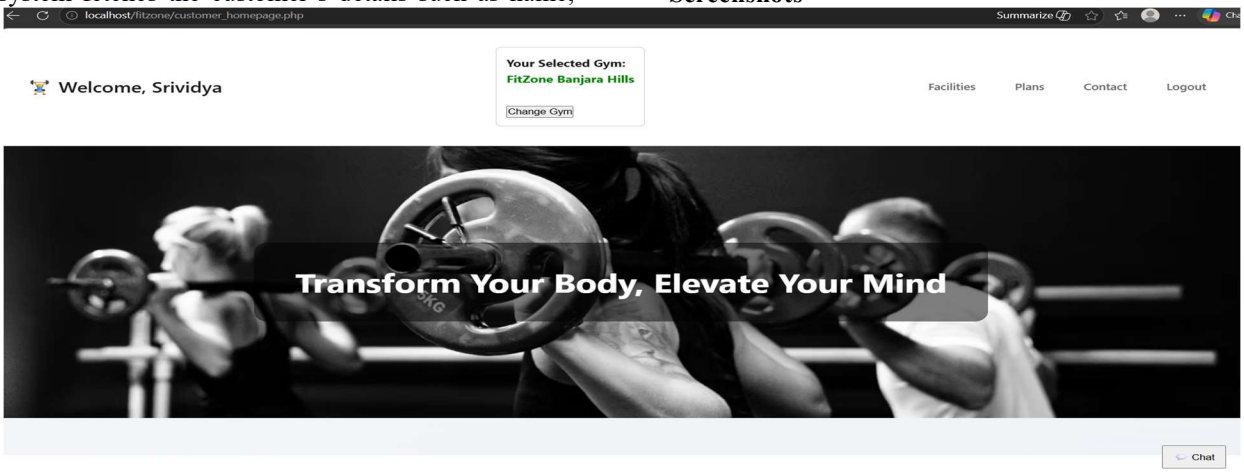
into a single development environment. The application is accessed through web browsers such as Google Chrome, ensuring cross-platform compatibility and smooth user interaction

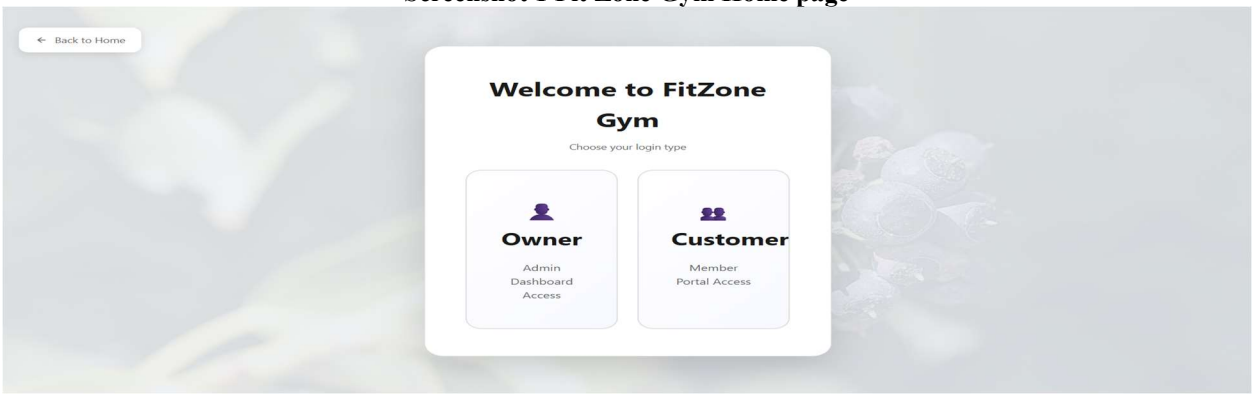
Implementation

The implementation of the Gym Management System is carried out using PHP as the backend language, MySQL as the database, and standard web technologies for the frontend. The system is built in a modular way to ensure separation of concerns and easy maintenance. Two major functional modules are implemented here: the customer dashboard and the owner (admin) management interface. These modules handle user interaction, data retrieval, and administrative control over membership plans and payments. The customer dashboard module is responsible for displaying personalized information to the logged-in user. It establishes a connection with the MySQL database using PHP and retrieves user-specific data based on the provided username. The system validates the user input to ensure security and prevents unauthorized access. Once authenticated, the system fetches the customer's details such as name, email, phone number, and membership status from the database. The interface dynamically displays whether the user has an active or inactive membership plan, along with relevant plan details such as start date, end date, and plan name. The dashboard is designed using HTML and CSS to provide a clean and responsive user interface, ensuring a smooth user experience. The owner (admin) module is responsible for managing customer subscriptions and payment records. It interacts with the database to retrieve all plan-related data and displays it in a structured tabular format. Before rendering the data, the system automatically updates expired plans by comparing the current date with the stored end date. This ensures that membership statuses remain accurate and up to date. The admin interface also supports viewing payment receipts, plan details, and customer information. Visual indicators such as status badges are used to differentiate between active, expired, and pending plans. This module enhances administrative efficiency by centralizing all management operations in a single interface.

Screenshots

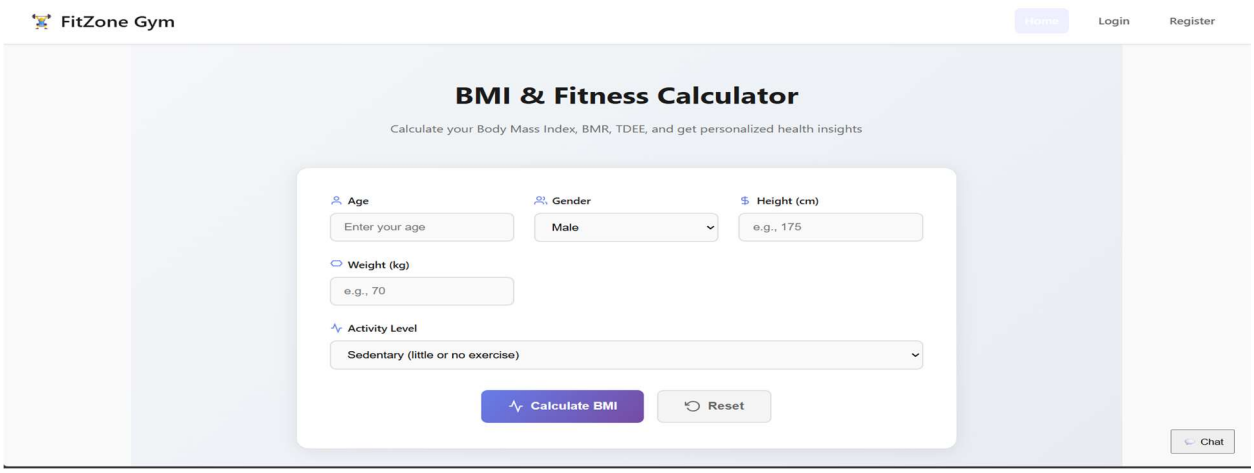


Screenshot 1 Fit Zone Gym Home page

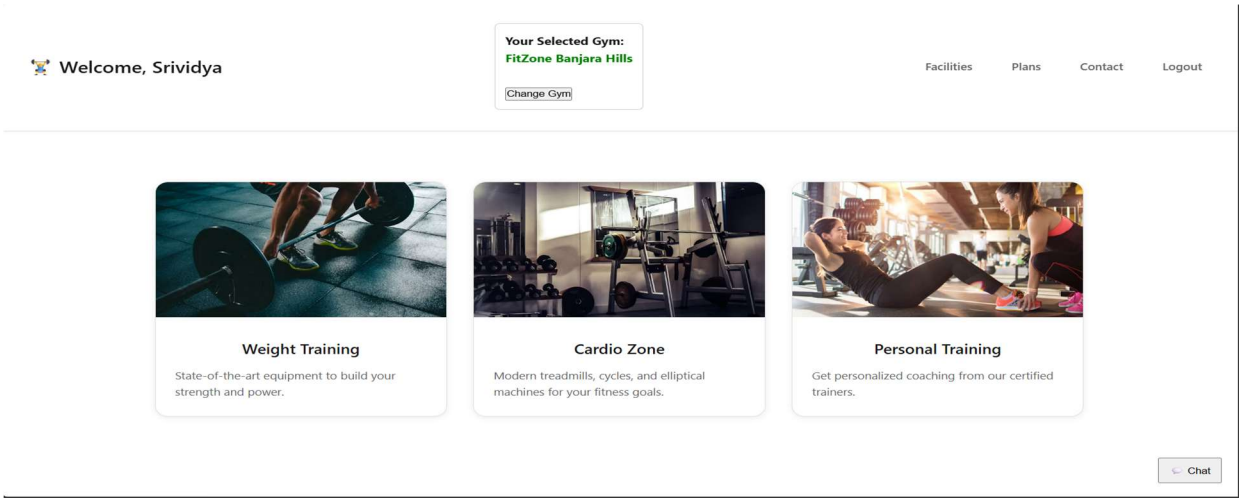


Screenshot 2

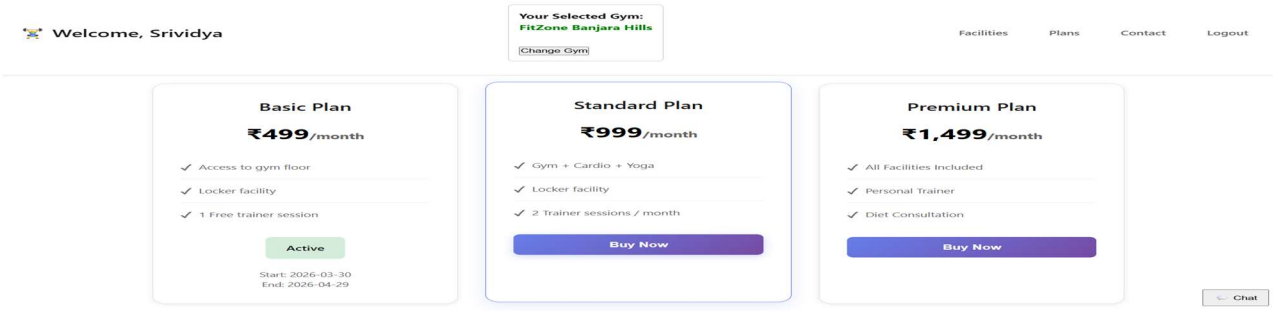
International Journal of Information Technology & Computer Engineering
ISSN 2347–3657
Volume 14, Issue 2, 2026



Screenshot 3



Screenshot 4



Screenshot 5

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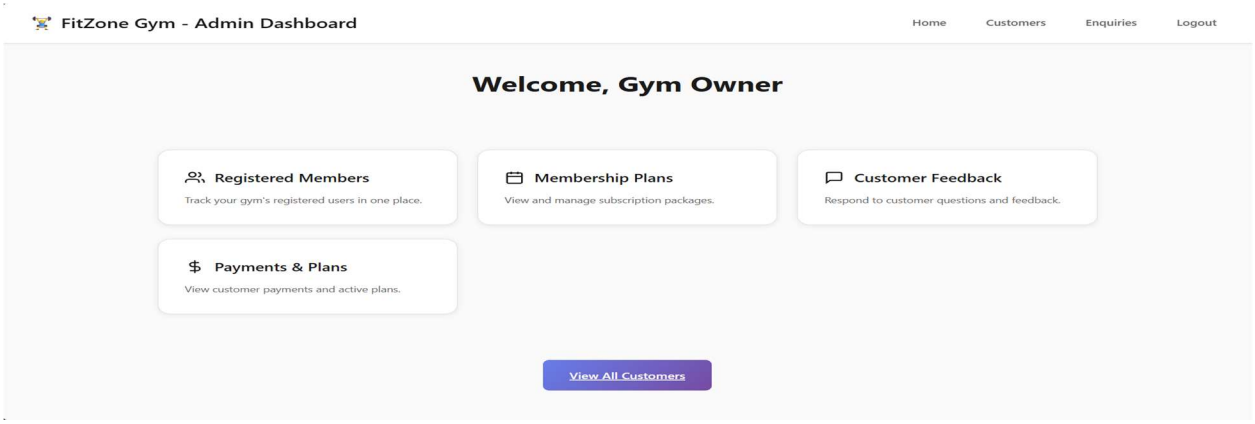
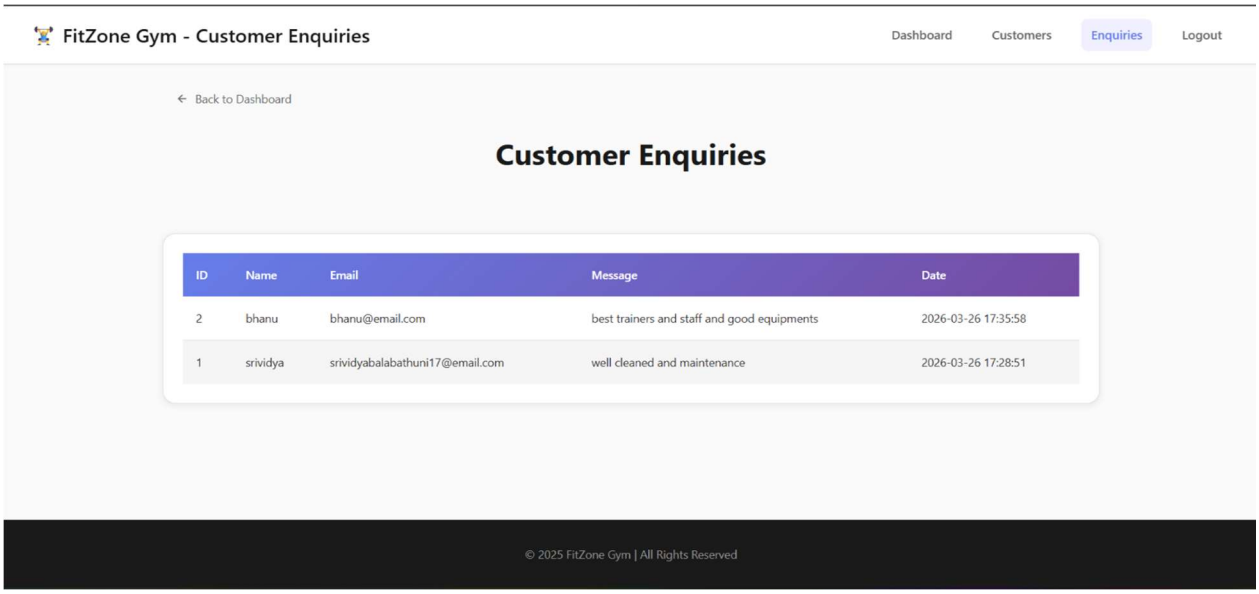
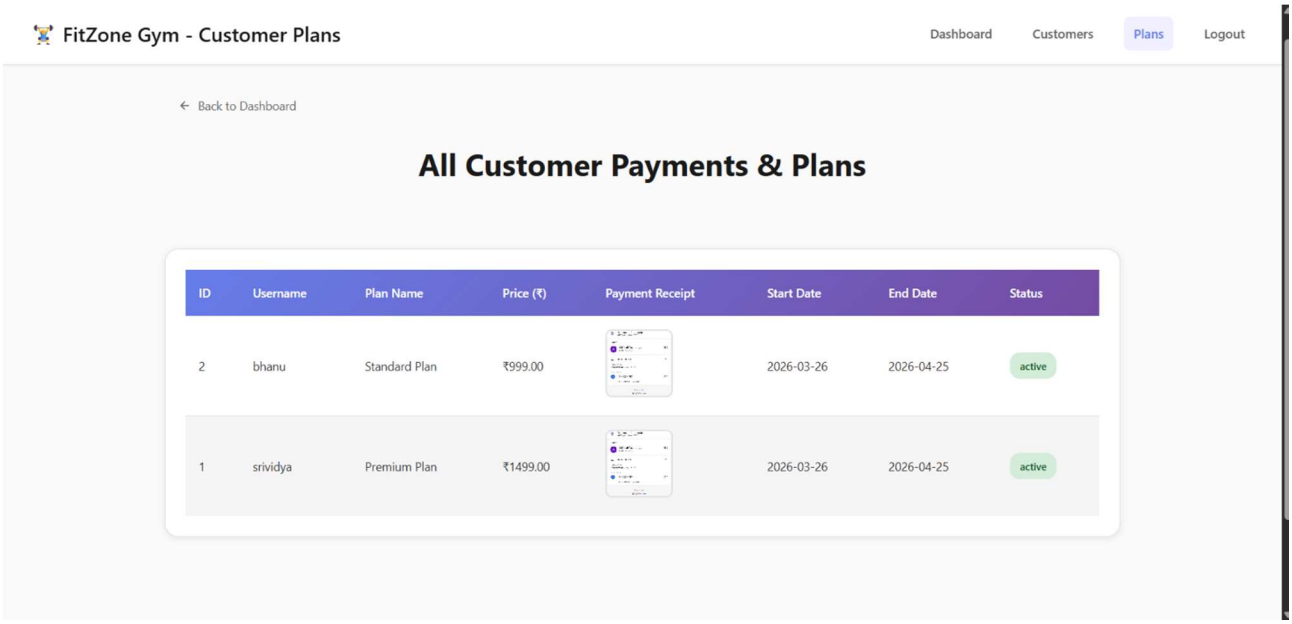


Screenshot 6



Screenshot 7



Screenshot 8

Test Cases

The system has been evaluated through multiple test cases to verify its correctness, reliability, and functionality across different modules. In the User Management module, the system successfully handles user registration and login operations. Valid registration and login attempts are processed correctly, while attempts to register with duplicate credentials are expected to be rejected to maintain data integrity. However, in some cases, duplicate validation may not function as intended, which indicates a need for stronger input validation mechanisms. In the Membership Plan Management module, the system correctly displays available plans to users. While plan retrieval works as expected, duplicate plan insertion is not fully restricted in all scenarios, indicating partial implementation of constraint handling. The Payment Management module ensures that users can successfully complete transactions when valid data is provided. However, in cases where a user attempts payment without selecting a plan, the system should ideally display an error message, though inconsistent validation may lead to incorrect processing in some instances. For the Admin Management module, the system validates both correct and incorrect login credentials. While successful login works properly, certain invalid credential checks may still allow access, highlighting the importance of improving authentication security. The Gym Assistant Chatbot module responds appropriately to both valid and invalid user queries. It provides correct answers for fitness-related questions such as BMI and returns default responses for unknown inputs, ensuring consistent interaction behavior. In the BMI Calculation module, correct inputs produce accurate results, while invalid inputs such as zero or missing values should ideally trigger error handling. However, incomplete validation may still allow incorrect calculations in some cases.

Conclusion

The Gym Management System successfully demonstrates the integration of web technologies to automate and simplify gym operations. It provides a centralized platform where users can register, log in, and select membership plans with ease. The system also supports secure payment processing, which enhances convenience and reduces manual intervention.From the administrative perspective, the system enables efficient management of users, membership plans, and payment records. This reduces operational workload and minimizes human errors in record keeping. The inclusion of additional features such as BMI calculation and a Gym Assistant chatbot further enhances user engagement by providing personalized fitness insights and real-time support.

Future Scope

The Gym Management System has significant potential for future enhancement. One of the major improvements could be the development of a mobile application, allowing users to access services anytime and anywhere. This would greatly improve accessibility and user convenience. Another possible enhancement includes the integration of online trainer booking functionality, enabling users to schedule sessions with fitness trainers based on availability. Additionally, the system can be extended to include personalized workout tracking and diet monitoring features to help users achieve their fitness goals more effectively. Integration with advanced payment gateways can further improve transaction security and speed. The existing chatbot system can also be upgraded using artificial intelligence techniques to provide more intelligent and context-aware responses

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