

EduStay: A Comprehensive Full-Stack Architecture for Unified Student Housing and Dining Service Discovery with AI-Augmented Location-Based Search

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Abstract-The increasing demand for student accommodation has created challenges in finding secure, affordable, and reliable housing near educational institutions. Traditional accommodation search methods are often time-consuming, lack transparency, and depend heavily on intermediaries. EduStay is a web-based accommodation management platform developed to simplify the process of discovering, managing, and booking student housing through a centralized digital system. The platform enables students to browse verified accommodation listings, compare facilities, and interact with property owners through an intuitive interface. Built using modern technologies such as React, Spring Boot, MySQL, and JWT-based authentication, the system ensures secure access and efficient data management while supporting role-based functionalities for students, property owners, and administrators. By reducing dependency on brokers, improving transparency, and providing a seamless user experience, EduStay helps students find PGs, hostels, and food services near colleges through a centralized web platform. The system provides filtered search, verified listings, JWT-based authentication, and booking management using React.js, Spring Boot, and MySQL.

Key Words: Student Accommodation, Accommodation Management System, Hostel Booking Platform, Student Housing, Spring Boot, React.js, MySQL Database, JWT Authentication, Role-Based Access Control, Web-Based Management System.

1. INTRODUCTION

The rapid growth of educational institutions and increasing student migration for higher studies have significantly raised the demand for suitable accommodation facilities. Students often face difficulties in finding secure, affordable, and well-equipped housing due to fragmented information sources, lack of transparency, and dependence on brokers or manual inquiries. Traditional accommodation search processes are time-consuming and may not provide accurate details regarding room availability, pricing, facilities, and location. As a result, students experience challenges in making informed decisions while property owners struggle to efficiently manage and promote their accommodations.

To address these issues, EduStay has been developed as a web-based accommodation management platform that connects students with accommodation providers through a centralized digital system. The platform enables users to search and compare verified accommodation listings, view detailed property information, and manage bookings through an intuitive interface. Developed using modern technologies such as React, Spring Boot, MySQL, and JWT-based authentication, EduStay ensures secure access, efficient data management, and role-based functionality for different user groups. By streamlining the accommodation search and management process, the proposed system enhances transparency, improves user experience, and contributes to the digital transformation of student housing services.

2. LITERATURE SURVEY

[1] Niranjana et al. (2026) describe **PGConnect**, a three-tier web portal for student accommodations in India. They note that traditional methods (physical visits, brokers) are “*time-consuming, not transparent enough*,” often leading to students encountering hidden costs. PGConnect’s approach is a responsive React frontend with a Laravel backend and PostgreSQL, delivering authenticated search results and advanced filtering to minimize search time and increase user satisfaction. Their evaluations show substantial reductions in search duration compared to manual methods. This underscores that a dedicated student-oriented platform can greatly improve efficiency and trust. This study explores the use of artificial intelligence and machine learning to automate various aspects of GitHub repository management, including issue classification, documentation generation, and pull request handling with large language models such as LLaMA. While it enhances repository maintenance and workflow efficiency, it lacks features that help new developers discover relevant repositories to contribute to, as its focus remains on internal automation rather than personalized recommendations.

[2] **Revolutionizing Student Accommodation** (Kotkar et al., 2026) proposes an Android app leveraging a real-time database (Firestore). This system integrates user authentication, document verification, and location-based services, so students can search rental rooms by location, price, and preferences. Notably, it features nearby amenity data: “*Location-based features allow users to view nearby essential facilities such as hospitals, supermarkets, and transport services, supporting informed decision-making*”. The focus on Android mobility and real-time updates reflects modern trends in student platforms, emphasizing accessibility and up-to-date information.

3. Odunuga (2023) examines Student Nest, an app for international students needing rental guarantors. This work highlights user-centered design: the interface guides students through a secure verification process and facilitates communication with guarantors. Even though its focus is on guarantor facilitation, its emphasis on usability and security is relevant: “*The design process follows a user-centered approach, focusing on simplicity, security, and reliability*”.

These principles apply broadly to student housing apps, suggesting that trust (e.g., listing verification) and straightforward workflows are critical for user adoption.

4. OVERVIEW

EduStay is a web-based student accommodation management platform designed to simplify the process of searching, managing, and booking accommodation for students. The system serves as a centralized platform that connects students with accommodation providers, enabling users to access verified property information, compare facilities, and make informed housing decisions. By utilizing modern web technologies, the platform ensures secure access, efficient data management, and an enhanced user experience.

1. Objective:

The primary objective of EduStay is to provide a reliable and user-friendly platform for student accommodation management. The system aims to reduce the challenges associated with traditional accommodation searches by offering verified listings, secure user authentication, efficient property management, and seamless communication between students and accommodation providers. It also seeks to improve transparency, accessibility, and convenience throughout the accommodation process.

2. Core Components:

The EduStay platform consists of several core components that work together to deliver its functionality:

- **User Management Module:** Handles registration, login, authentication, and role-based access control.
- **Accommodation Listing Module:** Allows property owners to add, update, and manage accommodation details.
- **Search and Filtering Module:** Enables students to search accommodations based on location, price, and facilities.
- **Booking and Management Module:** Facilitates accommodation booking and management processes.
- **User Database Management System:** Stores user information, property details, and booking records.

3. Working Principle:

The system operates through a client-server architecture. Users access the platform through a web interface where they can register and authenticate securely. Property owners upload accommodation details, including facilities, pricing, and availability. Students can browse listings, apply filters, and view detailed information before making accommodation decisions. The backend processes user requests, manages data transactions, and communicates with the database to ensure accurate and real-time information availability.

4. Accessibility and Innovation:

EduStay enhances accessibility by providing a web-based platform that can be accessed from any internet-enabled device. The system incorporates modern technologies such as React, Spring Boot, MySQL, and JWT-based authentication to ensure security, scalability, and performance. Its innovative approach lies in integrating accommodation discovery, management, and user interaction within a single platform specifically designed to address the needs of students and accommodation providers.

5. Social Impact:

EduStay contributes positively to society by making student accommodation more accessible, transparent, and efficient. The platform reduces dependence on intermediaries, helping students save time and costs while searching for suitable housing. It also supports accommodation providers by offering a digital platform to reach potential tenants. By improving access to reliable housing information, EduStay promotes better living conditions and supports students in pursuing their educational goals without accommodation-related difficulties.

5. METHODOLOGY

The development of EduStay began with a detailed analysis of the problems faced by students while searching for accommodation. Existing methods often involve manual searches, unreliable information, and dependence on intermediaries. The requirements of both students and accommodation providers were studied to identify the essential features needed in the system.

EduStay follows a web-based client-server architecture that enables seamless communication between users and the application. The system is designed to provide a centralized platform where accommodation providers can manage property listings and students can access accommodation information from a single source.

The frontend of the application is developed using React.js to create an interactive and responsive user interface. The design focuses on improving user experience by providing easy navigation, fast page loading, and accessibility across different devices such as laptops, tablets, and smartphones.

The backend is implemented using Spring Boot, which handles application logic, user requests, and communication with the database. RESTful APIs are used to exchange data between the frontend and backend, ensuring efficient processing and smooth operation of the platform.

MySQL is used as the database management system to store user profiles, accommodation details, booking information, and other system records. The database structure is designed to maintain data integrity, reduce redundancy, and support efficient retrieval of information whenever required.

After implementation, the system undergoes comprehensive testing to verify functionality, performance, and security. Once testing is completed successfully, the application is deployed and maintained to ensure continuous availability, reliability, and future scalability. This methodology enables EduStay to provide a secure, efficient, and user-friendly accommodation management solution.

6. SYSTEM ARCHITECTURE

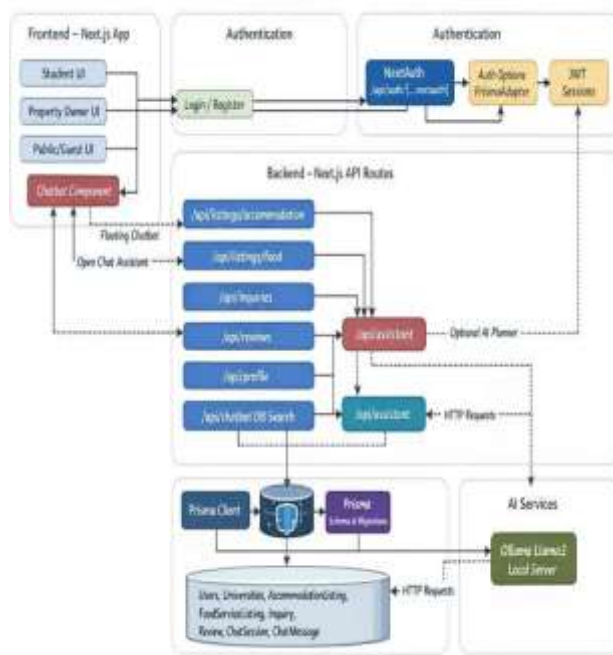


Fig: System Architecture Diagram

The system architecture of EduStay is designed using a three-tier architecture consisting of the presentation layer, application layer, and data layer. This architecture ensures modularity, scalability, and efficient communication between different components of the system. Each layer performs a specific function while maintaining seamless interaction with the other layers.

The presentation layer serves as the user interface of the application and is developed using React.js. This layer enables students, property owners, and administrators to interact with the system through a responsive and user-friendly interface. It handles user inputs, displays accommodation information, and communicates with the backend through API requests.

The application layer is developed using Spring Boot and acts as the core processing unit of the system. It contains the business logic responsible for handling user requests, processing accommodation data, managing bookings, and enforcing system rules. This layer acts as an intermediary between the frontend and the database, ensuring smooth data

flow and efficient request handling.

The authentication and authorization module is integrated within the application layer to provide secure access to the platform. JWT-based authentication is used to verify user identities, while role-based access control ensures that students, property owners, and administrators can access only the functionalities assigned to their respective roles.

The accommodation management module enables property owners to create, update, and manage accommodation listings. Information such as property details, pricing, facilities, images, and availability status is processed through the backend and stored securely in the database. This module ensures that accommodation information remains accurate and up to date.

The database layer is implemented using MySQL and serves as the central repository for all application data. It stores user profiles, accommodation records, booking information, authentication details, and administrative data. The relational database structure ensures data consistency, integrity, and efficient retrieval of information whenever requested by users.

The communication between all system components is achieved through RESTful APIs, which facilitate secure and efficient data exchange between the frontend and backend. This architectural design improves system performance, supports future scalability, and ensures that EduStay can effectively handle increasing numbers of users and accommodation listings while maintaining reliability and security.

7. IMPLEMENTATION

The implementation of EduStay focuses on developing a secure, scalable, and user-friendly accommodation management platform that addresses the challenges faced by students and accommodation providers. The system is built using modern web technologies, including React.js and TypeScript for the frontend, Spring Boot for backend services, and MySQL for database management. The

implementation follows a modular architecture that enables efficient communication between system components while ensuring maintainability and future scalability.

The platform integrates multiple functional modules such as user authentication, accommodation management, search and filtering, booking management, and database processing. Secure authentication mechanisms, role-based access control, and RESTful APIs are employed to facilitate seamless interaction between users and the system. Through the integration of these components, EduStay provides an efficient environment for accommodation discovery, booking, and management, thereby enhancing the overall user experience and operational efficiency.

6.1 User Registration and Authentication

The implementation of EduStay begins with a secure user registration and authentication module. Users can create accounts by providing the required information and subsequently log in using their credentials. The system utilizes JWT-based authentication to validate users and maintain secure sessions. Role-based access control is implemented to ensure that students, property owners, and administrators can access only their authorized functionalities.

6.2 User Interface Development

The frontend of EduStay is developed using React.js and TypeScript to provide a responsive and interactive user experience. The interface is designed to allow users to easily navigate through accommodation listings, manage profiles, search for properties, and perform booking-related activities. The application is optimized for different screen sizes to ensure accessibility across various devices.

6.3 Accommodation Listing Management

The accommodation management module enables property owners to add, update, and remove accommodation listings. Each listing includes details such as property name, location, pricing, facilities, images, and availability status. The system validates the submitted information before storing it in the database to maintain data consistency and reliability.

6.4 Search and Filtering Implementation

The search and filtering functionality allows students to efficiently locate accommodations based on specific criteria such as location, price range, and available facilities. User requests are processed through backend APIs, which retrieve matching records from the database and return relevant results. This mechanism improves the overall efficiency of accommodation discovery.

6.5 Booking Management Mechanism

The booking management mechanism serves as the core functionality of the system. Students can submit booking requests for available accommodations, while property owners can review and manage these requests. The system maintains booking records, updates accommodation availability, and ensures proper coordination between students and accommodation providers.

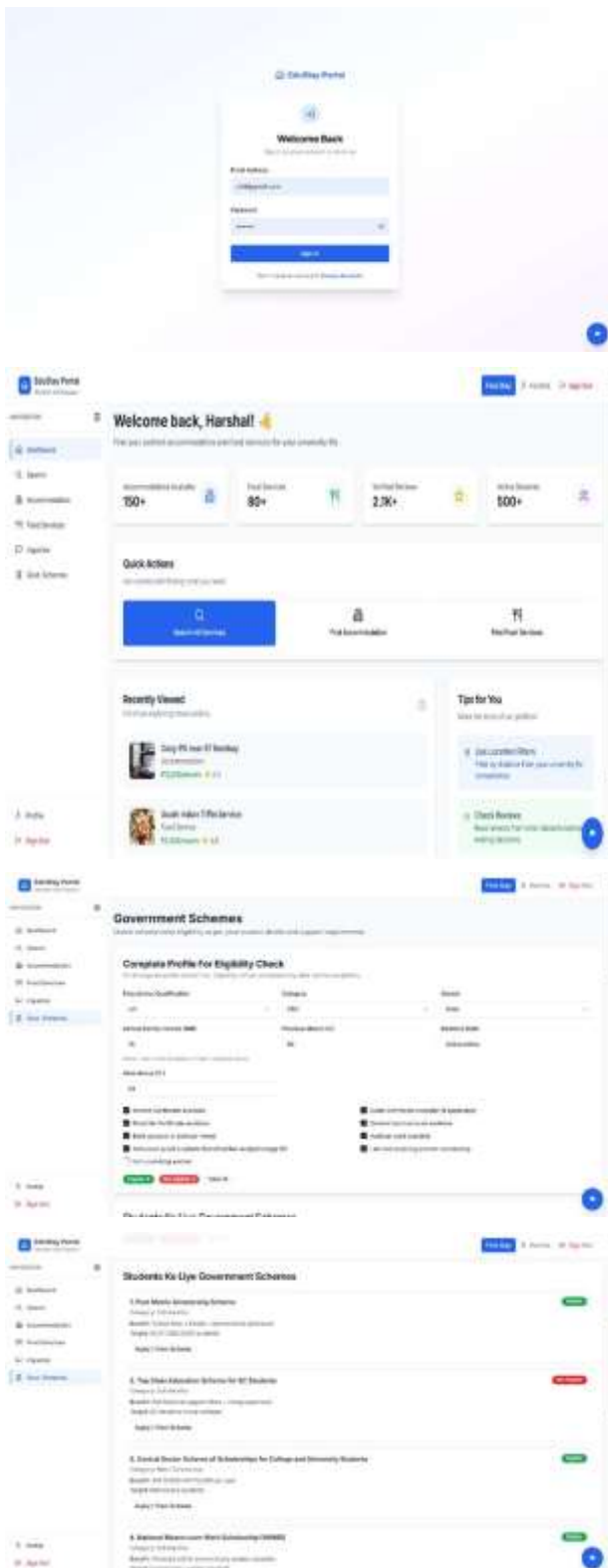
6.6 Database Integration and Backend Processing

The backend is implemented using Spring Boot and is responsible for handling business logic, API processing, and communication with the database. MySQL is used for storing user information, accommodation records, and booking details. RESTful APIs facilitate seamless data exchange between the frontend and backend components.

6.7 Output Generation and Reporting

The system generates outputs in the form of accommodation listings, booking confirmations, user dashboards, and administrative reports. These outputs are dynamically generated using real-time database information, enabling users to access accurate and updated accommodation-related data.

8. RESULTS AND EVALUATION



7. RESULTS AND EVALUATION

The EduStay platform was successfully developed and implemented to provide an efficient solution for student accommodation management. The system integrates user authentication, accommodation listing management, search and filtering, booking management, and administrative functionalities within a secure and user-friendly environment. Evaluation of the platform demonstrates its ability to streamline accommodation discovery and management processes while reducing manual effort and improving transparency. The system was tested under various scenarios to assess functionality, performance, usability, and reliability. The results indicate that EduStay effectively meets the requirements of students, property owners, and administrators by providing secure access, accurate information retrieval, responsive performance, and an enhanced user experience.

7.1 System Implementation Results

The implementation of EduStay successfully achieved all planned functionalities, including user registration, authentication, accommodation management, search operations, and booking management. The integration of frontend, backend, and database components enabled seamless communication and efficient data processing. The system operated as expected during testing and demonstrated stable performance across different user roles.

7.2 Functional Evaluation

The functional evaluation confirmed that all major modules performed according to the specified requirements. Users were able to register, log in, browse accommodation listings, apply search filters, and manage bookings without significant issues. Property owners successfully managed accommodation

information, while administrators effectively monitored and controlled platform activities.

7.3 Performance Analysis

Performance testing indicated that the system responds efficiently to user requests and maintains acceptable loading times for accommodation listings and booking operations. The use of Spring Boot, React.js, and MySQL contributed to efficient data handling and smooth application performance. The system demonstrated reliable operation under normal user workloads.

7.4 User Experience Analysis

The user interface was designed to be intuitive and accessible, allowing users to navigate the platform with minimal effort. The responsive design ensured compatibility across multiple devices, including desktops, tablets, and smartphones. User interactions such as searching, filtering, and booking accommodations were completed efficiently, contributing to a positive overall experience.

7.5 Comparative Analysis

Compared with traditional accommodation search methods that rely on manual inquiries and intermediaries, EduStay provides a centralized and digital solution for accommodation management. The platform improves transparency, reduces search time, enhances information accessibility, and simplifies communication between students and accommodation providers. These advantages demonstrate the effectiveness of the proposed system over conventional approaches.

7.6 Overall System Outcome

The overall outcome of the project indicates that EduStay successfully fulfills its objective of providing a secure, scalable, and user-friendly accommodation management platform. The system enhances the accommodation search and booking process, improves operational efficiency for property owners, and supports better decision-making for students. The successful implementation and evaluation confirm the platform's potential for practical deployment and future expansion.

8. CONCLUSION

The EduStay platform was developed to address the challenges associated with student accommodation search and management by providing a centralized, secure, and user-friendly web-based solution. The system successfully integrates essential functionalities such as user authentication, accommodation listing management, search and filtering, booking management, and administrative control within a single platform. By utilizing modern technologies including React.js, TypeScript, Spring Boot, and MySQL, the application delivers reliable performance and efficient data management.

The implementation and evaluation of the system demonstrate its effectiveness in simplifying the accommodation discovery process for students while enabling property owners to manage their listings efficiently. The secure authentication mechanism and role-based access control ensure data protection and controlled access to system resources. Additionally, the responsive user interface enhances accessibility and usability across multiple devices and platforms.

The results obtained from testing indicate that EduStay improves transparency, reduces the time required to find suitable accommodation, and minimizes dependence on traditional manual methods and intermediaries. The integration of search and filtering capabilities allows users to identify accommodations that match their specific requirements, thereby improving decision-making and overall user satisfaction.

In conclusion, EduStay provides a scalable and practical solution for modern student accommodation management. The successful implementation of the platform highlights its potential for real-world deployment and future enhancements. Additional features such as online payment integration, real-time communication, accommodation recommendations, and mobile application support can further improve the system and expand its capabilities to meet evolving user needs.

9. FUTURE WORK

Although EduStay successfully provides a centralized platform for student accommodation management, several opportunities exist for future enhancements. One potential improvement is the integration of intelligent recommendation systems that can suggest accommodations based on user preferences, search history, budget constraints, and location requirements. Advanced search capabilities, including image-based property search and personalized filtering mechanisms, can further improve the accommodation discovery experience and help students identify suitable housing options more efficiently.

Future versions of the platform may incorporate automation technologies to simplify administrative processes and reduce manual effort. Features such as automated document verification, OCR-based processing of accommodation-related documents, and AI-assisted customer support can enhance operational efficiency and improve user convenience. Additionally, integrating online payment gateways and automated booking confirmation systems would provide a more seamless end-to-end accommodation management experience.

To improve user engagement and decision-making, EduStay can incorporate emerging technologies such as virtual property tours and augmented reality-based accommodation visualization. These features would allow students to explore accommodation facilities remotely before making booking decisions. Furthermore, real-time communication modules, including chat systems and notification services, can strengthen interaction between students and accommodation providers while ensuring timely updates regarding bookings and accommodation availability.

From a long-term perspective, the platform can evolve into a comprehensive student support ecosystem by integrating services beyond accommodation management. Potential enhancements include scholarship information modules, travel assistance services, university onboarding support, predictive analytics for accommodation demand forecasting, and secure digital verification mechanisms. Continuous improvements in scalability, security, and user experience will enable EduStay

to meet the evolving needs of students and accommodation providers while supporting the broader digital transformation of student housing services.

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