AI-POWERED UNIVERSITY HOSTEL MANAGEMENT SYSTEM FOR ACCOMODATION ADMINISTRATION AND STUDENT SUPPORT

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APPROVAL PAGE

This research, titled "**AI-POWERED UNIVERSITY HOSTEL MANAGEMENT SYSTEM FOR ACCOMODATION ADMINISTRATION AND STUDENT SUPPORT**," has been assessed and approved by the Department of Computer Science and Mathematics Committees in the Faculty of Natural Sciences and Environmental Studies, Godfrey Okoye University, Enugu, Nigeria.

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CERTIFICATION

I certify that I completed the research included therein and that it was primarily based on my observations and investigation. Consequently, I will fully accept the University's decision if I am found to have cheated on the assignment.

_____

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DEDICATION

This project is dedicated to God Almighty for His grace, wisdom, strength, and guidance throughout my academic journey, and to my beloved mother for her love, prayers, sacrifices, encouragement, and unwavering support toward the successful completion of my studies.

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Firstly, I give thanks to GOD Almighty for His grace, strength, wisdom, and guidance throughout this project work and my academic journey..

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I also acknowledge myself for the dedication, consistency, hard work, and determination invested in completing this project successfully despite the challenges encountered along the way.

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ABSTRACT

This project presents an AI-Powered University Hostel Management System for Accomodation Administration and Student Support developed to improve the efficiency of hostel operations within higher institutions. The system was developed using HTML, CSS, JavaScript, PHP and MySQL running on a XAMPP local server environment. The system provides functionalities such as student registration, hostel room application, room allocation, payment management, complaint handling, maintenance request management and notification services. An AI-powered chatbot was integrated into the system to provide intelligent student support and automate hostel-related enquiries. The chatbot utilizes a Decision Tree algorithm for intent classification and Collaborattive filltering for intelligent room recommendation based on student similarities such as gender, faculty, department and academic level. The completed system successfully manages 180 hostel rooms distributed across four hostels and supports four user roles namely Student, Administrator, Maintenance Staff and Super Administrator. System testing showed that users were able to successfully register, apply for accommodation, submit complaints, report maintenance issues, track payment status and interact with the chatbot for hostel support services, The developed system improved hostel administration efficiency, reduced manual processes and enhanced communication between students and hostel management.

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CHAPTER ONE
INTRODUCTION

1.1 Background of the Study

The development of information and communication technology has greatly changed the way of management services of educational institutions. The universities have adapted digital systems for the purposes of improving efficiency, reducing manual systems and improving the service they provide to the students. One such field that has been used with the help of technology is hostel management. The hostel management system enables the institutions to manage the accommodation allocation/booking, student records, and room booking in a more organized and efficient way. A number of Universities have now introduced a Hostel Booking System on the Web, through which the student is provided with the facility to apply and secure a room in the hostels. These systems have minimised handwritten hostel allocation and enhanced record keeping. Most of the current management systems of hostel only consider the allocation of rooms and money collection but do not pay much attention on the handling of complaints and maintenance management. However, students continue to create hostel issues as a manual process through the hostel officials, which causes delay, lacks proper communication, and doesn't have proper tracking.

Furthermore, there are challenges with overbooking and incorrect room allocation with some hostel systems because of poor validation procedures. These issues translates to loss of operational efficiency and have an impact on students' accommodation experience. In the era of Artificial Intelligence (AI) in management systems, there is the potential for incorporating intelligent technologies like chatbots within hostel management systems, which can enhance the way interactions are handled, streamline reporting and offer better service.

Chatbots are conversational systems that interact with users and provide automated responses based on user input. The chatbot technology can also be integrated in hostel management to enable students to report complaints, maintenance issues and seek guidance without having to fill out a separate manual form, or physically go and report it. Moreover, intelligent decision logic can be used to check for room availability and to avoid overbooking in the allocation of hostels.

Hence, this paper concentrates on the Accommodation Administration and Student Support using the AI system University Hostel Management. The proposed system has been designed to enhance the operations of the hostel with the use of intelligent interaction, smart room allocation validation, complaint handling and maintenance management.

1.2 Statement of the Problem

Although many universities have adopted the hostel management system based on the internet, there are still many problems in the administration of the hostel and in the management of housing.Although many universities have introduced the hostel management system based on the internet, there are still many problems in the administration of the hostel and in the management

of the housing. In most of the systems available the primary functions are associated with booking and allocating hostel rooms, which lack the significant features like complaint resolution, maintenance, etc.

Students frequently have to deal with issues faced at the hostels manually with the hostel supervisors or in the administrative offices which leads to delayed resolution, inadequate documentation of the complaints and ineffective tracking of the same. This manual method will not increase efficiency and will have a negative impact on communication among students and hostel administrators.

Further, there are some hostel systems facing problems of room allocation as students are allocated to rooms that are already occupied or full as a result of improper validation and no intelligent allocation mechanism. Manual oversight and lack of intelligent support tools add to inefficient operations and user experience.

In addition, the many existing hostels systems currently in place do not have interactive support systems that can inform the user and make communication processes easier. Without an intelligent chatbot feature, students who want to access accommodation assistance or report problems are left without convenient and easy access.

Hence, there is a need of Web based Hostel Management System with AI Chatbot Support to streamline the Hostel Management process, automate complaint reporting, improve communication and avoid room allocation errors.

1.3 Aim and Objectives of the Study

The study proposed to build "AI-Powered University Hostel Management System for Accomodation Administration and Student Support for efficient hostel administration, smart room allocation, and intelligent complaint handling".

To achieve the stated aim, the following specific objectives were pursued:

i. Implement a smart room allocation feature that prevents room overbooking and invalid allocation.

ii. Design and integrate an AI chatbot interface for complaint and maintenance reporting.

iii. To develop a robust database system for storing hostel, student, and complaint records.

iv. Optimize and develop a web-based hostel management system for hostel booking and administration

v. To improve communication between students and hostel administrators through intelligent interaction.

1.4 Significance of the Study

The study is important, as it will enhance the efficiency of the hostel administration in universities by implementing a web-based management system and integrating AI chatbot support. The suggested system will minimize the manual practices needed for complaints and maintenance reporting, which will enhance the effectiveness of the operations.

The study will also enable students to interact more easily with the hostel management as the Chatbot interface will make it easier for them to report and communicate. Moreover, the smart room allocation feature will help to avoid overbooking and manage room allocation in the hostel.

Moreover, the research has practical applications in the field of educational management systems and is used as a reference for future research on intelligent management systems and applications of chatbots.

1.5 Scope of the Study

The research will look into the university hostel management system, which is an AI-based accommodation management system and support system for the students.

The study will develop a rule-based AI chatbot that will help students to report problems and interact with the hostel management system. It will remain limited to the web-based environment only, and no mobile applications or machine learning will be incorporated into the project.

1.6 Limitation of the Study

This study focuses on the design and development of the web-based hostel management system for university settings. Owing to limited time and resources, the chatbot application will be designed using the rule-based conversation system instead of utilizing the sophisticated natural language processing algorithms.

Further, the system operates on the Internet and hence its use in an offline mode will not be covered in this study.

1.7 Operational Definition of Terms

Artificial Intelligence (AI)

Artificial Intelligence is defined as the imitation of human intelligence in computer systems, enabling them to carry out certain functions like decision making and interaction.

Chatbot

A chatbot is an application that mimics conversations between humans and provides automated response according to user interaction.

Hostel Management System
A hostel management system is an electronic tool utilized to manage hostel room accommodation as well as allocation.

Smart Room Allocation
Smart room allocation is a system where room allocation is done automatically depending on room availability and other criteria of room allocation.

Database
A database is a collection of data that has been systematically organized electronically.

Web-Based System
A web-based system is a software application that can be accessed via the internet or any other type of network using a web browser.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter reviews the literature on hostel management systems, Artificial Intelligence (AI), chatbot technology, and web-based management systems. The objective of reviewing the literature in this chapter is to analyze the past works, to find out the contribution of the past researchers, and to identify the limitation that exists in the present system.

Reviewing the literature will help the researcher in identifying the gaps in the present hostel management systems in order to establish the relevancy of the proposed study. Gaps include intelligent interaction, complaints handling, and smart room allocation in the hostel management system. By analyzing the past researches and technologies in the related area, this chapter provides the foundation of the proposed system.

2.2 Theoretical Background

The theoretical background of the study involves hostel management systems, Artificial Intelligence (AI), chatbot systems, smart room allocation, and web-based systems. The concepts serve as the foundation of the proposed system.

2.2.1 Hostel Management Systems

i. Digital systems are used for managing hostel operations.
ii. Handles room allocation and student accommodation.
iii. Reduces manual record keeping.
iv. Importance of early detection and treatment.
v. Most existing systems focus mainly on booking and allocation.

2.2.2 Artificial Intelligence in Management Systems

i. AI facilitates automation.
ii. Improves communication and increases efficiency.
iii. It is used in contemporary management systems.
iv. AI assists in intelligent human-computer interaction.
v. Assists in reducing workload of humans.

2.2.3 Chatbot Technology

i. Chatbots simulate human conversation.
ii. Used for automated assistance and support.
iii. Can answer questions and guide users.
iv. Rule-based chatbots respond using predefined logic.
v. Improves interaction between users and systems.

2.2.4 Smart Room Allocation Systems

i. Automates hostel room assignment.
ii. Checks room availability before allocation.
iii. Prevents overbooking and duplicate allocation.
iv. Improves room management efficiency.
v. Uses intelligent validation logic.

2.2.5 Web-Based Management Systems

i. Accessible through web browsers.
ii. Supports remote access and centralized management.
iii. Easier to maintain and update.
iv. Commonly used in educational institutions.
v. Developed using technologies such as HTML, CSS, JavaScript, PHP, and MySQL.

2.3 Review of Related Works

A number of scholars have designed various hostel management systems and intelligent management systems for improving accommodation management and automation of organizational processes.

Francesco Ricci et al. (2011) devised concepts for intelligent recommendation systems based on collaborative filtering techniques. The research enhanced personalized recommendation in digital systems. Nonetheless, it did not involve any hostel accommodation management system.

Quinlan John R. (2007) suggested the use of the Decision Tree Classification algorithm for designing intelligent decision-making systems. The algorithm became popular in application for machine learning algorithms. Although the Decision Tree Algorithm is

useful for classification and predictive analytics, it did not consider the operations of hostel management.

Qusai Y. Shambour et al. (2022) designed a hotel recommendation system applying collaborative filtering techniques. The study helped in improving accuracy in recommendations of accommodations by considering similarities among users' preferences. The recommendation system was not oriented towards hostel management in universities but rather hotels.

Resnick et al. (1994) designed collaborative filtering techniques through the GroupLens recommendation system. It shows the applicability of user preferences for recommendation of related items to similar users. Although the study involved information filtering, its recommendation principles apply to room recommendation systems.

Breese, Heckerman and Kadie (1998) compared different algorithms of collaborative filtering and presented methods for enhancing recommendation accuracy. The findings helped develop intelligent recommendation systems but were not focused on accommodation management.

Burke (2002) evaluated a number of recommender systems and suggested approaches to hybrid recommendations. The research helped enhance recommendation accuracy but did not consider student hostels allocation contexts.

Han, Kamber and Pei (2012) considered a number of classification algorithms, such as Decision Trees, for intelligent data mining applications. The authors illustrated how Decision Trees were helpful in classification and predictions but did not consider hostel management systems.

Witten, Frank and Hall (2016) assessed machine learning algorithms and considered classification algorithms, including Decision Trees. They proved that Decision Trees were appropriate for intelligent systems and their classification tasks.

Adamopoulou and Moussiades (2020) considered technologies of chatbots and applications in various areas. The research demonstrated the importance of chatbots for improving customer interaction and delivery of services but did not focus on hostel management processes.

Russell & Norvig (2021) gave artificial intelligence techniques that can be used in intelligent systems and decision-making processes. The book is the theoretical framework

of AI systems which includes conversational assistants and automated decision support systems.

The current university hostel management systems that are in use in Godfrey Okoye University, Afe Babalola University, and Babcock University only focus on hostel bookings and management. The majority of the systems have not integrated all the intelligent features of AI chatbot interaction, intelligent complaint processing, and smart room allocation.

Thus, this research aims at improving the existing hostel management systems through integration of AI chatbot interaction, intelligent complaints processing, and smart room allocation features.

2.4 Summary of Literature Review

This section summarizes the key findings from the literature. Presented in tabular format

S/N	AUTHOR(S)	CONTRIBUTION/ WORK DONE	TECHNIQUE/ METHODOLOGY	LIMITATIONS
1.	Ricci et al. (2021)	Developed recommender system concepts for intelligent recommendation platforms	Collaborative Filtering	Did not focus on hostel management
2.	Quinlan (2007)	Developed Decision Tree classification techniques for intelligent systems.	Decision Tree	Limited handling of unstructured conversations
3.	Shambour et al. (2022)	Developed hotel recommendation systems using collaborative filtering.	Collaborative Filtering	Focused mainly on hotels, not student hostels
4.	Habila et al. (2024)	Developed a hostel allocation system using machine learning techniques	Naive Bayes Algorithm.	No chatbot integration.
5.	Resnick et al. (1994)	Developed GroupLens recommendation system	Collaborative Filtering	Not hostel-related

6.	Breese et al. (1998)	Compared recommendation algorithms	Collaborative Filtering	No accommodation focus
7.	Burke (2002)	Proposed hybrid recommender systems	Hybrid Recommendation	Not hostel-specific
8.	Han et al. (2012)	Applied Decision Trees in data mining	Decision Tree	Np hostel application
9.	Adamopoulou and Moussiades (2020)	Review of chatbot applications	Chatbot Technology	No hostel integration
10.	Russell and Norvig (2021)	AI techniques for intelligent systems	Artificial Intelligence	General AI focus
11.	Existing University Hostel Systems	Support hostel booking and room allocation.	Web-based accommodation systems.	Limited intelligent interaction and no AI chatbot integration.

CHAPTER THREE
SYSTEM ANALYSIS AND DESIGN

3.1 Introduction

In this chapter, the design and implementation of the suggested web-based Hostel Management System and an AI chatbot will be discussed. The methods and technologies used in designing and developing the system will be explained here.

3.2 Development Methodology

3.2.1 Agile Software Development Methodology

Agile Software Development Methodology was chosen as the development methodology for the suggested web-based system. This method is suitable for the incremental and iterative development of the system which allows developing, testing, and improvement of the system modules at any point in time.

It was chosen due to the flexibility, fast testing, feedback, and debugging provided by the method during development. The system development was performed in steps starting from the authentication module and database creation followed by other modules such as room allocation, payments, maintenance, complaints, and AI chatbot.

Moreover, it was easier to solve implementation issues such as database connection, server configurations, and file path issues using the Agile method**.**

3.3 System Architecture

3.3.1 Three Tier Architecture

The web-based Hostel Management System that has been proposed will be designed using a three-tier architecture that comprises:

i. Presentation Layer

This layer includes the user interface of the system. This layer was designed using HTML, CSS, and JavaScript. Users including students, admin, maintenance personnel, and super-administrator can interact with the system through this layer via web pages and dashboards.

ii. Business Logic Layer

This layer involves the application logic coded using PHP. User requests will be processed, validated, control of user authentication will be done along with hostel bookings and also communication will be controlled between frontend and database.

iii. Data Layer

This layer includes the MySQL database where all hostel records, rooms, students, bookings, complaints, maintenance reports, chatbot interactions and payments will be stored.

Flowchart depicting workflow of the proposed system is given below.

The operational workflow of the proposed system is illustrated in the system flowchart below.

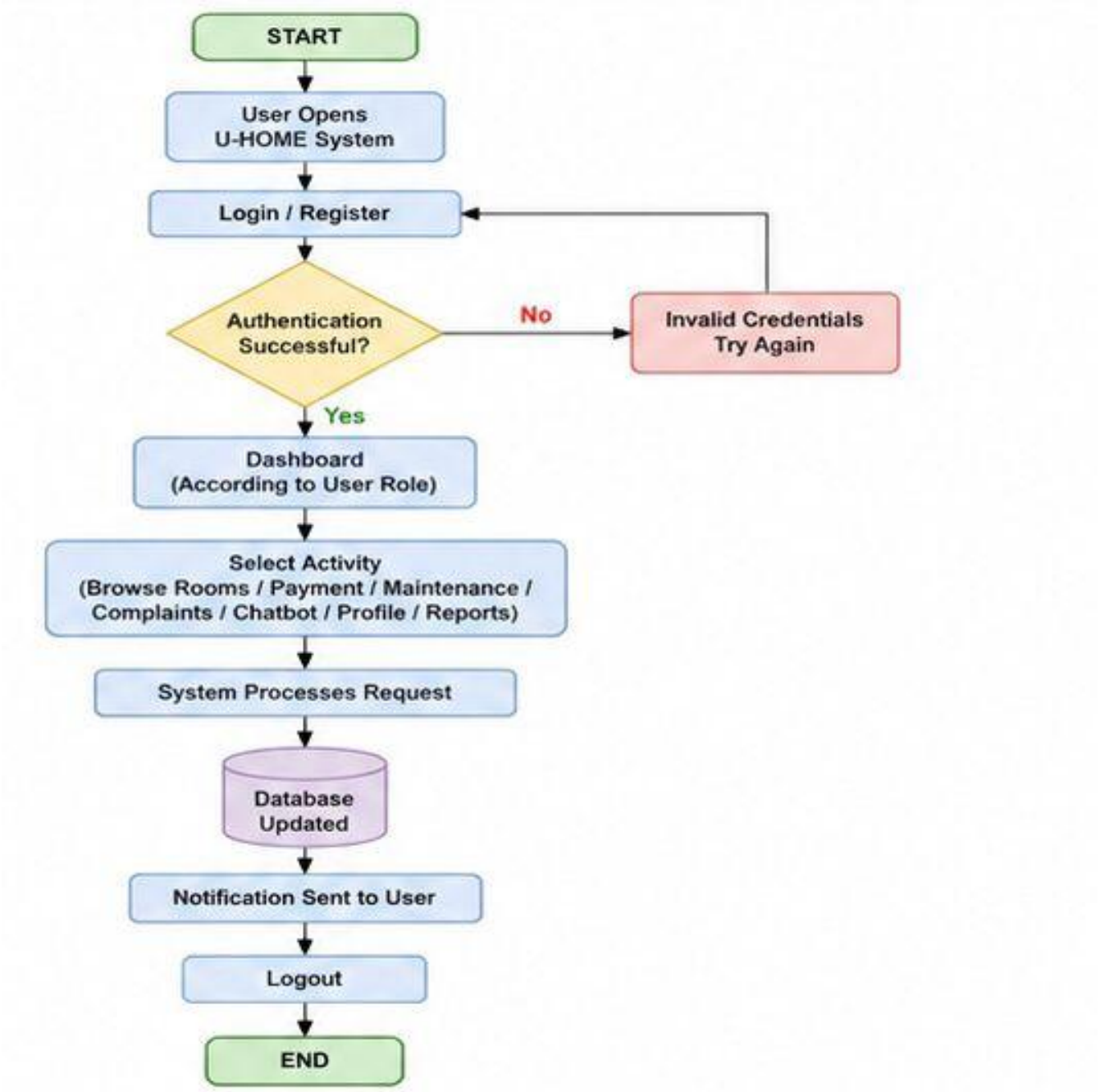

Fig 3.1 System Flowchart Diagram

3.4 Analysis of Existing System

Most of the existing hostel management systems implemented in various universities concentrate mainly on registration, hostel application, room allocation, and payments. The use of such systems has enabled efficient management through minimal record keeping and hostel management processes.

However, there are numerous shortcomings of these existing systems. Most of these systems do not facilitate intelligent interaction between the hostel administrators and the students. In most cases, students are forced to make physical visits to the hostel office whenever they want to report maintenance problems, lodge complaints, or look for information concerning hostels.
Moreover, intelligent room allocation is another function which is lacking in existing hostel management systems, since there are no systems which allow students to recommend a suitable hostel room based on the academic background and personal preference.

3.5 Proposed System

The proposed system referred to as U-HOME Hostel Management System with AI Chatbot, was developed to overcome the shortcomings found in the current systems of hostel management.
The system combines the operations of hostel management and the technologies of Artificial Intelligence in order to enhance efficiency and improve the user experience. The proposed system includes processing of hostel applications, accommodation, management of payments, management of maintenance, management of complaints and notifications through a single platform.
The proposed system differs from the current systems due to its incorporation of an AI chatbot that aids students with answering hostel inquiries, managing complaints, managing maintenance requests and making hostel room recommendations. The system also uses Decision Tree algorithm for the purpose of classifying intents and Collaborative Filtering in making intelligent hostel room recommendations.
Thus, the proposed system is a more intelligent and efficient way of carrying out the operations of hostel management compared to current systems.

3.6 Programming Languages and Tools Used

The following technologies and tools were used in the development of the system:

TECHNOLOGY	PURPOSE

HTML	Structure of web pages
CSS	Styling and page design
JavaScript	Client-side interactivity
PHP	Backend development
MySQL	Database management
Apache Server	Local web server
XAMPP	Development environment
Visual Studio Code	Source code editor

3.7 Database Design

The database for the system has been created using the MySQL database management system which is a relational database management system. This database comprises of eleven tables, each one connected to the other through the use of primary and foreign keys.

The tables are as follows:

i. Users
ii. Student_profiles
iii. Hostel_blocks
iv. Rooms
v. Hostel_settings
vi. Bookings
vii. Payments
viii. Maintenance_requests
ix. Notifications
x. Chat_logs
xi. Complaints

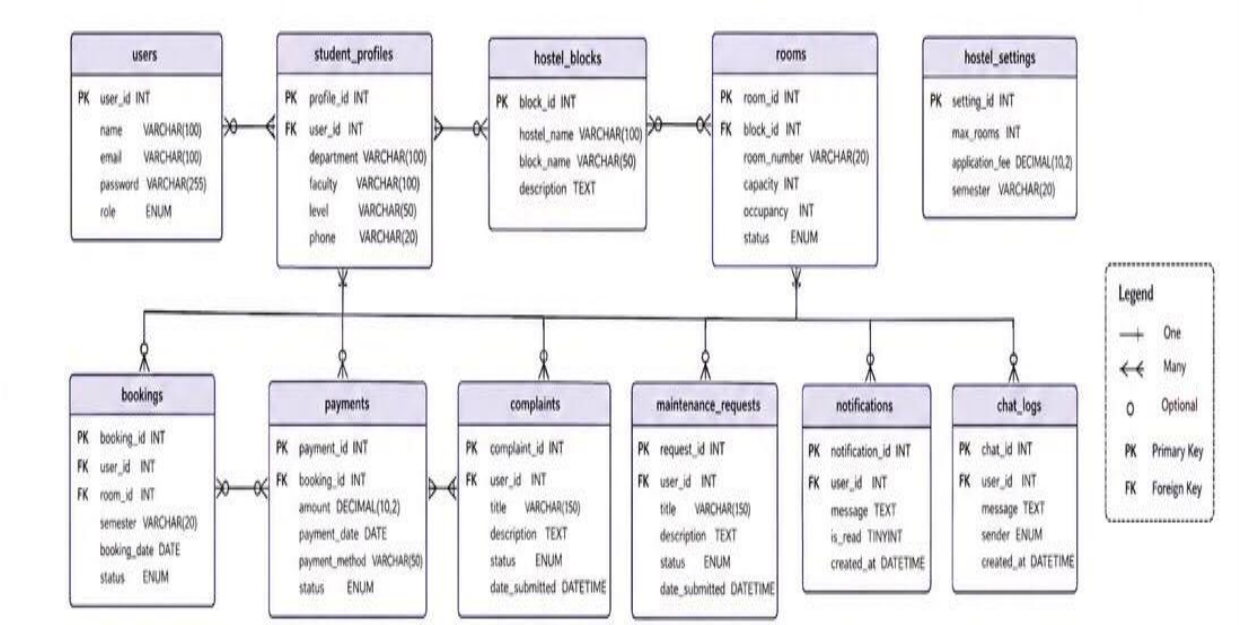

Figure 3.5: Entity Relationship Diagram (Database Design) of U-HOME Hostel Management System

Fig 3.5: Entity Relationship Diagram

3.8 Machine Learning and AI Implementation

3.8.1 AI Chatbot Module

The suggested solution features an AI-based chatbot module which helps students communicate with the hostel management system.

The chatbot delivers intelligent answers to queries regarding the hostel, lodging complaints, reporting maintenance issues, and requesting recommendations on rooms.

The AI chatbot has been designed applying machine learning principles together with the natural language intent classification technique.

The flow of activities executed by both the user and AI chatbot in the system is presented in the diagram below.

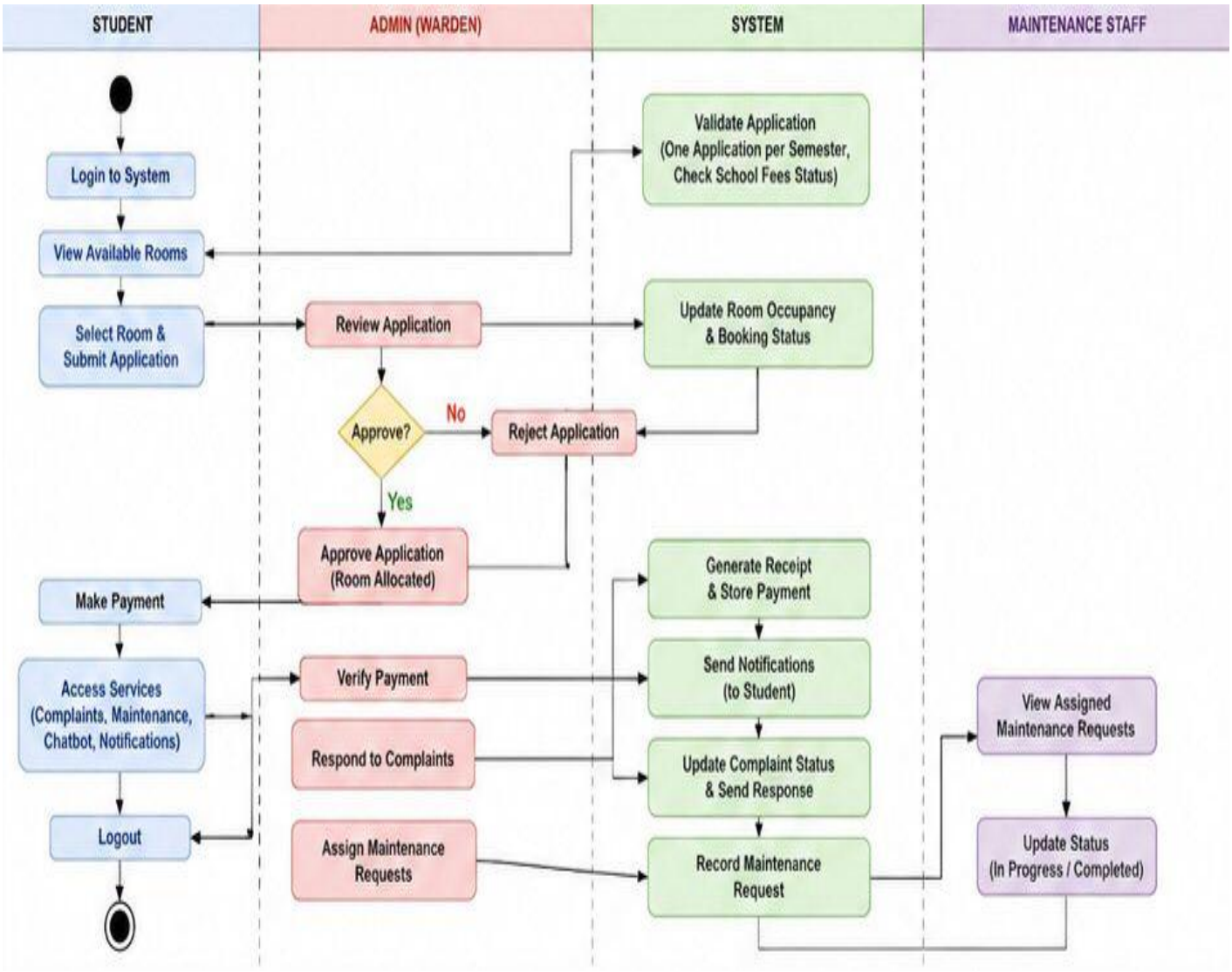

Fig 3.2 Activity Diagram

3.8.2 Decision Tree Algorithm

Decision Tree Algorithm is one of the major algorithms that were used in the chatbot module to classify user queries into several intents using keywords and decision nodes.

The following purposes were served by the Decision Tree algorithm:

i. Classification of hostel inquiry
ii. Status of booking confirmation
iii. Classification of complaints
iv. Classification of maintenance request
v. Availability of rooms
vi. Checking payment status

By classifying requests appropriately, the algorithm ensures that the right processing modules of the system receive user requests.

Decision Tree algorithm was chosen because it is:

i. Easy to understand
ii. Quick for classification
iii. Effective for decision-making
iv. Quick in processing requests from students

3.8.3 Collaborative Filtering Algorithm

Collaborative Filtering algorithm was incorporated in the hostel system to intelligently recommend room to the students.

Collaborative Filtering makes room recommendations to students based on similarity between the students in terms of the following factors:

i. Gender
ii. Faculty
iii. Department
iv. Academic level

The algorithm determines the rooms that are often chosen by students with similar attributes and recommends the same to new users.

3.8.4 Rule-based Processing Layer

Another feature that was added to the chatbot was the rule-based processing layer, which was used for dealing with frequently asked questions related to the hostel like hostel rules, registration procedures, Wifi, and other related information.

3.9 System Modules

The following figure shows the functional modules of the proposed Hostel Management system through the use case diagram below.

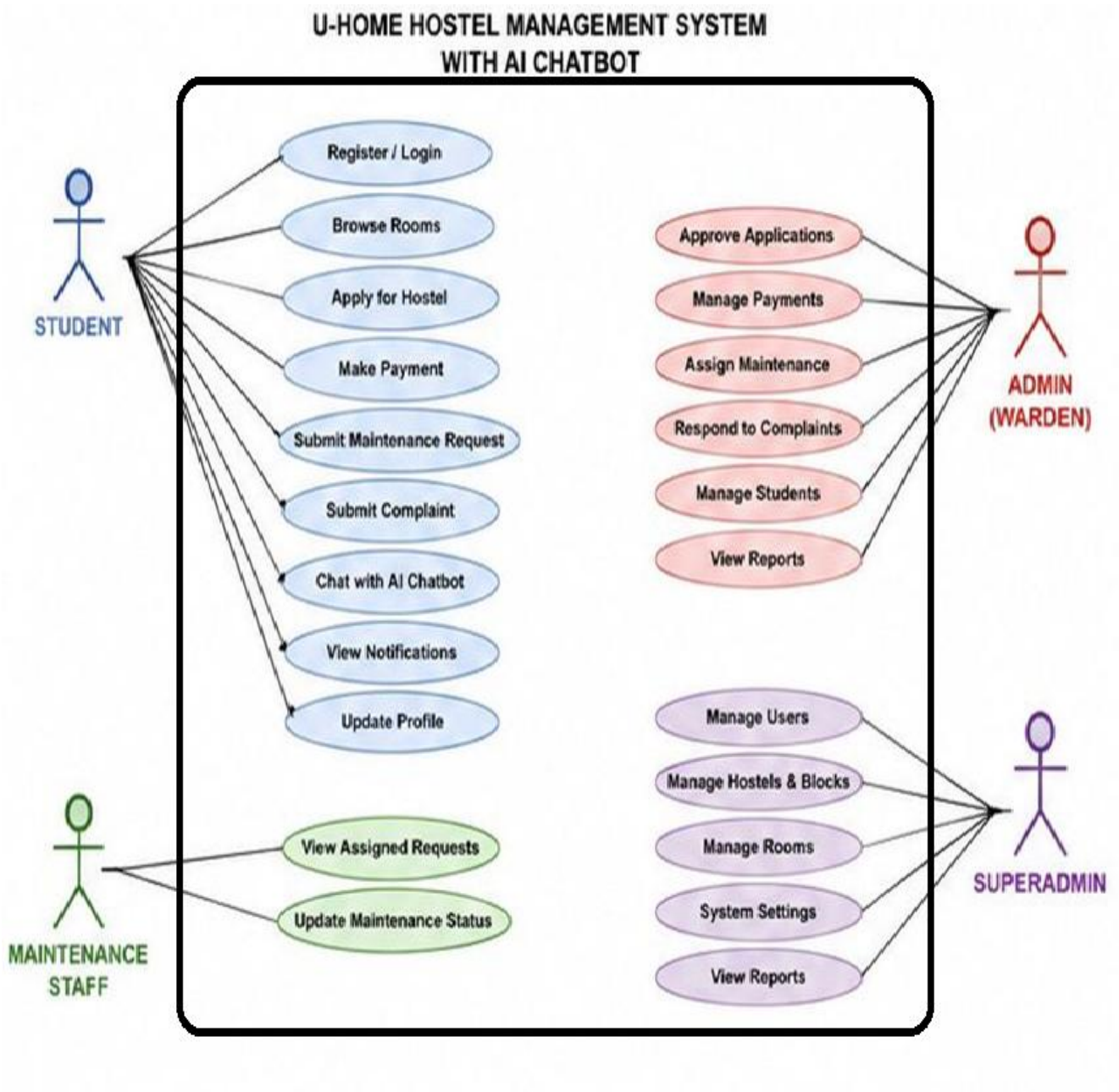

Fig 3.3 Use Case Diagram

3.9.1 Authentication Module

The authentication module handles user registration and login in the system. Students can register with their matric numbers and academic information while administrator accounts are maintained by the system administrator.

The authentication module includes:

i. Password Hashing
ii. Session Authentication

iii. Role-based Access Control
iv. Prevention of Unauthorized Access

3.9.2 Room Allocation Module

Room allocation module helps students search and make applications for hostel rooms for accommodation.

The module:

i. Filters rooms according to gender
ii. Prevents overbooking
iii. Monitors room occupancy
iv. Prevents multiple applications in one semester

Administrators are able to either accept or reject the application while the system updates occupancy of rooms automatically.

3.9.3 Maintenance Management Module

The maintenance module helps the students report any maintenance issues about their hostel such as plumbing, electrical faults, furniture or cleaning.

Maintenance staff will get assigned maintenance requests and change their status from assigned to completed.

3.9.4 Payment Management Module

Payment management module helps in handling hostel fees submission and verification. Students are required to upload their payment information while administrators will be confirming and rejecting payments made.

3.9.5 Complaints Management Module

This module allows students to lodge complaints through the AI chatbot.
Complaints can be reviewed by the administrator, reply to the students and update the status of the complaint accordingly.

3.9.6 Notifications Module

The notifications module alerts the users about:

i. Status of hostel application process
ii. Status of payment
iii. Status of maintenance
iv. Status of complaints

This module enhances communication between the students and the administrators of the hostel.

3.10 Security Mechanisms

The following security mechanisms have been put in place for the system:

i. Hashing passwords using PHP password_hash()
ii. Roles based access control
iii. Session authentication
iv. Unauthorized page restriction
v. Secure routing of dashboards
vi. Database validations

These help in improving the security of the system.

3.11 System Requirements

System requirements refer to the hardware and software requirements that are necessary for the development and operation of the proposed hostel management system. These include the various requirements for the proper functioning of the system. Web technology and database management system are used in developing this system.

3.11.1Hardware Requirements

The minimum hardware requirements that are required for the proposed system are:

i. Computer system
ii. At least 4 GB RAM
iii. 500 GB storage unit
iv. Intel dual core processor

3.11.2Software Requirements

The software requirements for the system are:

i. Visual Studio Code
ii. XAMPP server
iii. MySQL database
iv. Modern web browser
v. Windows operating system
vi. Apache server

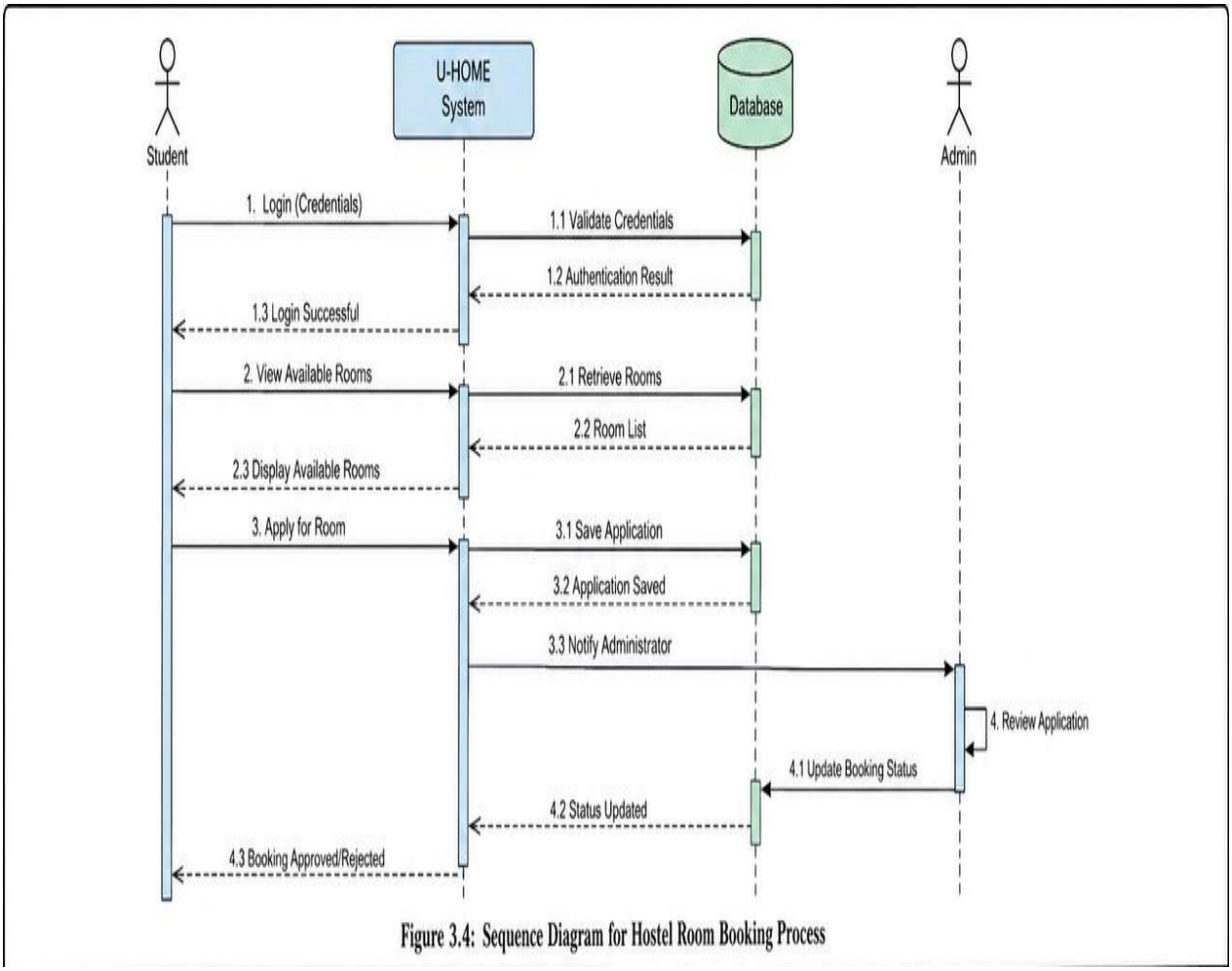

Fig 3.4: Sequence Diagram

3.12 Implementation Challenges and Solutions

During the development of the system, several technical challenges were encountered. These include:

CHALLENGES	SOLUTIONS
MySQL access denied error	Change the MySQL port and update the configuration settings
Apache port conflict	Configured the Apache server to run on port 8080
404 errors in PHP pages	Corrected project file structure and routing
Database foreign key conflicts	Recreated database relationships properly

Chatbot file path issues	Implemented reliable path handling using PHP constants
Login redirect errors	Corrected session authentication logic

The successful resolution of these challenges improved the stability and reliability of the system.

3.13 Summary

The proposed web-based hostel management system with the assistance of the AI chatbot was covered in this Chapter. This Chapter described the current system, the limitations of the current system, the architecture of the proposed system, methodology, database design, and flow of the system. The next Chapter covers the implementation and testing of the proposed system.

CHAPTER FOUR
SYSTEM IMPLEMENTATION

4.1 Introduction

In this chapter, the design, testing, and findings of the proposed Hostel Management System with AI Chatbot Support are discussed. It discusses the manner in which the system was designed based on the selected programming languages and machine learning algorithms. In addition, it discusses the screenshots of the developed system, its testing procedures, and findings from the design process.

4.2 System Implementation

The proposed Hostel Management System was implemented through the use of HTML, CSS, JavaScript, PHP, and MySQL. HTML, CSS, and JavaScript were used to develop the frontend

while PHP was used to handle the backend operations and to communicate with the MySQL database.

The system was implemented locally by utilizing the XAMPP development environment that offered both the Apache server and MySQL database services. Visual Studio Code was used as the main source code editor during the implementation process.

Implementation processes entailed:

i. database development
ii. user authentication design
iii. room allocation implementation
iv. payment management
v. maintenance request management
vi. complaint management
vii. AI chatbot integration
viii notification system implementation

4.3 Database Implementation

The database for the system under discussion was built using MySQL, which is a relational database management system. The database is composed of eleven related tables for storage of information about users, hostels, bookings, maintenance, complaints, notifications, and chatbots. Primary keys and foreign keys were used for ensuring data integrity and creation of connections between different tables. The database tables that were created include the following:

i. users
ii. student_profiles
iii. hostel_blocks
iv. rooms
v. hostel_settings
vi. bookings
vii. payments
viii. maintenance_requests
ix. notifications
x. chat_logs
xi. complaints

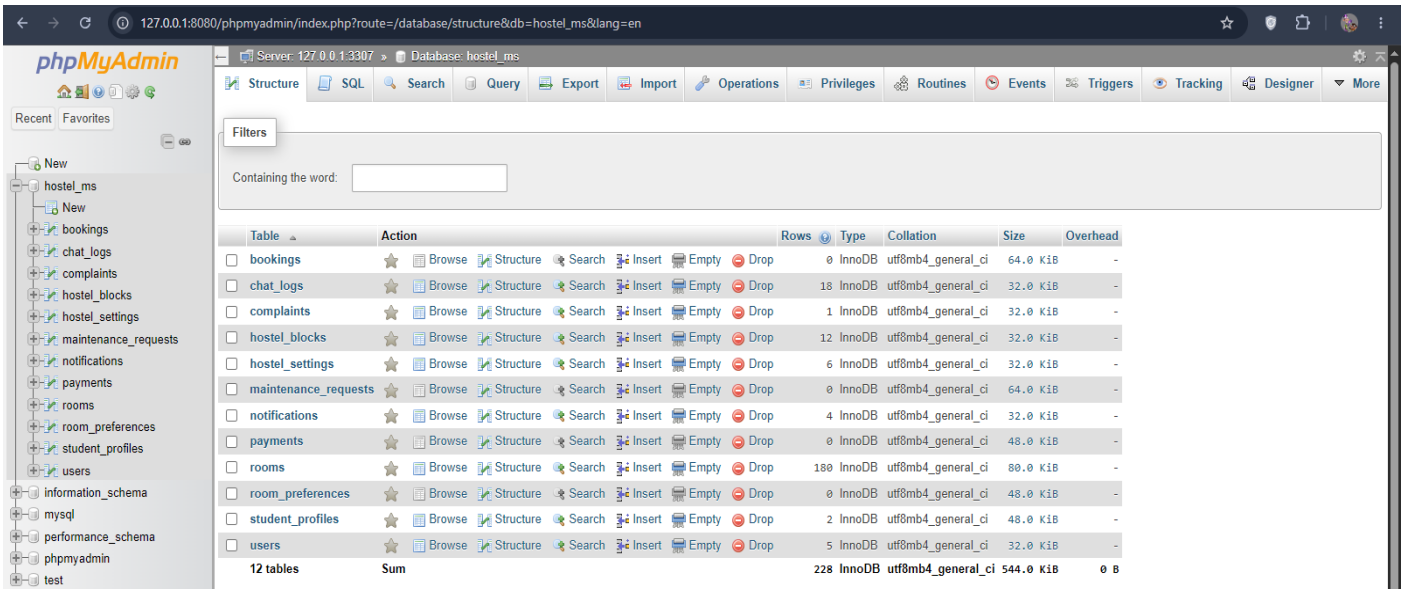

Figure 4.1 Database Tables of the Proposed Hostel Management System

4.4 System Interfaces

4.4.1 Sign In Interface

Sign-in page is the mechanism through which registered users can login to the system via their email and password. System authenticates users and forwards them to respective dashboards according to their roles.

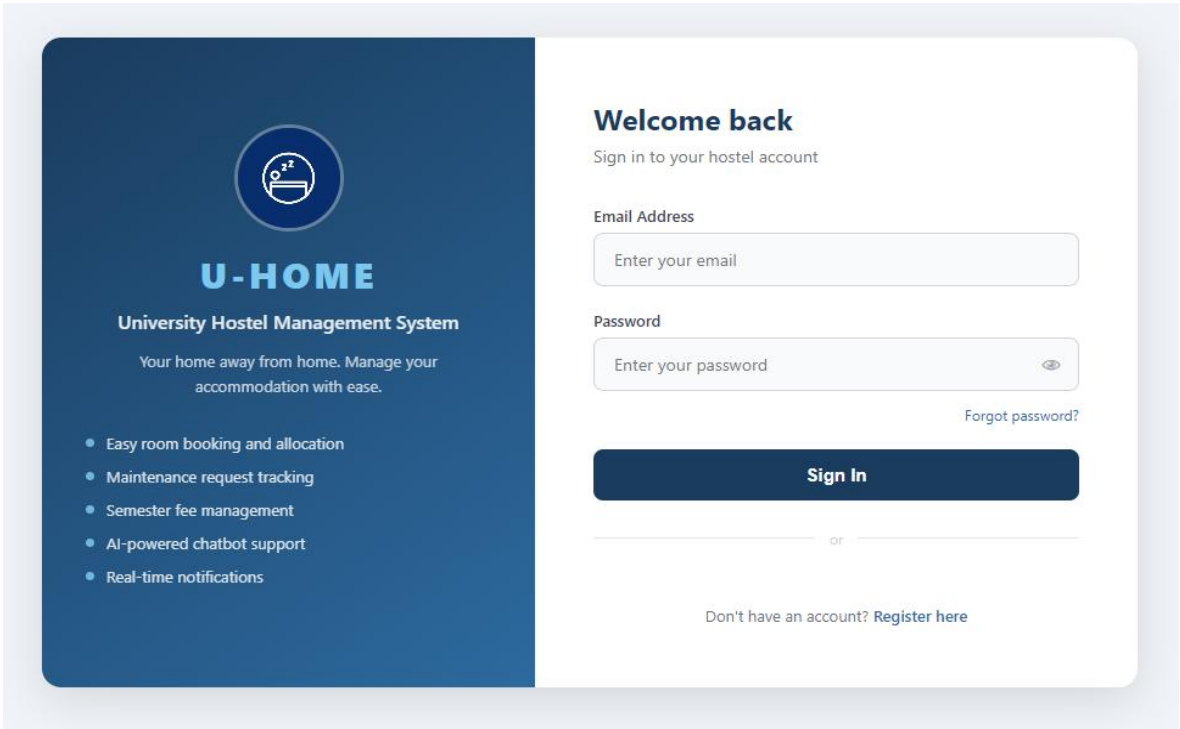

Figure 4.2: Sign In Interface

4.4.2 Student Dashboard

The student dashboard provides students with access to hostel application services, maintenance reporting, payment submission, complaint management, notifications, and AI chatbot interaction.

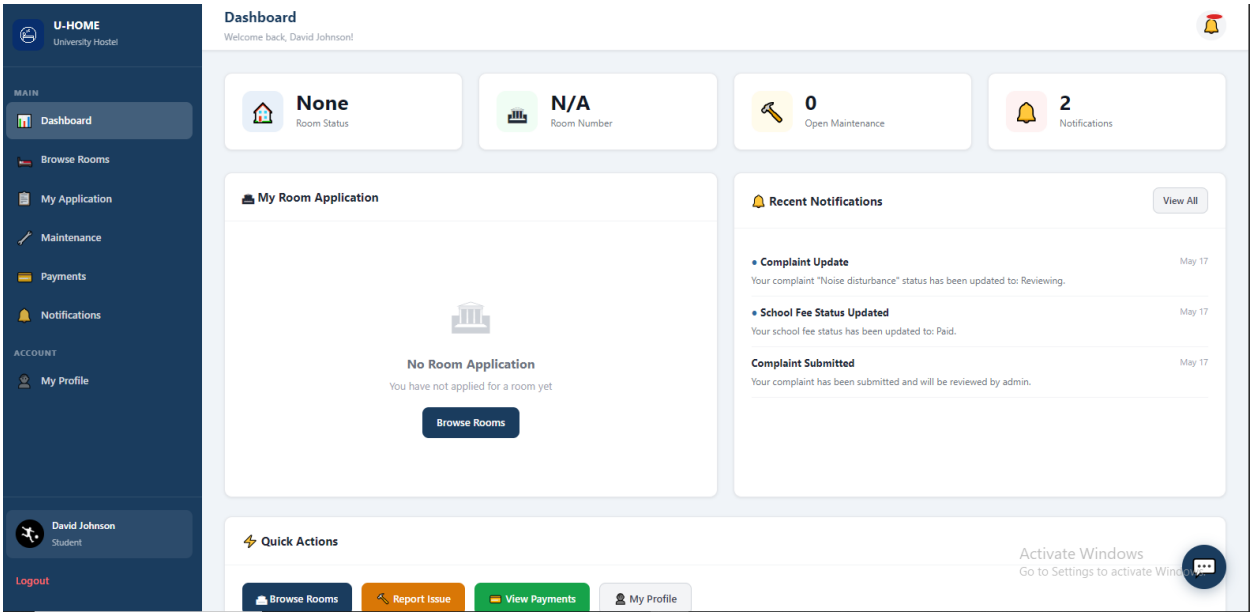

Figure 4.3: Student Dashboard

4.4.3 Room Allocation Interface

The room allocation interface enables students to browse available rooms based on hostel blocks and gender restrictions. Students can apply for available hostel rooms directly from the interface.

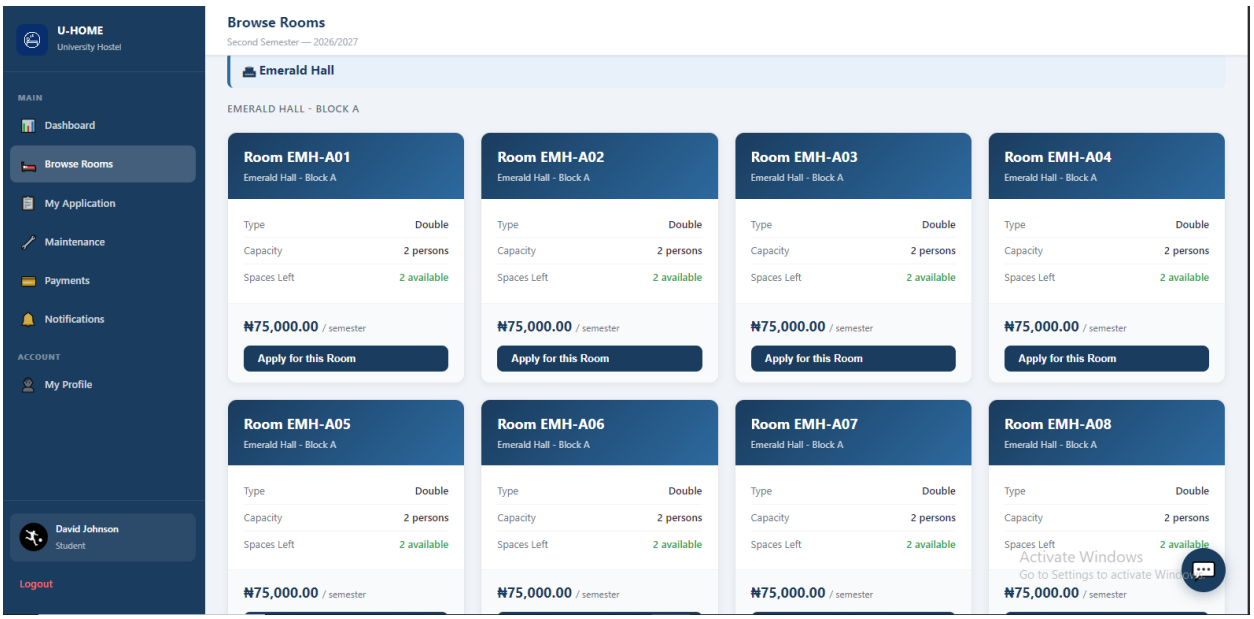

Figure 4.4: Room Allocation Interface

4.4.4 Payment Interface

The payment interface allows students to submit hostel payment details and upload payment references for verification by hostel administrators.

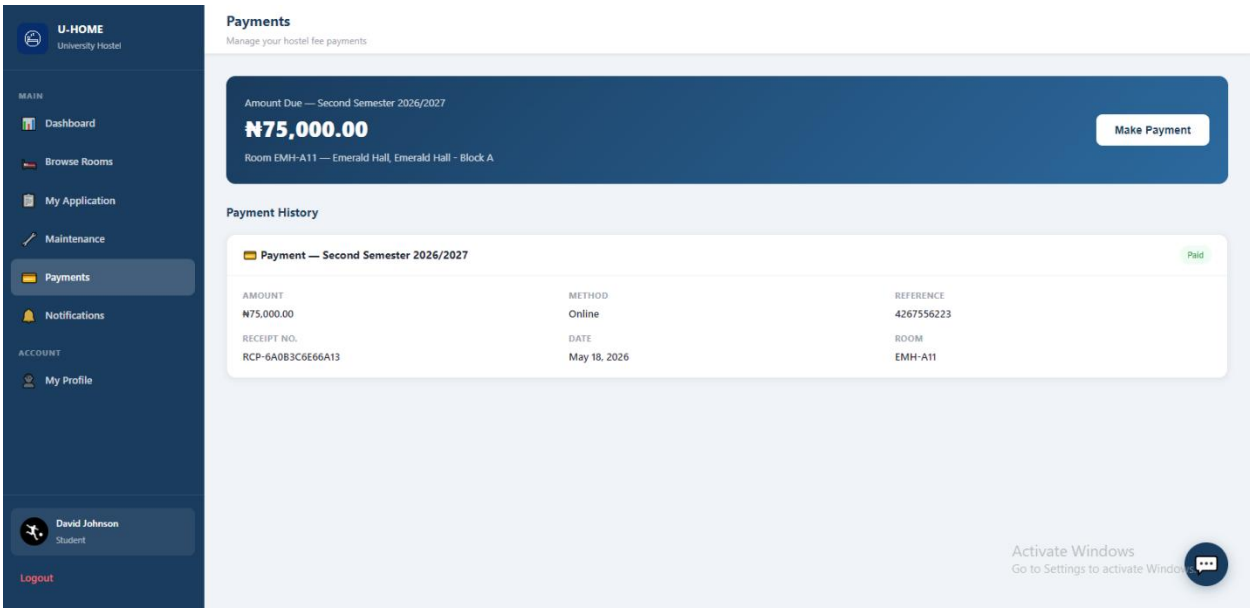

Figure 4.5: Payment Interface

4.4.5 Maintenance Request Interface

The maintenance request interface allows students to report hostel maintenance issues, including plumbing, electrical, cleaning, and furniture-related problems.

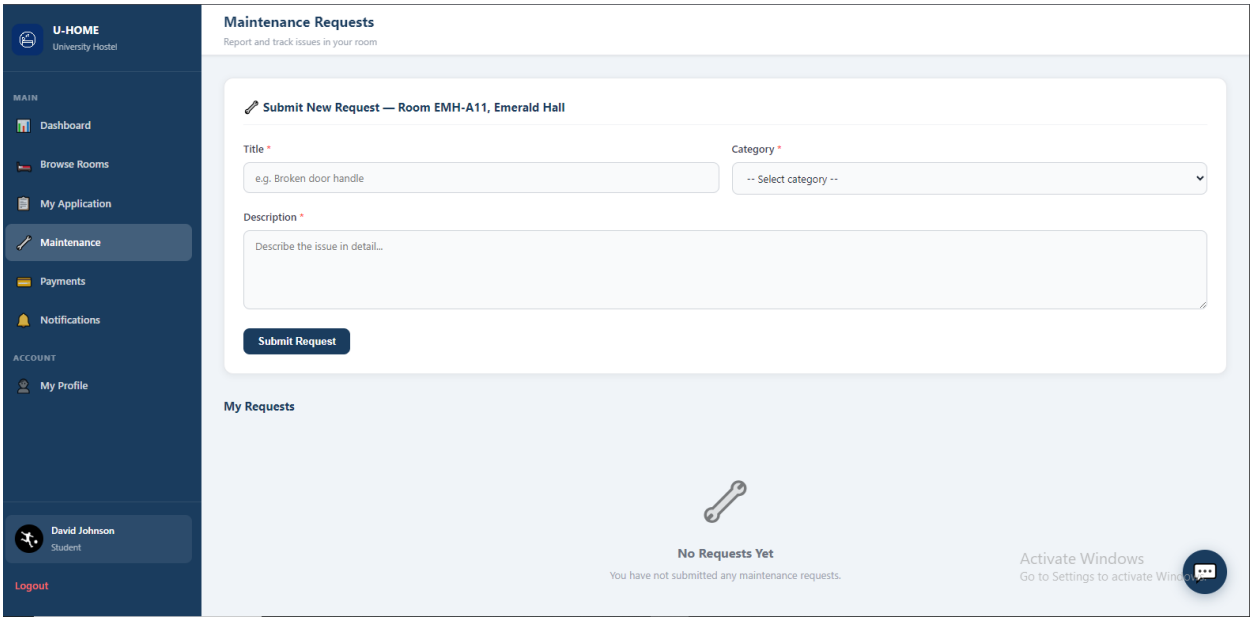

Figure 4.6: Maintenance Request Interface

4.4.6 AI Chatbot Interface

AI chatbot Interface facilitates students to communicate with the system through conversational messages. The capabilities of the chatbot include hostel information, maintenance request, complaint submission, room recommendation, and booking assistance.

Chatbot uses Decision Tree Classification, Collaborative filtering recommendation and rule based pre-processing techniques.

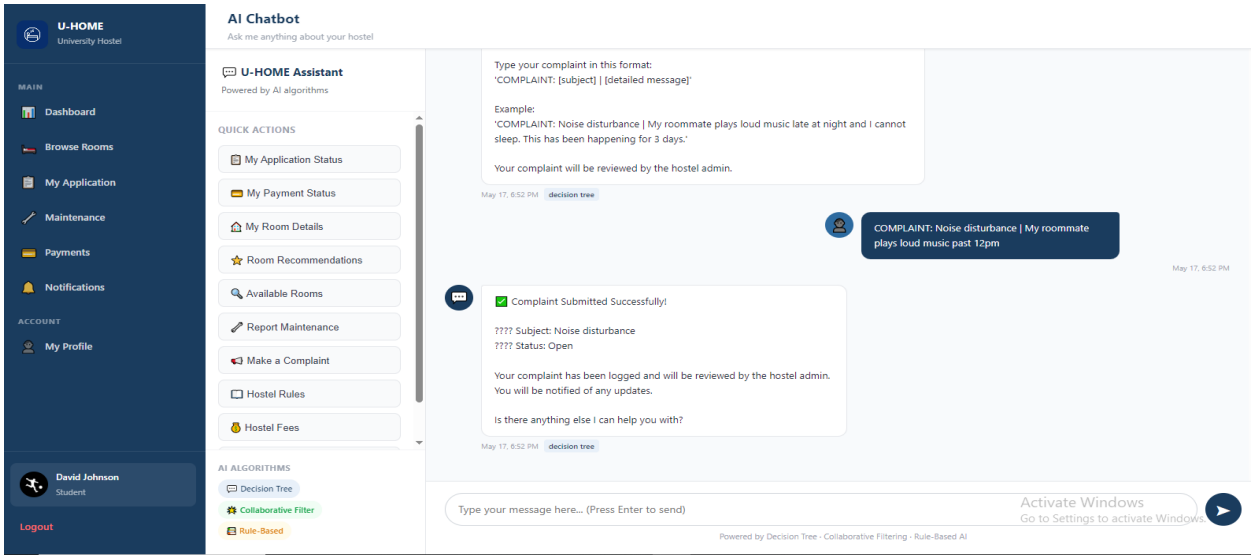

Figure 4.7: AI Chatbot Interface

4.4.7 Admin Dashboard

The admin dashboard allows hostel administrators to manage room applications, payments, maintenance requests, complaints, and student records within the system.

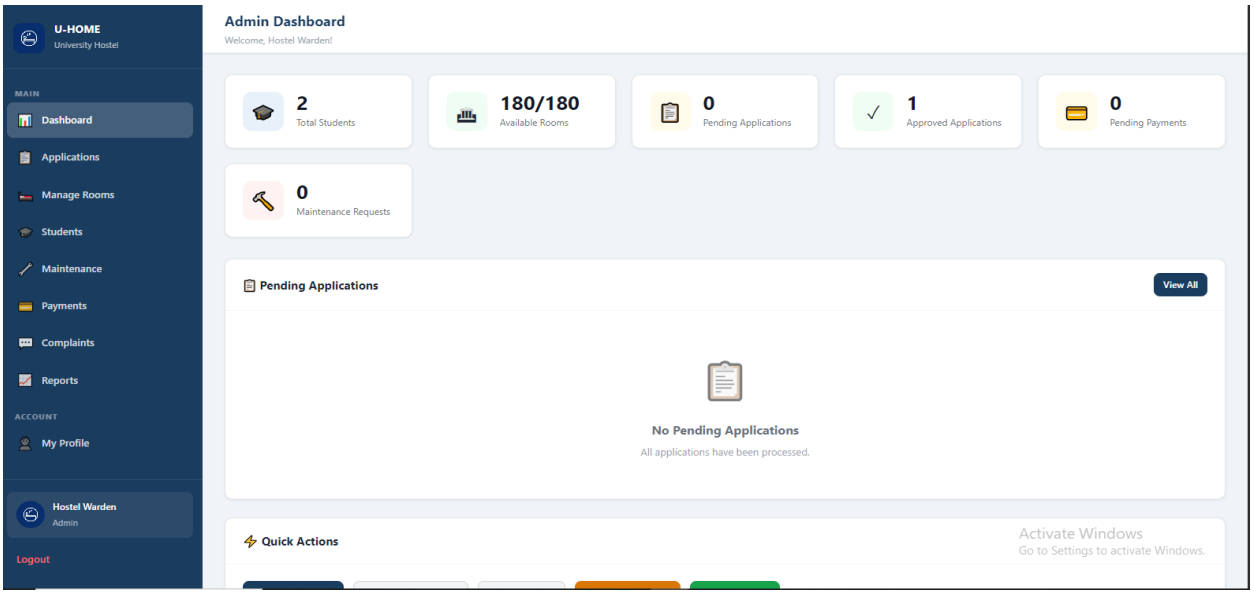

Figure 4.8: Admin Dashboard

4.4.8 Registration Interface

The registration interface allows students to create accounts by providing their personal and academic information, including matric number, department, faculty, and level.

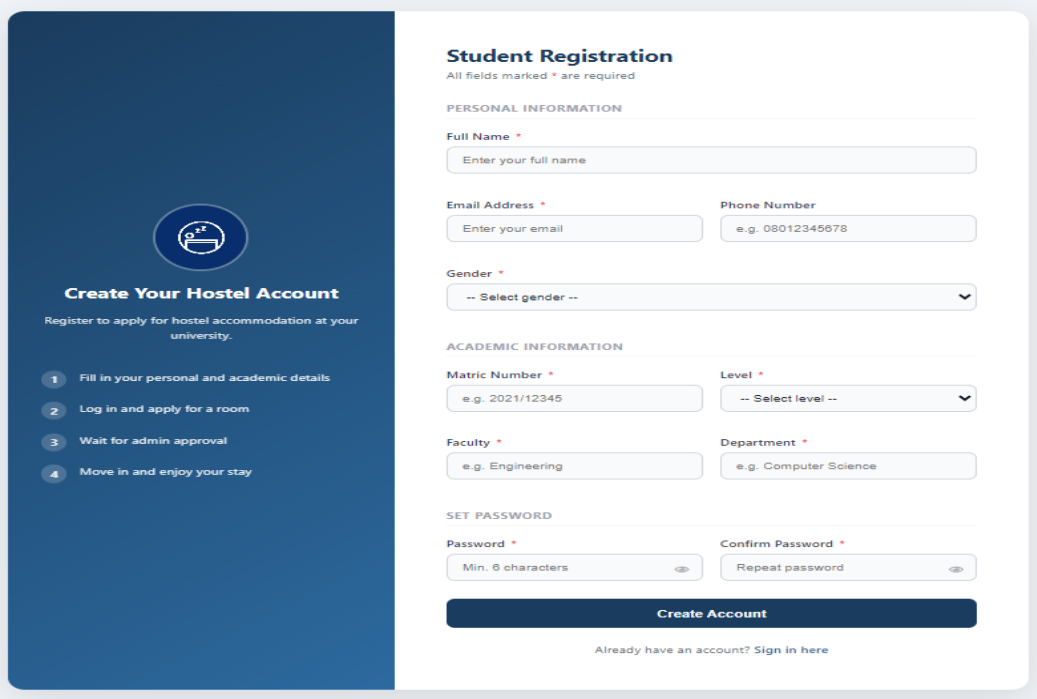

Figure 4.9: Student Registration Interface

4.4.9 Notification Interface

The notification interface provides students with real-time updates regarding hostel applications, maintenance requests, payments, and complaint responses.

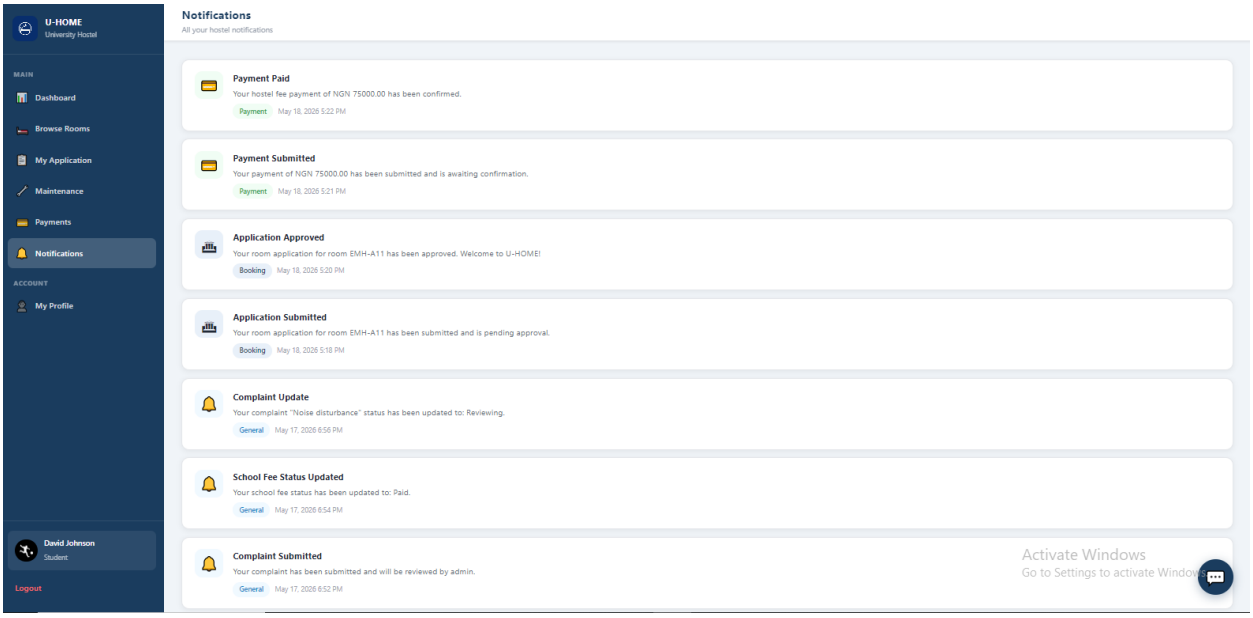

Figure 4.10: Notification Interface

4.4.10 Complaint Management Interface

The complaint management interface enables students to submit complaints while administrators review and respond to reported hostel issues.

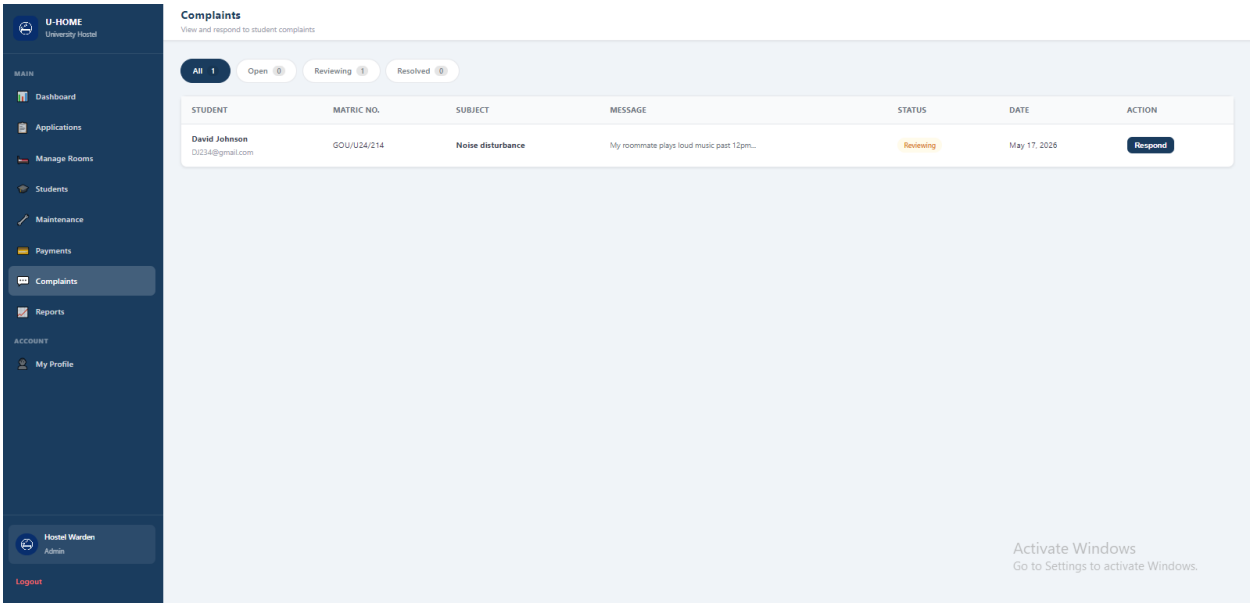

Figure 4.11: Complaint Management Interface

4.4.11 Superadmin Dashboard

The superadmin dashboard provides full administrative control over the hostel management system, including user management, hostel settings, room management, and system reports.

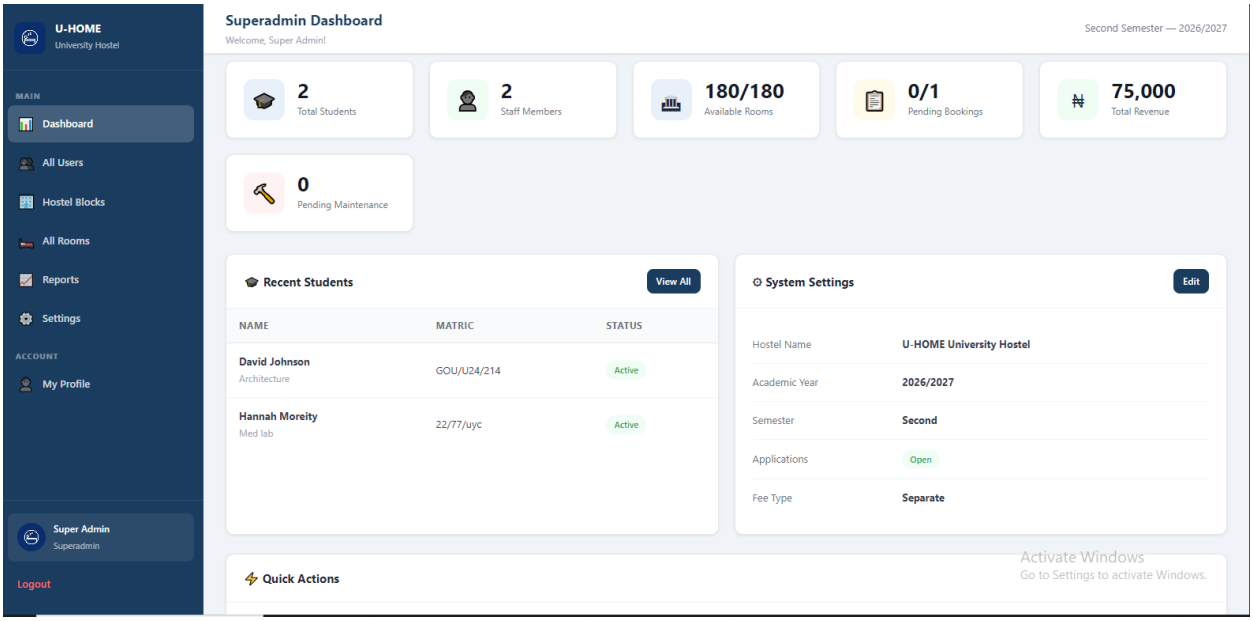

Figure 4.12: Superadmin Dashboard

4.4.12 Maintenance Staff Dashboard

The maintenance staff dashboard enables maintenance personnel to view assigned requests and update maintenance progress within the hostel system.

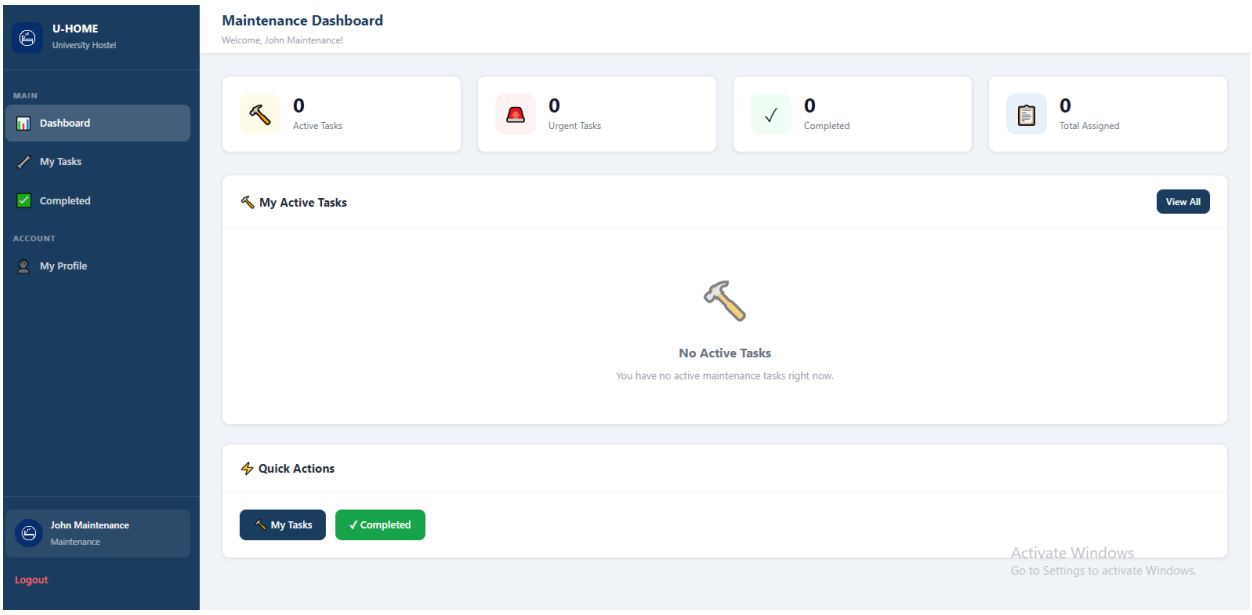

Figure 4.13: Maintenance Staff Dashboard

4.4.13 Hostel Application Approval Interface

The hostel application approval interface allows administrators to review, approve, or reject hostel applications submitted by students.

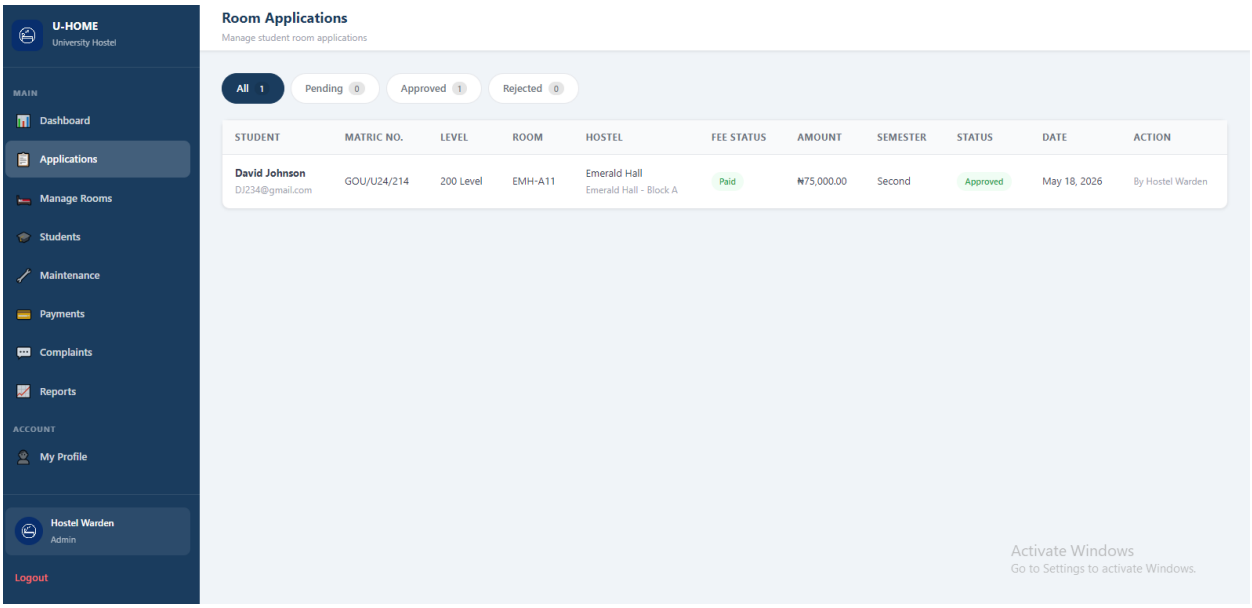

Figure 4.14: Hostel Application Approval Interface

4.4.14 System Reports Interface

The reports interface provides hostel administrators with visual summaries of hostel occupancy, student applications, maintenance requests, and payment records.

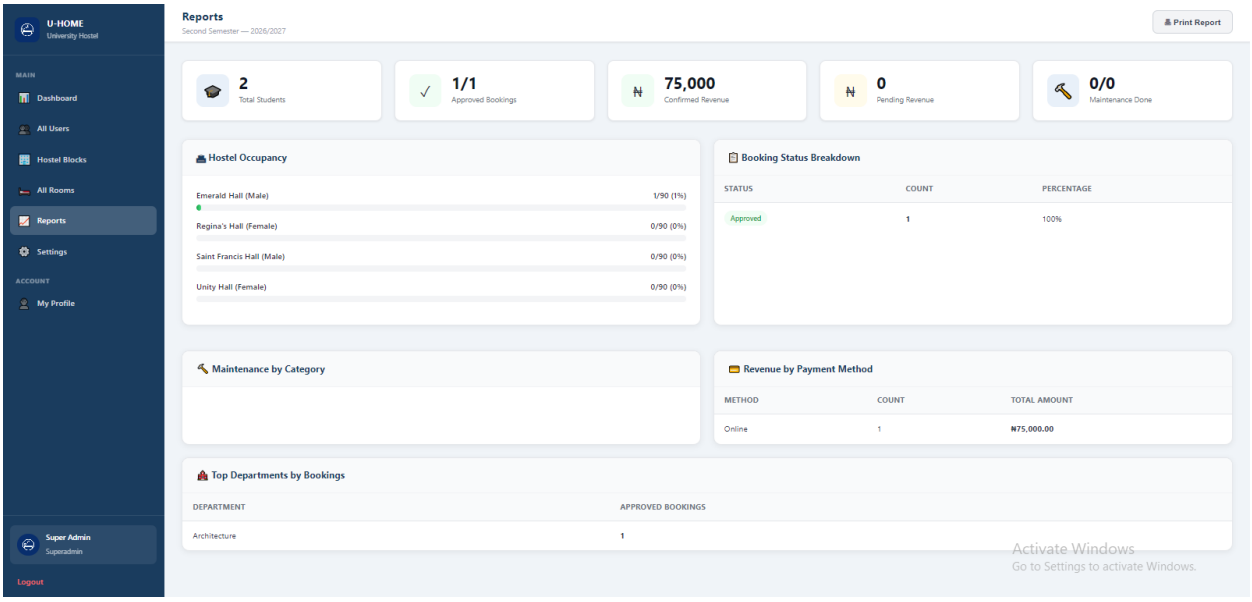

Figure 4.15: System Reports Interface

4.5 System Testing

The system developed was then tested to ensure that all modules worked properly and effectively. The following modules were tested for functional efficiency – authentication, allocation of rooms, payment transactions, maintenance, complaint management, and chatbot interaction modules.

From the testing process, it is clear that the system effectively performs the hostel management functions**.**

4.5.1 Test Cases and Results

Test Case	Expected Result	Actual Result	Status
User Login	User redirected to dashboard	Successful	Pass ✓
Room Application	Room application submitted	Successful	Pass ✓
Payment Submission	Payment stored in the database	Successful	Pass ✓
Complaint Submission	Complaint saved successfully	Successful	Pass ✓
Maintenance Request	Request assigned successfully	Successful	Pass ✓
Chatbot Interaction	Chatbot responds correctly	Successful	Pass ✓

4.6 Results Obtained

Introduction of the suggested hostel management system has effectively enhanced hostel management functions through digitization of room allocation, payment management, complaints handling, maintenance, and AI chatbot.

This has ensured that the hostel management process was minimized manually, and communication between students and hostel managers was facilitated.

Machine learning integration has also improved the classification of student requests by the chatbot.

4.7 Summary

This chapter described the implementation, testing, and findings of the proposed Hostel Management System. This chapter covered the interfaces that were implemented, the database design, and the testing procedure employed to validate the system. It is from the results obtained that it can be seen that the system successfully met its objectives.

CHAPTER FIVE
SUMMARY, CONCLUSION, AND RECOMMENDATIONS

5.1 Summary

This research project dealt with the university hostel management system based on artificial intelligence that is called U-HOME with the support of an AI chatbot.

The designed system was aimed at solving problems related to manual management of hostels, such as improper room assignment, delay in maintenance, ineffective complaints' processing, and inadequate communication between students and hostel administration.

The proposed system was designed using such programming languages and technologies as HTML, CSS, JavaScript, PHP, and MySQL in the XAMPP development environment. The designed system includes such modules as student registration, room allocation, payment management, maintenance, complaint management, notifications, and hostel management.

Machine learning was implemented via the implementation of a decision tree algorithm for classification of chatbot intents and collaborative filtering for room recommendation.

Thus, the proposed system has successfully provided a platform for hostel management along with the usage of an AI chatbot.

5.2 Conclusion

The deployment of the Hostel Management System with the AI Chatbot was successful in meeting the objectives of the research project through an intelligent and efficient digital hostel management system.

The system helped in improving the process of room allocation, reduced the burden of administrative work, improved maintenance activities, and made the process of handling complaints from students easier. Machine learning techniques were used to make the chatbot more intelligent in offering its services.

The developed system is a clear demonstration of how artificial intelligence and web technology can be integrated.

5.3 Recommendations

In light of the results from this project, the following recommendations are made to improve the system in the future:

Real time payment gateway integration

Deployment of the system to a live cloud server

Creating a mobile app version of the system

Advanced Natural Language Processing (NLP) integration for improved chatbot intelligence

Installation of biometric hostel check-in and check-out systems

Email and SMS notification services

Enhancing recommendation system by adding more student behavioural data

5.4 Contribution to Knowledge

Contribution to knowledge is made by the project through the use of machine learning techniques and AI chatbot support in university hostel management processes.
Unlike conventional hostel management systems which only concern themselves with room assignment and management of payments, the system proposed here integrates decision tree classification and collaborative filtering along with chatbots to enhance hostel management and students' support service delivery.
It also shows how the machine learning techniques can be applied in practice in the context of academic hostel management.

5.5 Directions for Further Research

Further research could be directed towards enhancing the intelligence of the chatbot by using sophisticated models like Machine Learning and Deep Learning techniques such as NLP (Natural Language Processing) and Neural Networks.
Future research directions could also involve analyzing hostels' occupancy in advance, developing maintenance prediction systems, and using smart hostel IoT devices to monitor the hostel operations.

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Appendix