

NITJ Hostel and Mess Management System

Submitted towards the partial fulfillment of the requirements for the award of the
degree of

Bachelors of Technology

by

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SELF DECLARATION

We, the undersigned, hereby declare that the Minor Project titled "**NITJ Hostel and Mess Management System**" submitted in partial fulfillment of the requirements for the award of the degree of Bachelor of Technology in the Department of Instrumentation & Control Engineering, at Dr B R Ambedkar National Institute of Technology, Jalandhar, is an original work carried out by us under the supervision of **Dr Dilbag Singh**.

We further declare that this project has not been previously submitted to any other university or institute for the award of any degree, diploma, or fellowship.

All the information furnished in this report is based on our work and research conducted during the project. We have acknowledged all sources used and cited them appropriately.

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CERTIFICATE

This is to certify that the project report entitled **NITJ Hostel and Mess Management System** submitted by **Raushan Kumar Jha (22106087)**, **Monib Kumar Singha (22106064)**, **Bhashkar Kumar (22106029)** and **Akhilesh Chauhan (22106008)** to the Dr. BR Ambedkar National Institute of Technology Jalandhar, in partial fulfillment for the award of the degree of B. Tech in Instrumentation and Control Engineering has been carried out under my supervision and this work has not been submitted elsewhere for a degree.

Dr Dilbag Singh
Professor

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ACKNOWLEDGEMENT

We would like to extend our heartfelt gratitude to the individuals who played pivotal roles in the success of the "**NITJ Hostel and Mess Management System**" project. This endeavor would not have been possible without the dedication, expertise, and support of our incredible team members and mentors.

Our project was a collaborative effort, and we owe our success to the hard work and commitment of each team member. Your enthusiasm, creativity, and tireless efforts have been instrumental in turning our vision into a reality. Thank you for your unwavering dedication.

We are deeply grateful to our mentor, **Dr Dilbag Singh**, for his invaluable guidance and mentorship throughout the project. Your vast knowledge, constructive feedback, and unwavering support have been instrumental in shaping our project and ensuring its success. Your mentorship has been a source of inspiration to us.

In closing, we would like to express our sincere appreciation to everyone who contributed to "**NITJ Hostel and Mess Management System**". Your dedication and collaboration have made this project a reality, and we look forward to continuing to grow and improve with your support.

Thank you all for your outstanding contributions and unwavering support.

Sincerely,

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Chapter 1

INTRODUCTION

In the current era of digital transformation, the need for efficient, reliable, and scalable management systems in educational institutions has become increasingly apparent. Hostel accommodations and mess operations are two critical areas that significantly influence the well-being and academic focus of students. Traditional methods of managing hostel admissions, fee collection, room allocation, and mess scheduling are often manual, time-consuming, and prone to errors. These limitations result in administrative inefficiencies, lack of transparency, and frequent miscommunication among stakeholders.

To address these challenges, this project—**Hostel and Mess Management System**—aims to automate and streamline various aspects of hostel and mess administration using modern web technologies and machine learning techniques. The proposed system will serve as a centralized platform to handle student registrations, room allotment, fee tracking, attendance monitoring through facial recognition, and meal scheduling.

By integrating a web-based system with intuitive interfaces and robust backend operations, the project seeks to significantly reduce the dependency on paperwork, minimize manual errors, and ensure a more organized living and dining environment for students and hostel authorities.

1.1 Project Description

The **Hostel and Mess Management System** is a full-stack web application designed to manage the daily operations of a student hostel and its associated mess. It features multiple modules, each focusing on specific functions like room management, mess & hostel attendance, fee tracking, and student registration. Additionally, the system employs predictive data analytics for decision-making, and role-based access control for security.

The system is designed with modularity and scalability in mind, supporting multiple roles such as admin, hostel staff, and students. Administrators can manage room occupancy, generate reports, and oversee overall system performance. Hostel staff can track mess inventory, student check-ins/check-outs, and disciplinary records. Students can log in to view their records, update profiles, and receive meal reminders.

This solution not only improves operational efficiency but also introduces a level of automation that can significantly enhance the living experience of hostel residents while aiding administration with valuable insights and real-time data.

1.2 Objectives of the Project

The primary objectives of the Hostel and Mess Management System are as follows:

Automation of Key Administrative Tasks:

- Automate student admission, fee tracking, and mess attendance.
- Streamline hostel operations with reduced manual intervention.

Centralized and Secure Data Management:

- Provide a unified system to store and access all student and hostel-related data.
- Enhance data integrity and privacy through secure user authentication.

Efficient Mess and Room Utilization:

- Ensure optimal room occupancy and prevent under- or over-utilization.
- Track food consumption and manage inventory to reduce waste.

Attendance Monitoring and Behavior Analysis:

- Maintain disciplinary records and analyze behavioral trends.

User-Friendly and Accessible System:

- Develop a web-based solution accessible across devices with an intuitive UI.
- Ensure role-based functionality for different types of users.

Insightful Reporting and Analytics:

- Enable administrators to generate real-time reports on occupancy, fee status, and meal attendance.
- Use data analytics to aid in predictive decision-making and long-term planning.

1.4 Expected Outcomes

Upon completion, the following outcomes are expected from the project:

- A fully functional, web-based Hostel and Mess Management System with distinct modules for students, administrators, and hostel staff.
- Seamless student registration, check-in/check-out, and real-time attendance logging using facial recognition.
- Robust fee collection mechanism with reminders, due tracking, and automated receipt generation.
- Dynamic mess management system including meal planning, portion control, and inventory alerts.
- An intuitive dashboard for real-time monitoring and decision-making by hostel authorities.
- Scalable architecture that can be adapted for other residential institutions beyond the college.
- Data security measures such as authentication, authorization, and encrypted storage of sensitive information.

Chapter 2

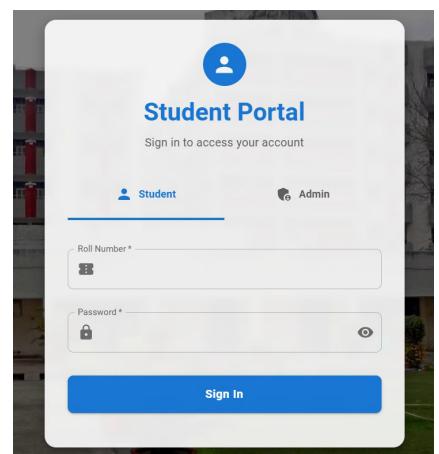
OVERVIEW OF STUDENT PORTAL PAGE

The **Hostel and Mess Management System** features a structured and intuitive user interface accessible through a sidebar navigation panel. Each section of the sidebar represents a functional module of the application, catering to the needs of students, hostel authorities, and mess managers. This chapter elaborates on the individual pages and functionalities presented in the sidebar of the student portal.

2.1 Student Login Page

The **Student Portal** of the Hostel Mess Management System offers a secure and user-friendly interface for students to log in and access their accounts. As shown in the image, the portal requires students to enter their **Roll Number** and **Password** for authentication. A toggle option is available to show or hide the entered password, improving usability and minimizing input errors.

Students can switch between the **Student** and **Admin** login modes using the tab at the top, ensuring appropriate access levels for different user roles. Once logged in, students are likely granted access to view their meal records, attendance status, mess fee details, and place special meal requests. This portal ensures streamlined communication between students and hostel mess administration, promoting efficiency and transparency.



2.2 Dashboard

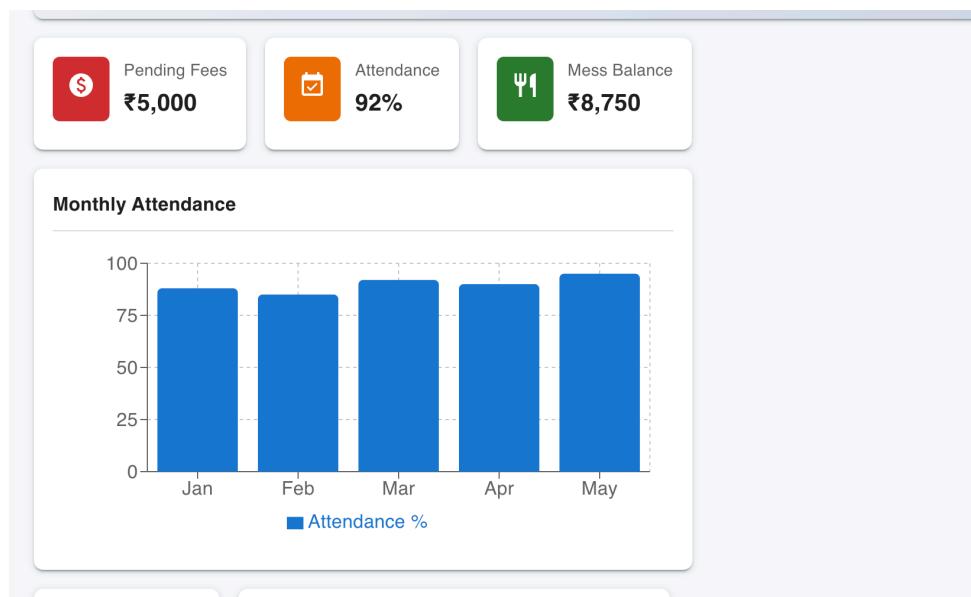
The dashboard of the Hostel Mess Management System functions as a centralized hub, offering students a quick snapshot of their essential hostel-related details. At the very top, three key summary widgets deliver critical statistics that help students stay informed and proactive. The first widget, labeled "Pending Fees: ₹5,000" and displayed in a red box, highlights any outstanding dues the student must pay. The red coloring serves as an alert, encouraging timely payment and helping students avoid late fees, service restrictions, or disciplinary actions. This visual reminder also reduces the administrative burden of following up on unpaid fees manually.

The second widget focuses on attendance, showing a label like "Attendance: 92%" within an orange box. This figure reflects the student's attendance percentage over a selected period and emphasizes the importance of regularity and discipline. In many hostels, attendance is directly tied to eligibility for certain services or financial benefits, such as mess fee refunds. By monitoring this metric, both students

and authorities can track engagement levels, identify patterns, and address irregularities promptly. It may also integrate with leave application systems and assist in compliance or security monitoring.

The screenshot shows the 'Student Portal' dashboard for DR B R AMBEDKAR NIT JALANDHAR. On the left, a sidebar lists navigation options: Dashboard, Fee Payment, Attendance, Mess Menu, Mess Billing, and Complaints. The main area is titled 'Dashboard' and contains a section for 'DETAILS OF THE CANDIDATE'. It displays the student's name (Krishna), date of birth (15-05-2003), gender (Male), contact number (9876543210), blood group (O+), and hostels (MBH-F). A profile picture of Krishna is shown, along with his roll number (2210000). Below this, there is a table with columns for Student Name, Branch, Course, Year, Father's Name, Date of Birth, Gender, Contact No., Blood Group, and Hostel.

The third key metric is the "Mess Balance: ₹8,750," displayed in a green box. This figure represents the remaining mess credit or the amount a student has spent on meals within a specific time frame. It enables students to manage their food-related expenses more effectively and helps them plan their spending. For the mess administration, it provides insights into consumption patterns, which can guide meal planning, inventory control, and budget forecasting. The transparency this feature offers also reduces billing disputes and builds trust between students and management.



Additionally, the dashboard includes a Monthly Attendance Chart to provide a visual breakdown of attendance trends. Displayed as a blue bar chart with months (January to May) on the X-axis and percentage on the Y-axis, it allows students to quickly identify fluctuations in their attendance. This graphical representation is not only useful for students aiming to improve their consistency but also for

parents, wardens, and academic counselors who may want to observe behavioral patterns or address concerns early.

Overall, the dashboard plays a vital role in enhancing the user experience by consolidating important information on a single screen. It offers immediate alerts on key matters like unpaid fees or low attendance, motivates students to remain accountable, and supports informed decision-making. By minimizing the need to navigate multiple sections and offering clear, actionable data, the dashboard ensures efficient, data-driven hostel management for both students and administrators.

2.3 Fee Payment – Structure and Significance

The **Fee Payment** module is a critical feature of the Hostel and Mess Management System. It provides students with a clear, organized view of all their financial obligations toward hostel accommodation and mess services. By presenting real-time, accurate, and actionable fee data, this section promotes transparency, ensures timely payments, and reduces the administrative burden on hostel staff.

Detailed & Transparent Billing

- The system provides an **itemized breakdown** of hostel and mess fees, clearly distinguishing between accommodation charges, meal plans, and other services. This granular view helps students understand exactly what they are paying for, minimizing disputes.
- Automated status tracking** updates payment records in real-time, with color-coded indicators (green for paid, red for pending) for quick reference. This ensures both students and administrators always have accurate, up-to-date financial data.

Seamless Payment Processing & Due Date Management

- An **integrated payment gateway** (via the "PAY NOW" button) enables instant digital transactions, reducing reliance on cash payments and administrative bottlenecks.
- Prominent due dates** are displayed alongside each fee, helping students avoid late payments and associated penalties. Automated reminders further encourage compliance.
- A **total due summary** gives students a snapshot of their outstanding balance, while administrators gain a consolidated view for easier financial tracking and reporting.

The screenshot shows the DR B R AMBEDKAR NIT JALANDHAR Student Portal. The top navigation bar includes the institution logo, name, and a user profile for 'Krishna' (22002200). On the left, a sidebar menu lists 'Student Portal' with options: Dashboard, Fee Payment (selected), Attendance, Mess Menu, Mess Billing, and Complaints. The main content area is titled 'My Fee Payments' and displays a table of fees:

| Fee Type | Amount (₹) | Due Date | Status | Action |
|------------|------------|------------|---------|---------|
| Hostel Fee | 5000 | 2023-11-15 | Pending | PAY NOW |
| Mess Fee | 3000 | 2023-11-10 | Paid | |

Total Due: ₹5000

Operational Efficiency & Financial Insights

- The module **eliminates manual record-keeping**, reducing errors and freeing up staff for higher-priority tasks.
- **Data analytics capabilities** allow administrators to identify payment trends, forecast revenue, and address chronic late-payment issues proactively.
- By digitizing the entire fee management process, the system **enhances accountability** while providing students with 24/7 access to their financial records.

Significance of the Fee Payment Module

1. Transparency and Accountability

The Fee Payment module establishes complete financial transparency by displaying real-time transaction records, due amounts, and payment histories in an easily accessible dashboard. This visibility prevents disputes and builds trust between students and administration, as every payment is automatically logged with timestamps and receipts. For administrators, the system eliminates manual accounting errors and reduces paperwork through automated record-keeping, while enabling quick generation of reports to identify pending payments. The integration with institutional banking systems ensures seamless reconciliation, and automated reminders keep students informed of upcoming deadlines, significantly improving on-time payment compliance.

2. Improved Compliance

Beyond basic transactions, the module serves as a powerful analytics tool by tracking payment patterns to forecast cash flow, identify chronic late-payers, and optimize financial planning. Students benefit from a streamlined experience—viewing dues, making secure online payments, and downloading receipts in just a few clicks, eliminating physical visits to the office. For administrators, the data supports strategic decisions, such as adjusting payment schedules or offering tailored financial guidance. Together, these features transform fee management from an administrative task into a dynamic system that fosters financial responsibility and institutional sustainability.

This **Fee Payment module** is not just a billing system; it is a **financial management tool** that strengthens communication between the institution and students, simplifies operations, and promotes responsible financial behavior.

2.4 Attendance Dashboard

The "My Attendance" section provides students with a comprehensive overview of their hostel attendance records. At the top, the **Current Month Summary** displays key metrics for May 2025, including working days (22), present days (20), absent days (2), and an overall attendance rate of 90.9%. Below this, a detailed **Monthly Records Table** compares attendance data across months, highlighting trends and consistency. The current month (May) is emphasized for quick reference, showing 95.5% attendance.

The online leave and attendance system provides two key benefits: it ensures **transparency** by enabling real-time tracking of attendance records with automatically calculated percentages, giving students and administrators an accurate, up-to-date view of participation. Additionally, it offers **convenience** by allowing students to submit leave requests digitally, eliminating the need for physical paperwork and enabling remote access from anywhere at any time.

Significance of the Attendance Dashboard

This dashboard fosters **transparency** by giving students real-time access to verified, tamper-proof attendance records, reducing disputes and promoting accountability. It ensures **institutional compliance** with hostel policies by automating tracking and flagging attendance below thresholds. For students, it serves as a self-monitoring tool to identify patterns (e.g., frequent absences on specific days) and share reports with parents. Administratively, it eliminates manual errors and integrates with college systems for streamlined record-keeping. Future enhancements like heatmaps could further reveal behavioral insights, linking attendance to meal participation or campus activities.

Student Portal

- Dashboard
- Fee Payment
- Attendance
- Mess Menu
- Mess Billing
- Complaints

DR B R AMBEDKAR NIT JALANDHAR

Krishna 22002200 E+

My Attendance

Current Month Summary

Working Days: 22 | Present: 20 | Absent: 2
Overall Attendance: 90.9%

Monthly Records

| Month | Working Days | Present | Absent | Percentage |
|----------|--------------|---------|--------|------------|
| January | 22 | 20 | 2 | 90.9% |
| February | 20 | 18 | 2 | 90% |
| March | 23 | 22 | 1 | 95.7% |
| April | 21 | 19 | 2 | 90.5% |
| May | 22 | 21 | 1 | 95.5% |

2.5 Mess Menu

This page displays the weekly mess menu for Mega Boys Hostel at Dr. B R Ambedkar NIT Jalandhar. The menu is organized in a clear table format showing:

- Daily Meal Structure (7-day weekly cycle)
 - Breakfast
 - Lunch
 - Snacks
 - Dinner
- Standard Daily Offerings (bottom section)
 - Regular items available every day

- Additional extra items
- Admin Note
 - Clarifies that extra items depend on availability and the menu may change based on material procurement

Significance & Purpose

For Students:

- Provides complete transparency about daily/weekly meal plans
- Helps plan personal schedules around meal times
- Allows dietary preferences to be managed in advance
- Reduces food waste through predictable meal expectations

For Mess Administration:

- **Centralized Control:** Only admin can update ensuring menu consistency
- **Inventory Planning:** Menu directly links to procurement needs
- **Dietary Management:** Balanced nutrition across week
- **Special Days:** Sunday/holiday meals marked appropriately

Operational Benefits:

- **Reduces Queries:** Students don't need to ask about daily meals
- **Budget Control:** Fixed menu helps cost management
- **Quality Assurance:** Standardized offerings maintain quality
- **Feedback System:** Basis for evaluating popular/unpopular items

Why Admin-Only Control?

- **Prevents Chaos:** Avoids conflicting changes from multiple users
- **Inventory Sync:** Ensures menu matches actual supplies
- **Nutrition Balance:** Professional oversight of dietary needs
- **Legal Compliance:** Meets institutional food standards
- **Emergency Updates:** Quick changes for supply issues/special events

2.6 Mess Billing

The Mess Billing section provides students with complete transparency into their dining expenses and meal consumption patterns. The system displays a clear financial overview showing the total due amount (₹1200), payments made this month (₹800), and upcoming expected charges (₹400). This real-time financial snapshot helps students manage their hostel dining budget effectively.

A detailed payment history log maintains records of all transactions with timestamps and payment methods, while the upcoming charges section forecasts future expenses based on the current meal plan. The most valuable feature is the daily consumption tracking, which provides an itemized breakdown of each meal consumed, including dates and specific food items. This granular data empowers students to monitor their actual usage against billed amounts.

The system offers robust reporting capabilities, allowing students to generate customized reports for any date range and export them in multiple formats including Excel, PDF and CSV. Visual analytics present spending trends through easy-to-understand graphs and charts. For dispute resolution, students can flag discrepancies with supporting evidence and track resolution progress through the portal.

For administrators, this system automates accounting processes while maintaining detailed consumption records that help with inventory planning and menu optimization. The transparency builds trust between students and management by eliminating billing ambiguities. Future enhancements could include integration with digital payment systems and mobile notifications for low balance alerts. The comprehensive tracking transforms mess billing from a black box into an accountable, data-driven process that benefits all stakeholders.

2.7 Complaint Management

The Complaint Management section provides students with an organized platform to report and track various hostel-related issues. The interface features a tabbed view categorizing complaints by status (All, Pending, Resolved), enabling efficient monitoring of reported concerns.

The screenshot shows the 'My Complaints' section of the DR B R AMBEDKAR NIT JALANDHAR Student Portal. On the left, there's a sidebar with links for Dashboard, Fee Payment, Attendance, Mess Menu, Mess Billing, and Complaints. The main area has tabs for ALL, PENDING, and RESOLVED, with ALL selected. It lists two complaints:

- Broken Window** (Pending): Hostel, Window in room 203 won't close properly. Submitted: 11/5/2023, 4:00:00 PM.
- Mess Food Quality** (Resolved): Mess, Food was cold during dinner time. Submitted: 11/4/2023, 12:15:00 AM.

At the top right, it shows the user's name Krishna and ID 22002200, with a refresh button. At the bottom right, there are 'NEW COMPLAINT' and 'REFRESH' buttons.

Two sample complaints demonstrate the system's functionality: a maintenance request for a broken window in Room 203, and a food quality complaint about cold dinner. Each entry displays the complaint type, location, description, and submission timestamp, creating a transparent audit trail. The "New Complaint" button allows students to submit additional issues, while the refresh option ensures they see the latest updates on their submissions.

This system serves multiple important functions. For students, it provides a formal channel to voice concerns with guaranteed tracking and response mechanisms. The categorization by status helps them follow up appropriately on pending matters while maintaining records of resolved issues. For administrators, it centralizes feedback collection, prioritizes resolution efforts, and creates an institutional memory of recurring problems.

The design emphasizes clarity and accountability - each complaint receives a timestamped record that documents the entire resolution process. Future enhancements could include automated status notifications, photo upload capabilities for visual evidence, and integration with maintenance workflow systems. This digital approach transforms complaint management from an informal, potentially overlooked process into a structured, trackable system that benefits both students and hostel administration.

Chapter 3

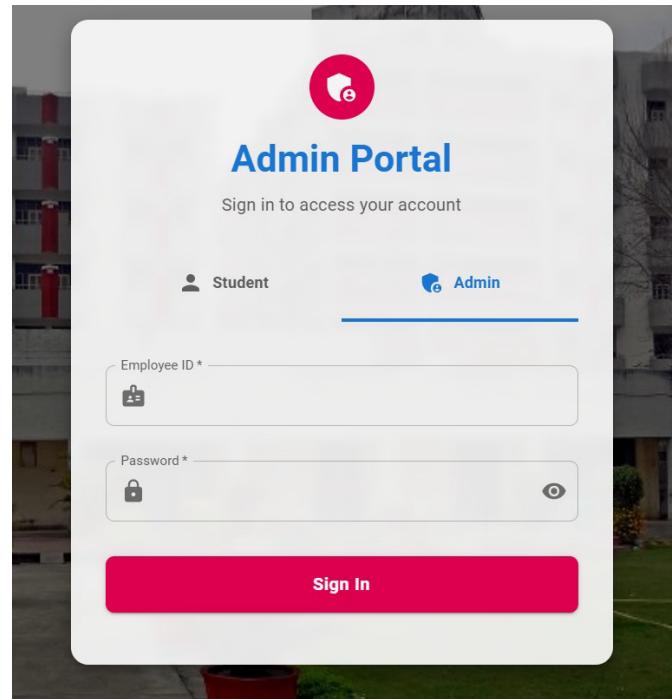
OVERVIEW OF ADMIN PORTAL PAGE

The **Hostel Mess Management System** is a digital platform designed to simplify and streamline the administration of hostel-related services, particularly focusing on the functioning of the mess. This system was created with the intent to reduce manual workload, improve accuracy, and offer real-time visibility into various operational areas of hostel management. The **Admin Panel**, in particular, acts as the central command module from where the administrator can manage student records, track attendance, handle fee payments, respond to complaints, and monitor daily mess activities. The integration of visual tools like graphs, pie charts, and activity feeds makes it easier for administrators to oversee multiple aspects efficiently.

3.1 Admin Login Page

The login interface of the Hostel Mess Management System features a clean and intuitive design, offering separate sign-in options for **students** and **admins**. As shown in the image, users can toggle between the two roles by selecting the appropriate tab at the top of the portal. For **admin login**, the portal requires the entry of an **Employee ID** and a **Password** to authenticate access. The password field includes a visibility toggle icon, allowing users to view or hide the entered password for convenience and accuracy.

This dual-login structure ensures that access is role-specific, with admins receiving higher-level permissions to manage student records, attendance, mess services, and system settings. The design emphasizes simplicity, security, and user-friendliness, which are crucial for managing institutional data efficiently.

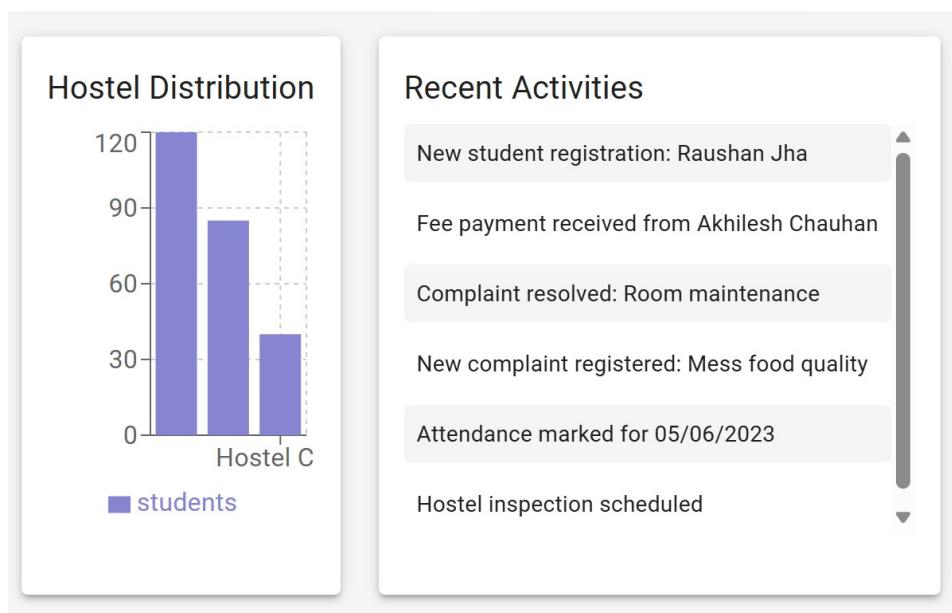


3.2 Dashboard

The **Dashboard** is the first interface the admin encounters upon logging in. It provides a compact and data-rich summary of key hostel metrics. It prominently displays the **total number of students**, which is

currently 245, giving an instant sense of hostel occupancy. Additionally, it shows **pending fees**, which amount to ₹12,500. The system also displays the **percentage of present students for the day**, standing at 87%, helping the admin gauge mess turnout. Importantly, the dashboard highlights **active complaints**—there are currently 12 unresolved student issues requiring administrative attention.

What makes the dashboard particularly valuable is its integration of real-time data visualization tools. A **weekly line graph** charts student attendance trends, allowing administrators to spot anomalies or patterns in daily participation. For instance, a consistent drop on weekends might help in rescheduling or reducing food wastage. Meanwhile, a **pie chart illustrates the fee status**, showing that 97% of students have paid their mess fees, leaving only 3% in arrears. These visuals turn raw data into actionable insights, enabling swift administrative response and improved planning.



The **Hostel Distribution** chart offers a breakdown of how students are spread across different hostels. This information is crucial for mess logistics—knowing how many students reside in each block enables more efficient food preparation and inventory planning. For example, if Hostel C consistently has lower occupancy, administrators can adjust food supply accordingly or explore reasons for lower student allocation.

A particularly useful feature is the **Recent Activities** panel. This functions like an audit trail and lists all major actions performed within the system. Whether it's registering a new student, logging a fee transaction, recording attendance, updating hostel assignments, or responding to a complaint, every action is timestamped and traceable. This log promotes **accountability** and **transparency**, and is especially helpful when multiple administrators are managing the system.

Some common recent activities might include:

- Registered new student: Raushan Jha
- Recorded fee payment: ₹4,000 by A
- Logged complaint: "Unhygienic food served on 12/06/2023"
- Approved leave: Sanjana (from 13/06/2023 to 15/06/2023)

By keeping track of these events, the admin can ensure that no task goes unnoticed and that student grievances or records are not lost in the system.

3.3 Student Management

The **Student Management** section is a comprehensive database of all students currently or previously registered in the system. Each student entry includes crucial information such as their full name, roll number, email ID, assigned hostel, and current status (active or inactive). The panel allows the admin to **edit**, **delete**, or **update student profiles** as necessary. This ensures that records remain up to date, especially during student transfers, graduations, or when disciplinary actions necessitate status changes.

The screenshot shows the 'Student Management' section of the 'Hostel Mess Management - Admin' application. On the left, a sidebar menu for 'Admin User' includes 'Dashboard', 'Manage Students', 'Attendance', 'Fee Management', 'Mess Management', 'Settings', and 'Logout'. The main area is titled 'Student Management' and displays a table of student data. The table columns are: Name, Roll No., Email, Hostel, Status, and Actions. The data rows are:

| Name | Roll No. | Email | Hostel | Status | Actions |
|-------------|----------|------------------------|----------|----------|---------|
| Raushan Jha | 22106087 | raushanjha@gmail.com | Hostel A | Active | |
| Raju Jha | 22101064 | rajujhaha@gmail.com | Hostel B | Inactive | |
| Santosh Jha | 22001063 | santoshjhaha@gmail.com | Hostel F | Active | |

For example, Raushan Jha (Roll No. 22106087) is listed as an active student in Hostel A. In contrast, Raju Jha (Roll No. 22101064) is shown as inactive and assigned to Hostel B. These distinctions help in mess planning, such as meal quantity estimation and room allocation. Moreover, admins can easily filter and search student records using name or roll number, which enhances the speed and efficiency of student-related tasks, particularly during peak times such as admissions or semester transitions.

3.4 Attendance Management

The **Attendance Management** module plays a pivotal role in ensuring that mess services are fairly distributed and that student participation is accurately tracked. The admin can mark students as **Present**, **Absent**, or **On Leave**, and can view detailed logs for each entry. When students apply for leave, they must also state the reason, which helps the admin evaluate the request before granting approval.

Attendance Management

| Student | Date | Status | Leave Reason | Actions |
|------------------------|-----------|---------------|------------------|---------|
| Raushan Jha (22106087) | 15/6/2023 | present | N/A | |
| Monib (22106064) | 15/6/2023 | leave pending | Family emergency | |
| Bhaskar (22106029) | 14/6/2023 | absent | N/A | |

Attendance Management

| Student | Date | Status | Leave Reason | Actions |
|------------------------|------------|---------|--------------|---------|
| Raushan Jha (22106087) | 15/06/2023 | present | N/A | |

For instance, on 15/06/2023, Raushan Jha was present, while Monib had applied for leave citing a family emergency. The status of Monib's leave request remains pending. Another student, Bhaskar, was marked absent on 14/06/2023. These detailed records help in fair fee calculation—students on approved leave may be eligible for a mess fee rebate—and also serve as official documentation during audits or inspections. The admin also has the ability to **approve/reject leave**, **edit attendance records**, and **delete incorrect entries**, ensuring data integrity.

3.5 Fee Management

The **Fee Management** section of the Hostel Mess Management Admin Panel allows the admin to monitor and manage student fees efficiently. It displays essential details such as the student's name, fee type (Hostel, Mess, or Other), amount, due date, and payment status. The status is visually highlighted as "paid", "pending", or "overdue" to help identify which payments need attention.

| Student | Type | Amount | Due Date | Status | Actions |
|--------------------------|--------|--------|-----------|---------|---------|
| Akhil Chauhan (22106008) | Hostel | ₹5,000 | 15/6/2023 | Pending | |
| Monib Singh (22106064) | Mess | ₹3,000 | 10/6/2023 | Paid | |
| Bhaskar Kumar (22106029) | Other | ₹1,000 | 30/5/2023 | Overdue | |

| Student | Type | Amount | Due Date | Status | Actions |
|--------------------------|--------|--------|-----------|---------|---------|
| Bhaskar Kumar (22106029) | Hostel | ₹1,000 | 30/5/2023 | Overdue | |

Admins can perform quick actions like editing or deleting fee records using the icons provided. The “Add Fee” button enables the addition of new entries with ease. There are also dropdown filters to search by student name, status, or fee type, making the system easy to navigate even with multiple entries.

This organized layout ensures clarity and timely follow-ups on fee payments. It simplifies fee tracking and supports better decision-making for hostel and mess administrators.

3.6 Mess Management

The **Mess Management** page in the admin panel provides a structured view of student meal records. It includes student names, meal dates, type of meal (breakfast, lunch, or dinner), attendance status, and any special food requests. The system uses color-coded tags—green for "present" and red for "absent"—to quickly convey attendance information.

Admins can filter records by student name, meal type, or date using the dropdowns and calendar input at the top. There's also an "Add Record" button on the top-right corner, allowing admins to manually log new meal entries, ensuring all data remains updated and organized.

For each record, action buttons are available to edit or delete entries easily. The clean layout and intuitive interface make managing daily mess attendance and special meal requests simple and efficient for hostel administrators.

The screenshot shows the 'Hostel Mess Management - Admin' interface. On the left is a sidebar with a user icon and the text 'Admin User Admin Panel'. Below this are links for 'Dashboard', 'Manage Students', 'Attendance', 'Fee Management', 'Mess Management' (which is currently selected and highlighted in blue), and 'Settings'. At the bottom of the sidebar is a 'Logout' link. The main content area has a header 'Mess Management' with a 'Add Record' button. Below the header is a search bar with dropdowns for 'Student', 'Date' (dd-mm-yyyy), and a calendar icon. A table lists student meal records:

| Student | Date | Meal | Status | Special Request | Actions |
|--------------------------|-----------|-----------|---------|-----------------|---------|
| Raushan Jha (22106087) | 15/6/2023 | Lunch | present | No onions | |
| Bhaskar Kumar (22106029) | 15/6/2023 | Dinner | absent | spicy | |
| Monib Singh (22106064) | 14/6/2023 | Breakfast | present | Vegetarian meal | |

The system also allows hostel administrators to manage and monitor student meal participation effectively. As shown in the interface the system fetched and displayed a record for the student *Raushan*

Jha (22106087), who was marked as **present** for **lunch** on **15/06/2023**, with a special request for **no onions**.

The screenshot shows the 'Mess Management' section of the admin dashboard. At the top, there are four dropdown menus: 'Student' (Raushan Jha (22106087)), 'Status' (Present), 'Meal Type' (Lunch), and 'Date' (15-06-2023). A blue button '+ Add Record' is located in the top right. Below these is a table with columns: Student, Date, Meal, Status, Special Request, and Actions. One row is visible: Raushan Jha (22106087) at 15/6/2023, having Lunch, marked present, with a special request for 'No onions'. The 'Actions' column contains edit and delete icons.

3.7 Admin Settings

The **Admin Settings** section of the Hostel Mess Management System offers a user-friendly interface for managing essential account and system preferences. As depicted in the image, administrators have access to an **Account Security** panel where they can change their password by entering the current password and setting a new one, with a confirmation field to avoid errors. This enhances the security of the admin account and ensures controlled access to sensitive student and mess records.

Additionally, the interface provides **Notification Preferences**, enabling the admin to toggle options for receiving **email notifications** and **system notifications**, allowing customization based on their communication preferences. There is also an **Appearance** setting that includes a switch for **Dark Mode**, providing a more comfortable viewing option, especially in low-light environments. These features together contribute to a more personalized, secure, and accessible admin experience within the system.

The screenshot shows the 'Admin Settings' page. On the left is a sidebar with a user icon and the text 'Admin User Admin Panel'. Below this are links for 'Dashboard', 'Manage Students', 'Attendance', 'Fee Management', 'Mess Management', 'Settings', and a 'Logout' button. The main content area has a title 'Admin Settings' and a 'Account Security' section with fields for 'Current Password', 'New Password', and 'Confirm New Password', along with a 'Update Password' button. Below this are two smaller sections: 'Notification Preferences' (with 'Email Notifications' and 'System Notifications' toggles) and 'Appearance' (with a 'Dark Mode' toggle).

In the above interface we can observe a logout button too. So when you press the logout button you will again get back to the admin's login page.

Chapter 4

BACKEND

The **Hostel Management System** is a backend application designed to streamline hostel operations in educational institutions. It facilitates student attendance tracking, complaint resolution, fee management, mess operations, and administrative tasks. The system employs role-based access control, ensuring that administrators, students, and staff have appropriate permissions.

Key functionalities include secure user authentication, attendance records, complaint submissions, fee payments, and mess menu management. The backend is built using **Node.js** and **Express.js**, with **MongoDB** for data storage, ensuring scalability and efficiency.

Technology Used

The backend is developed using **Node.js**, a JavaScript runtime, and **Express.js**, a lightweight web framework. **MongoDB** serves as the database, with **Mongoose** providing schema-based data modeling. Security is reinforced with **JSON Web Tokens (JWT)** for authentication, **Bcrypt.js** for password hashing, and **CORS** for secure cross-origin requests. Additional security measures include **Helmet** for HTTP headers protection, **Express Rate Limit** to prevent brute-force attacks, and **Express Validator** for input sanitization.

Development tools like **Nodemon** (for auto-restarting the server during development) and **Morgan** (for HTTP request logging) enhance productivity. Environment variables are managed using **Dotenv**, ensuring sensitive data remains secure.

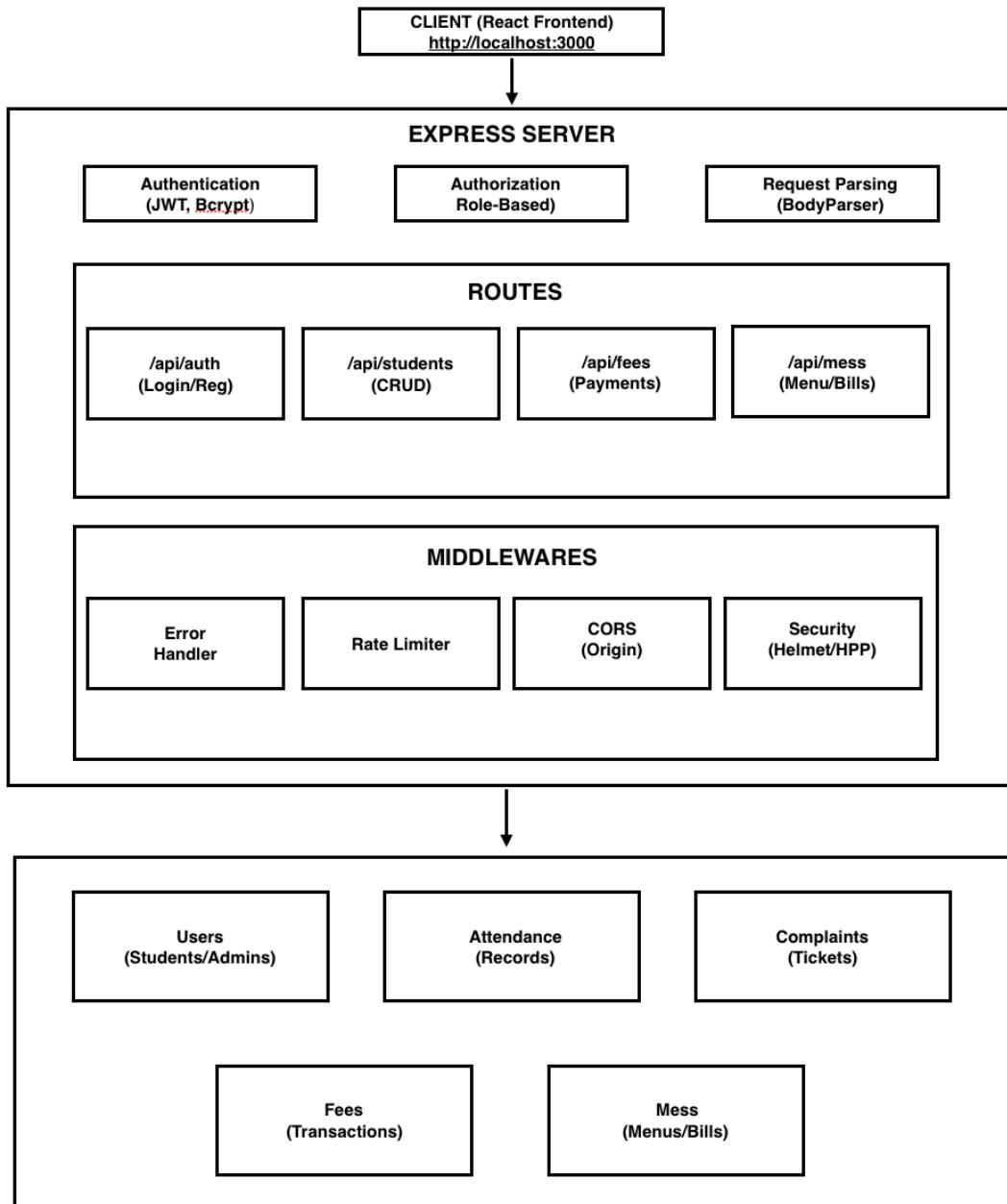
4.1 Backend Architecture (Client-Server Model)

The system follows a RESTful API architecture, where the frontend (client) interacts with the backend (server) via HTTP requests. The frontend, built with **React.js**, runs on <http://localhost:3000> and communicates with the backend to fetch and submit data.

API endpoints are logically grouped:

- /api/auth handles authentication (login, registration).
- /api/students manages student profiles.
- /api/attendance tracks attendance and leave applications.
- /api/complaints processes complaints.
- /api/fees manages fee payments.
- /api/mess handles mess operations.

The backend processes these requests, interacts with the database, and returns JSON responses, ensuring seamless communication between the client and server.



4.2 Database Structure (MongoDB)

The system uses MongoDB, a NoSQL database, with structured collections:

The User collection stores details of students, admins, and staff, including name, email, role, and authentication details. Indexes optimize searches on email, employee_id, and role.

The Attendance collection records student attendance, tracking status (present/absent/leave) and leaveReason. The Complaint collection stores submitted complaints, their category, and resolution status.

The Fee collection manages fee payments, tracking amount, due date, and payment status.

The MessMenu collection stores weekly meal plans, including breakfast, lunch, and dinner menus.

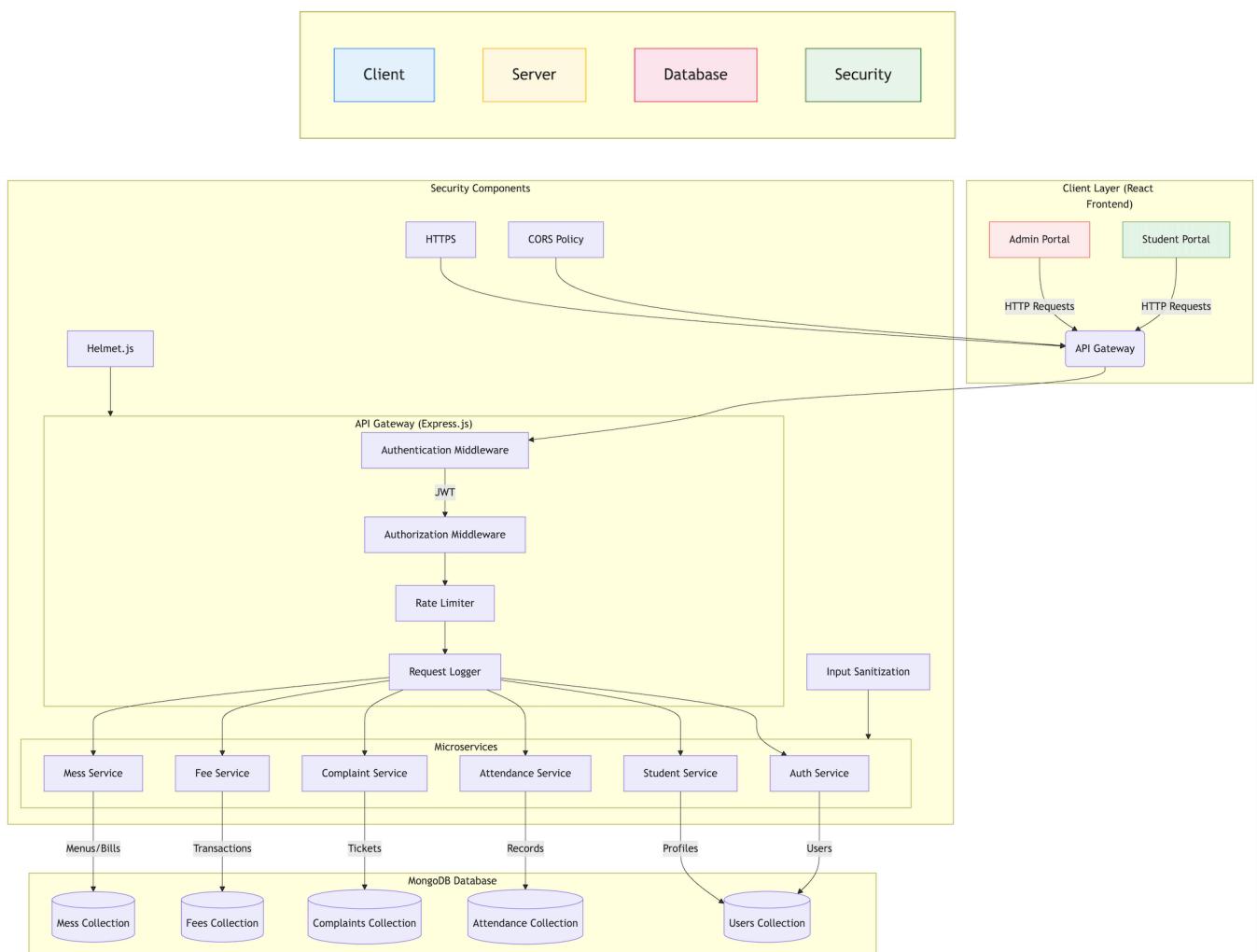
4.3 Backend Functionalities

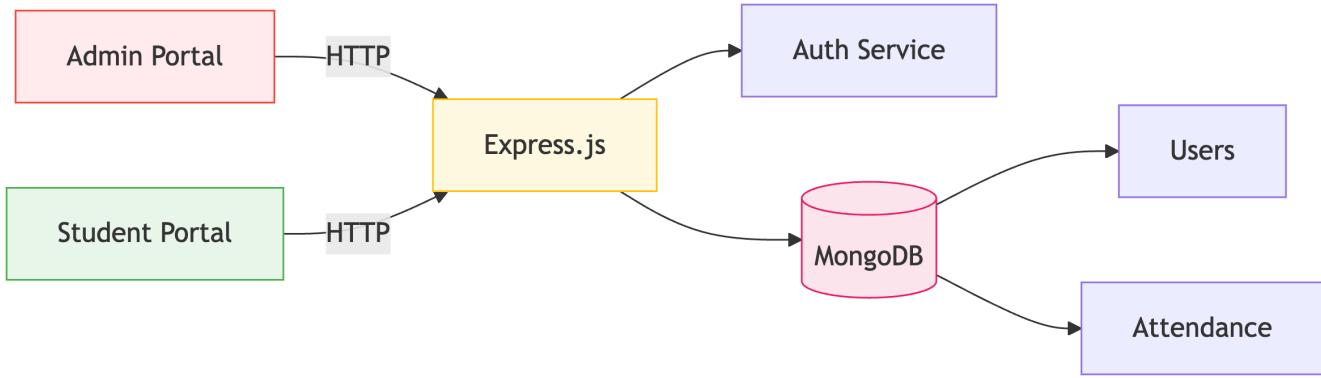
The backend provides several key functionalities. **Authentication** is handled via JWT, ensuring secure login and role-based access. Admins can manage student profiles, while students can update their personal details.

Attendance tracking allows admins to mark attendance, while students can apply for leave. The system generates attendance summaries for dashboards.

The **complaint system** enables students to submit complaints, which admins can resolve. The **fee management** module records payments and generates billing reports.

The **mess management** system lets admins update weekly menus, while students can view meal plans and billing details.





4.4 Security Considerations

Security is a priority in this system. **JWT tokens** authenticate users, while **Bcrypt.js** ensures passwords are securely hashed. **Role-based access control** restricts unauthorized actions.

Input validation is enforced using Express Validator, preventing malicious data entry. CORS restricts API access to trusted domains (e.g., `http://localhost:3000`).

Additional protections include **rate limiting** to prevent brute-force attacks, **Helmet** for secure HTTP headers, and **XSS-Clean** to block cross-site scripting attacks.

Chapter 5

CONCLUSION AND FUTURE ENHANCEMENTS

5.1 Conclusion

The Hostel Management System delivers a robust and secure backend solution designed to streamline hostel operations in educational institutions. Built using modern technologies such as **Node.js**, **Express.js**, and **MongoDB**, the system effectively handles key functionalities including user authentication, attendance tracking, complaint management, fee processing, and mess operations.

The architecture follows a **RESTful API design**, ensuring seamless communication between the frontend and backend. Security measures such as **JWT authentication**, **role-based access control**, and **input validation** safeguard sensitive data while maintaining system integrity. The modular structure of the codebase allows for easy maintenance and future scalability, making it adaptable to evolving institutional needs.

By automating routine tasks like attendance marking and fee collection, the system reduces administrative workload while improving accuracy. The complaint resolution module enhances transparency, ensuring student concerns are addressed promptly. Overall, this system provides a reliable foundation for efficient hostel management.

5.2 Future Scopes

1. Real-Time Functionality

The system could benefit from real-time features such as live notifications for attendance updates, fee reminders, and complaint status changes. Implementing **WebSocket** or **Firebase Cloud Messaging** would enable instant alerts, improving responsiveness. A built-in chat system would further facilitate direct communication between students and administrators.

2. Mobile Application Support

Developing a companion mobile app using **Flutter** or **React Native** would allow students to access hostel services on the go. Features like push notifications, QR-code-based attendance marking, and mobile fee payments would enhance convenience and accessibility.

3. Advanced Reporting and Analytics

Integrating tools like **Chart.js** or **Tableau** could provide administrators with interactive dashboards displaying attendance trends, fee collection rates, and complaint resolution statistics. Automated report generation in PDF or Excel formats would simplify record-keeping and auditing processes.

4. Expanded Operational Modules

Future versions could include additional modules such as a **visitor management system** to log guest entries and exits, a **dynamic room allocation system** to optimize hostel space, and an **inventory tracker** for monitoring hostel supplies. These additions would further reduce manual oversight and improve operational efficiency.

5. AI and Automation

Incorporating AI-driven features could transform system capabilities. For example, **predictive analytics** might forecast attendance patterns or identify potential fee defaulters, while **automated email/SMS reminders** could ensure timely fee payments and leave approvals.

6. Scalability and Deployment

To accommodate growing user bases, the system could be containerized using **Docker** and deployed with **Kubernetes** for better load management. Implementing **horizontal scaling** would ensure consistent performance during peak usage periods, such as fee payment deadlines.

7. AI-Powered Real-Time Attendance System

- Implementation of OpenCV with facial recognition algorithms for automated attendance marking
- Integration of deep learning models (like FaceNet or DeepFace) for accurate student identification
- Anti-spoofing measures using liveness detection to prevent proxy attendance

Reference:-

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