

AI-Powered Hostel Management System

To Test this Web-application use these credentials:

1.Admin (pre-defined)

admin@hms.com

password - admin123

2.Staffs (can created using admin)

kumar@hms.com (Electrician)

password - kumar123

jai@hms.com (cleaner)

password – jai123

other staff roles are also there it can created by admin.

3.Warden (can create using admin)

nyas@hms.com

password – nyas123

4.Resident Tutor (can create using admin)

ayas@hms.com

password – ayas123

Introduction

Welcome to the **Hostel Management System (HMS)** - A comprehensive solution for managing hostel operations including student bookings, room management, complaints, payments, and AI-powered assistance.

This system is designed to streamline hostel administration and provide students with a seamless experience for managing their accommodation, payments, and daily needs.

System Architecture

Frontend:

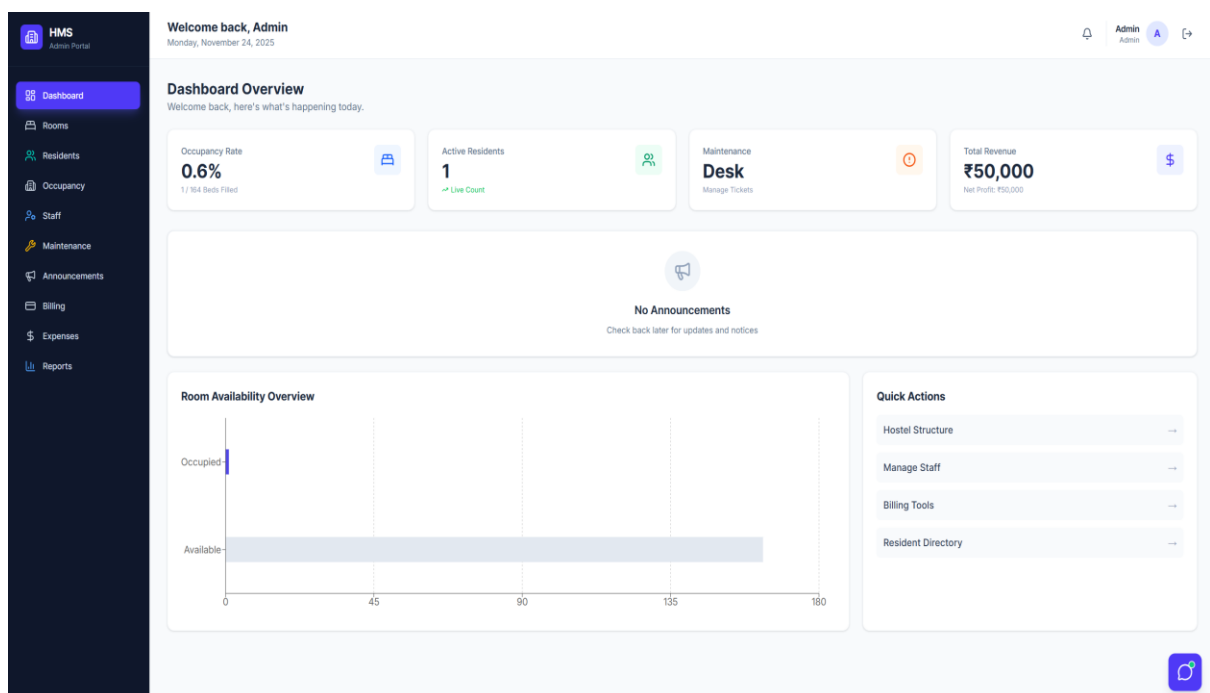
- **Framework:** React.js with Vite
- **Styling:** Tailwind CSS
- **State Management:** React Context API
- **Routing:** React Router DOM v6
- **Forms:** Formik + Yup validation
- **Icons:** Lucide React
- **AI Chat:** Integrated Gemini AI chatbot

Backend:

- **Framework:** Node.js with Express.js
- **Database:** MongoDB with Mongoose ODM
- **Authentication:** JWT (JSON Web Tokens) + bcrypt
- **File Upload:** Multer + Cloudinary
- **Payment Integration:** Razorpay
- **AI Integration:** Google Gemini AI API
- **Email:** Nodemailer + Sendgrid

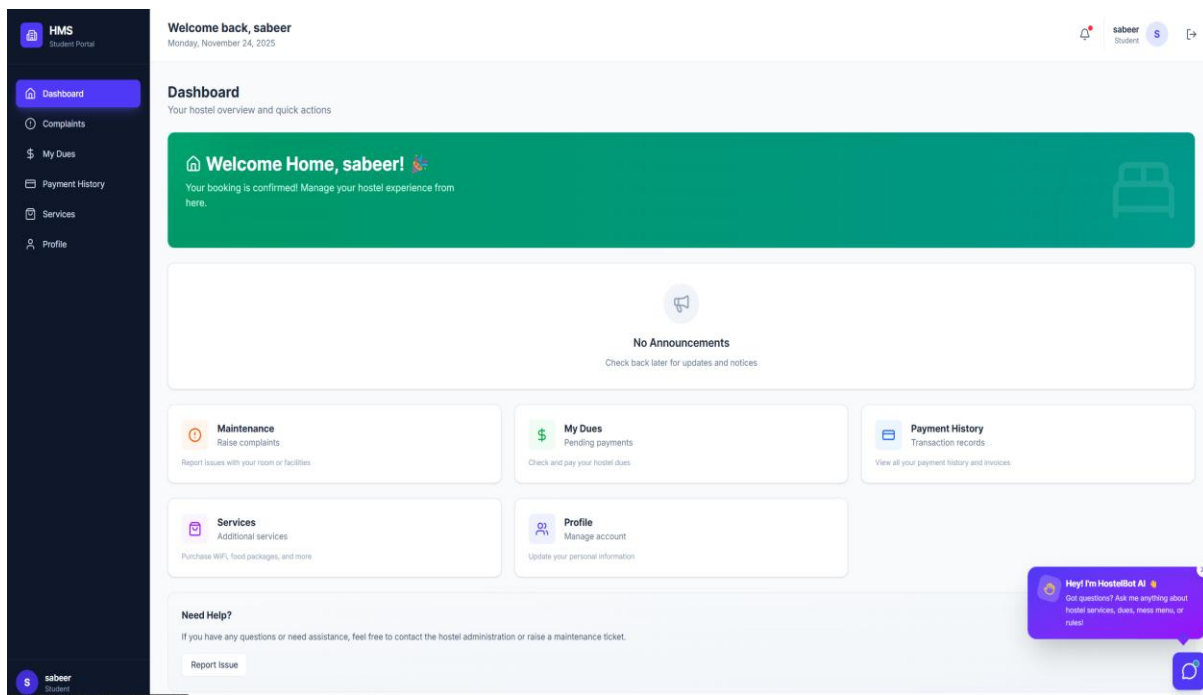
Admin Capabilities

1. Full system access
2. Manage blocks, floors, and rooms
3. View all residents and occupancy
4. Manage staff and assign tasks
5. Create announcements
6. View financial reports
7. Handle complaints and maintenance
8. Access analytics dashboard



Student Capabilities

1. Book hostel rooms
2. Make payments
3. Raise complaints
4. View mess menu
5. Check dues
6. Update profile
7. AI chatbot assistance



User Roles & Permissions

1. Admin/Warden

- Complete system control
- User management (CRUD operations)
- Property management (blocks, floors, rooms)
- Financial oversight
- Report generation
- Announcement creation
- Staff assignment

2. Resident Tutor (RT) / Warden

- Assigned to specific floors (only for RT's)
- Monitor student welfare
- Handle floor-specific queries
- View assigned students

3. Staff

- Receive maintenance assignments
- Update task status
- View assigned complaints
- Mark tasks as complete

4. Student

- Self-service portal
- Room booking and payment
- Complaint registration
- Service requests
- Profile management
- AI assistance

Features Overview

Property Management

- Structured as Blocks → Floors → Rooms
- Supports AC and Non-AC room types
- Multiple pricing plans
- Room capacity from 1 to 6 persons
- Seasonal and promotional discounts

Payment System

- Razorpay payment gateway integration
- Automatic PDF invoice generation
- Complete payment history
- Tracking of pending dues
- Automated email reminders for payments

Complaint Management

- Complaints categorized (Electrical, Plumbing, Furniture, Cleaning)
- Priority levels (Emergency, High, Medium, Low)
- Assign complaints to appropriate staff
- Track status: Pending → Assigned → In Progress → Resolved
- Option to upload images

Announcements

- Notice board for posting announcements
- Priority marking (Urgent, High, Medium, Low)
- Target audience options (All, Students, Staff)
- Support for images in announcements
- Automatic hiding of expired notices

AI Chatbot (HostelBot)

- 24/7 support
- Understands hostel-related queries
- Multi-language support
- Quick-action buttons for common questions
- Role-based suggestions

Example Queries

- “What’s on the mess menu today?”
- “Show my pending dues”
- “What are the hostel rules?”
- “What are the gate timings?”
- “How do I raise a complaint?”

Services Management

- Digital mess pass
- WiFi credential management
- Laundry service booking and tracking
- Support for additional customizable services

AI Hostel Assistant - RAG Implementation

The AI Hostel Assistant is a RAG (Retrieval-Augmented Generation) powered chatbot that combines static knowledge (hostel rules & mess menu) with dynamic student data (room info, dues, complaints) to provide personalized assistance.

RAG Components:

1. **Retrieve:** Loads hostel rulebook and mess menu from `knowledgebase.txt`
2. **Augment:** Fetches student's live data from MongoDB (room, dues, complaints)
3. **Generate:** Uses Google Gemini AI to create contextual responses

Features

Smart Context Awareness

- Knows current day's mess menu
- Accesses student's room number and type
- Checks pending dues in real-time
- Lists active complaints

Modern UI

- Floating chat button (bottom-right)
- Gradient purple/indigo theme
- Real-time typing indicators
- Quick question suggestions
- Smooth animations

Intelligent Responses

- Answers using rulebook data
- Provides personalized information
- Suggests actions (e.g., "Use Complaints page")
- Friendly tone with emojis

Testing Workflow

A. Admin Flow:

1. Login with admin credentials
2. Navigate to Hostel Manager
3. Create a new block/property
4. Add floors and rooms
5. View occupancy dashboard
6. Create test announcement
7. Assign staff to complaints

B. Student Flow:

1. Register new student account
2. Complete profile
3. Browse available rooms
4. Book a room and make payment
5. Raise a test complaint
6. Chat with AI bot
7. View payment history

C. Payment Testing:

Use Razorpay test mode

Test card: 2305 3242 5784 8228

CVV: Any 3 digits

Expiry: Any future date

Additional Features

Analytics & Reports

- Occupancy trends
- Revenue analysis
- Complaint statistics
- Student demographics
- Payment reports

Notification System

- Real-time updates
- Email notifications
- In-app alerts
- Payment reminders

Responsive Design

- Mobile-first approach
- Tablet optimization
- Desktop enhancement
- Cross-browser compatibility

Security Features

- JWT authentication
- Password encryption
- Role-based access control
- Input validation
- XSS protection
- CORS configuration

Support & Contact

For any queries or issues:

- **Documentation:** This file
- **AI Assistant:** Use HostelBot for instant help
- **Email Support:** sabeeranwermeeran@gmail.com

Thank you for testing the Hostel Management System!