 Marwadi University Marwadi Chandarana Group	Marwadi University Faculty of Engineering and Technology Department of Information and Communication Technology
Subject: Capstone Project	Aim: Deployment and Operations
Date: 26-9-2025	Enrolment No: 92310133001

1. Live Deployment

1.1 Platform Selection

The Galaxy Hostel Website was deployed using cloud services to ensure scalability, availability, and secure access.

- Frontend (Next.js + Tailwind CSS): Hosted on Vercel, providing fast, globally distributed access.
- Backend (Firebase Cloud Functions): Handles APIs for student registration, real-time attendance via webcam, complaint management, and optional chatbot queries.
- Data Storage:
 - Student details, attendance records, and complaints → Firestore
 - Real-time captured frames → temporarily stored in Firebase Storage if needed
 - Attendance reports → downloadable Excel using SheetJS
- Authentication & Security: Firebase Authentication ensures role-based access for students, wardens, and admins.

This setup ensures fast response times, low latency, and availability beyond local networks.

1.2 Deployment Process

🚦 Frontend Deployment (Next.js on Vercel):

- ✓ Build the project: `npm run build`
- ✓ Deploy to Vercel
- ✓ Configure Firebase environment variables in Vercel dashboard
- ✓ Set custom domain: <https://galaxy-hostel-prime-bnao.vercel.app/>

🚦 Backend Deployment (Firebase Cloud Functions):


- ✓ Navigate to functions/ and install dependencies: `npm install`
- ✓ Set environment variables for Firebase:
<https://console.firebase.google.com/project/galaxy-hostel-prime/firestoreDeploy>
`functions: firebase deploy --only functions`
- ✓ Functions run continuously to process API requests for attendance, registration, complaints, and chatbot responses

🚦 Database & Real-Time Data:

- ✓ Firestore collections created: students, attendance, complaints
- ✓ Temporary storage of webcam frames configured in Firebase Storage

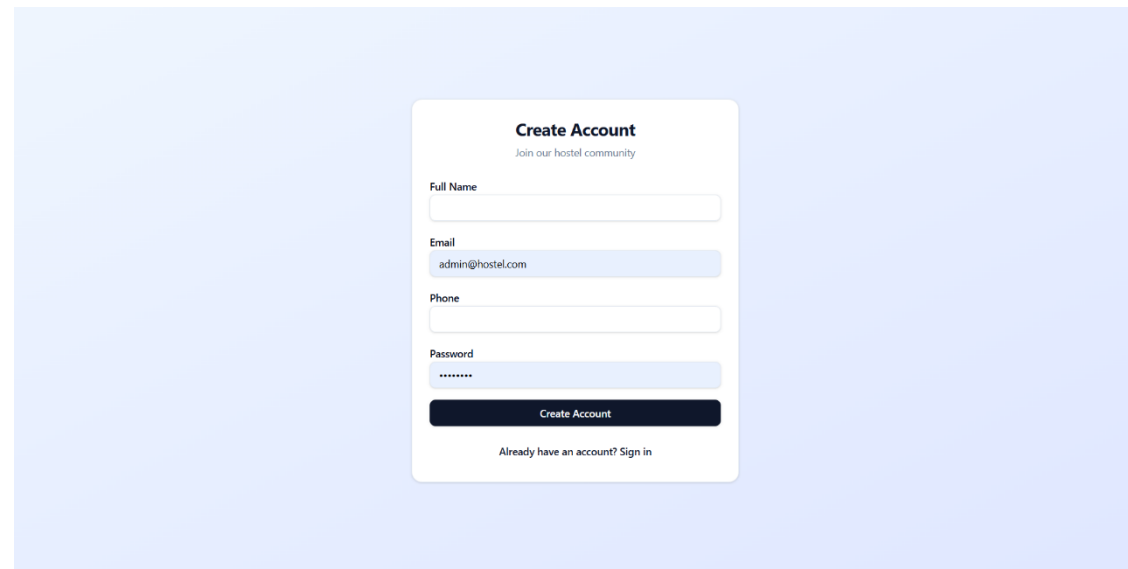
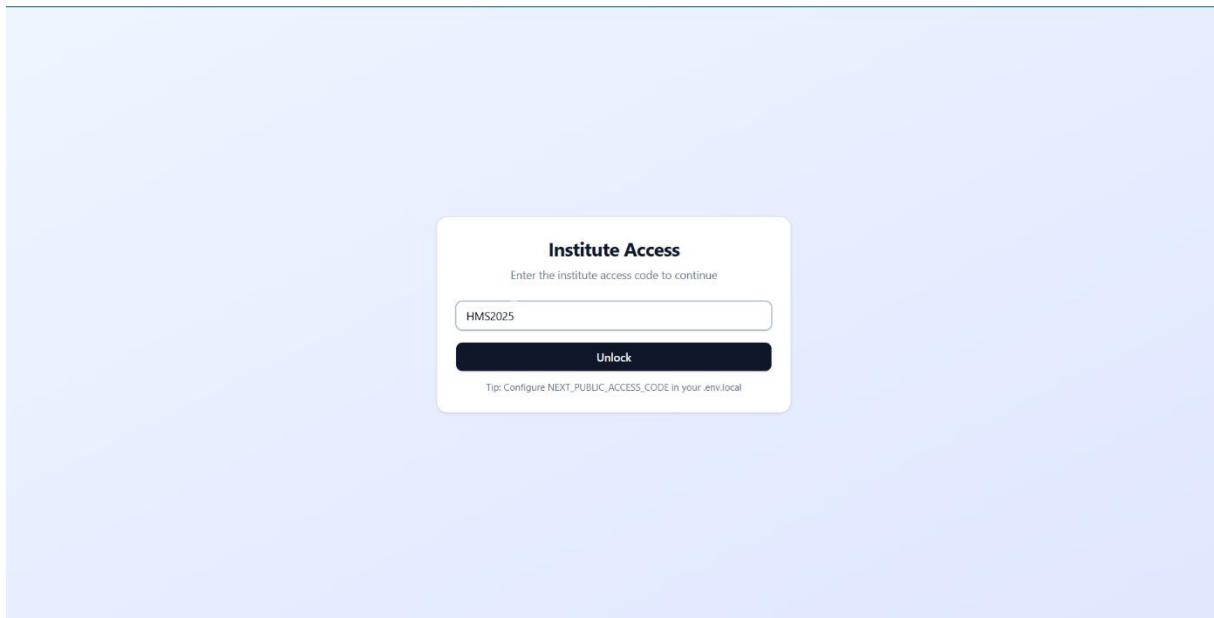
🚦 Domain & Hosting:


- ✓ Custom domain configured in Vercel
- ✓ HTTPS automatically enabled

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1.3 Deployment Evidence

- ✚ **Frontend URL:** <https://galaxy-hostel-prime-bnao.vercel.app/>
- ✚ **Backend API Endpoint:** Example: <https://console.firebase.google.com/project/galaxy-hostel-prime/firestore/databases/-default-/data/~2FgatePasses~2FGP-mfzw9s3u-4G1OYX>
- ✚ **Screenshots:**
 - Live dashboard showing student registration
 - Attendance page with real-time webcam capture
 - Chatbot interface for hostel queries



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Select Your Room

Choose from available rooms across 4 floors

195

Available Rooms

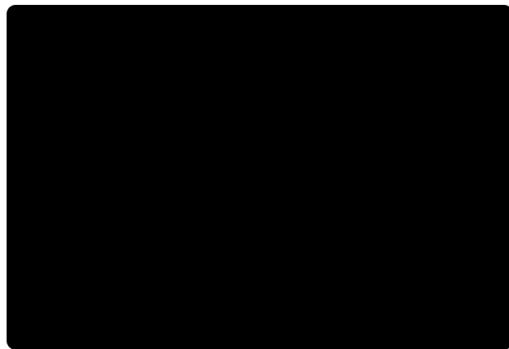
5

Occupied Rooms

Room 101 Floor 1 • Single Capacity: 1000000000000 Available: 1000000000000 Price: ₹1e+23/month	Room 102 Floor 1 • Single Capacity: 0 Available: 0 Price: ₹15000/month	Room 103 Floor 1 • Single Capacity: 1 Available: 0 Current Students: A Achyut Price: ₹15000/month	Room 104 Floor 1 • Single Capacity: 1 Available: 0 Current Students: D Dhruvi Patel Price: ₹15000/month
Room 105 Floor 1 • Single Capacity: 1 Available: 1 Price: ₹15000/month	Room 106 Floor 1 • Single Capacity: 1 Available: 1 Price: ₹15000/month	Room 107 Floor 1 • Single Capacity: 1 Available: 1 Price: ₹15000/month	Room 108 Floor 1 • Single Capacity: 1 Available: 1 Price: ₹15000/month
Room 109 Floor 1 • Single Capacity: 1	Room 110 Floor 1 • Single Capacity: 1	Room 111 Floor 1 • Single Capacity: 1	Room 112 Floor 1 • Single Capacity: 1

Face Recognition Setup

Align your face in the frame and capture a clear image




 Capture

Cancel

Tips for a good capture

Make sure your face is well-lit and centered

- Look straight into the camera
- Ensure proper lighting (avoid backlight)
- Keep the frame steady while capturing
- The saved image will be used for future verification
- You can update it later in profile settings

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[← Back to Dashboard](#)

Gate Pass Management


Generate New Gate Pass

Create a new gate pass with QR code

Purpose

Out Time

Expected Return

 **Generate Gate Pass**

Gate Pass History


Your recent gate passes

No gate passes generated yet

Attendance window is closed. Morning: anytime until 5:00 PM; Night: 10:00–11:59 PM.

Mark Attendance

Capture your face to mark attendance



Retake

Confirm

Cancel

Before you confirm

Verify the preview looks clear and is you

- Look straight into the camera
- Ensure proper lighting (avoid backlight)
- Keep the frame steady while capturing
- After confirming, your attendance will be marked
- You can retake if the image is blurry




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3. Maintenance Plan

3.1 Regular Maintenance Tasks

🚦 Weekly:

- Backup Firestore data and Firebase Storage (attendance logs, student metadata).
- Review Firebase logs for errors or failed API requests.

🚦 Monthly:

- Update dependencies in package.json (Next.js, Tailwind, Firebase SDK).
- Check domain and SSL certificate validity.

🚦 Quarterly:

- Perform load testing for concurrent users using tools like k6 or JMeter.
- Review Firebase rules and authentication settings for least-privilege compliance.


3.2 Potential Issues & Mitigation

One potential issue is low-light or blurry webcam captures, which can reduce the accuracy of attendance recognition, sometimes dropping it to around 50%. To mitigate this, faculty can be provided with guidelines on proper lighting and camera positioning. Additionally, future updates could implement frame preprocessing techniques to improve recognition accuracy.

Another concern is scalability when handling 100 or more concurrent users, which may cause high latency on attendance API requests. This can be addressed by leveraging Firebase's auto-scaling features and Vercel's serverless functions, ensuring smooth performance even under peak loads.

Dependency vulnerabilities are also a potential risk, as outdated packages could lead to security issues. Regularly updating all project dependencies and performing audits using npm audit will help minimize these risks.

Finally, service downtime, such as temporary failures of cloud functions, could make attendance and registration services unavailable. Firebase's built-in retry mechanisms help reduce the impact of temporary failures, and maintaining periodic backups ensures that data is safe and can be restored if needed.

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4. Challenges Faced During Deployment

- ✓ During deployment, several challenges were encountered. One of the first issues was permission errors with Firebase Storage, which initially prevented the system from uploading or accessing files. This was resolved by configuring the correct Firebase IAM roles, ensuring each role had only the minimum required access.
- ✓ Another challenge was CORS issues between the Next.js frontend and Firebase Functions, which caused requests to be blocked. This was addressed by adding appropriate CORS headers in the Cloud Functions and restricting access to allowed origins only.
- ✓ There were also delays in domain setup, where the custom domain did not link correctly at first. The problem was resolved by verifying the DNS settings and re-linking the domain through Vercel.
- ✓ Finally, handling peak loads presented performance challenges, especially when multiple users attempted to mark attendance simultaneously. This was mitigated by leveraging Vercel's serverless functions alongside Firebase's auto-scaling capabilities, ensuring smooth performance even during high traffic periods.