	Marwadi University **Faculty of Engineering and Technology** **Department of Information and Communication Technology**
Subject: Capstone Project	**Aim: Deployment and Operations**
Date: 24-9-2025	**Enrolment No: 92310133004**

1. Live Deployment

1.1 Platform Selection

1.2

The system was deployed on AWS Cloud, leveraging multiple managed services:

- Frontend (React.js): Deployed on AWS EC2 globally distributed access.
- Backend (Flask API): Containerized with Ec2(Linux) and hosted on AWS Elastic Beanstalk (EC2 instance behind a load balancer).
- Data Storage:
    - Student images → AWS S3 bucket
    - Face embeddings & metadata → AWS DynamoDB
    - Face matching → AWS Rekognition
    - Attendance records → Excel files stored in S3

This architecture ensures scalability, low latency, and availability beyond localhost.
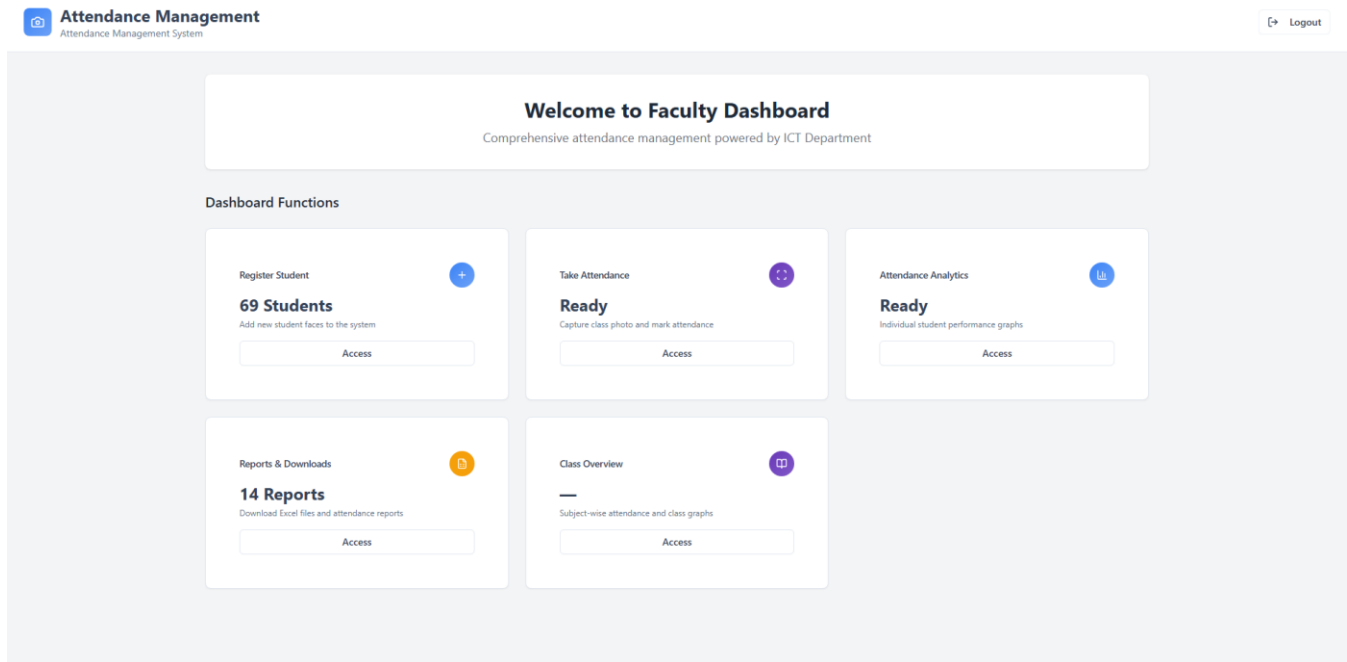
1.2 Deployment Process

1. Frontend Deployment (React):
    - Build React project → npm run build.
    - Configure CloudFront for caching + HTTP.
    - Set custom domain: http://ictattendance.me
2. Backend Deployment (Flask API):
    - EC2 app.py and services.
    - Deploy on → EC2 instance auto-managed by AWS.
    - Set environment variables (AWS keys, bucket names, DB tables).
    - Configured Nginx reverse proxy to forward requests.
    - Run 24*7 using (nohup python3 main.py > output.log 2>&1 &)
3. Database & AI Integration:
    - Created DynamoDB table (students) with partition key: roll_no.
    - Rekognition collection (attendance_collection) initialized.
    - S3 bucket policies configured with correct IAM roles for secure read/write.
4. Domain & DNS setup:
    - Purchased domain → namechip.
    - Applied DNS → Cloudflare.

1.3 Deployment Evidence

- Frontend URL: http://ictattendance.me
- Backend API Endpoint: http://ictattendance.me /api/upload
- Screenshots:
    - Live dashboard (React frontend).

- o Flask API returning Student Info and excel info.

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3. Maintenance Plan

3.1 Regular Maintenance Tasks

- **Weekly:**
  - Backup DynamoDB data to S3.
  - Review CloudWatch error logs.
- **Monthly:**
  - Security patching of Flask dependencies (requirements.txt).
  - Domain validation check.
- **Quarterly:**
  - Load testing with JMeter to ensure performance under peak load.
  - Review IAM roles and policies for least-privilege compliance.

3.2 Potential Issues & Mitigation

Potential Issue	Impact	Mitigation
Low-light or blurry classroom images	In blurry img recognition accuracy (~50%)	Faculty guidelines + pre-processing (histogram equalization in future version)
Scalability under 100+ concurrent uploads	High latency	Auto-scaling EC2 with Elastic Load Balancer
Dependency vulnerabilities	Security risks	Monthly pip-audit and patching

Potential Issue	Impact	Mitigation
VM failure	Service downtime	AWS Elastic Beanstalk auto-redeployment + backups

4. Challenges Faced During Deployment

Challenge	Resolution
IAM permission errors (S3 + Rekognition access denied)	Configured custom IAM policy with minimum required privileges
CORS issues between React frontend and Flask API	Added CORS headers in Flask + CloudFront distribution rules
Domain DNS not applying initially	Re-issued certificate and re-linked CloudFront
Load balancing delays during stress testing	Enabled auto-scaling for EC2 instances