Design Document

for

Student Activity Point Management Portal

Version 2.0

Prepared by Team 14:
(Based on SRS Version 1.0 prepared by Team 14)

Name	**Roll No.**	**NITC Mail ID**
Nalla Sairam Reddy	M251005CS	sairam_m251005cs@nitc.ac.in
Ankush Kumar Gupta	M250667CS	ankush_m250667cs@nitc.ac.in
Prakash Kumar Sarangi	M251250CS	prakash_m251250cs@nitc.ac.in

Project Manager:	Dr. Raju Hazari
Project Client:	NITC Students
Course:	CS6103E - Software Systems lab
Date:	September 28, 2025

Glossary

Term	**Definition**
MERN	MongoDB, Express, React, Node.js. The mandatory full-stack technology stack.
FA	Faculty Advisor. The user role responsible for First-Level Verification (F6).
JWT	JSON Web Token. Used for secure session management (F1).
API	Application Programming Interface. The RESTful endpoints built with Express/Node (3.1.3).
SPA	Single-Page Application. The architecture of the React frontend.
Two-Level Approval	The required workflow: FA verifies first, then Admin finalizes (1.2).

Contents

MERN Application Design Document: Student Activity Point Management Portal

1. Introduction

Goal: Provide a high-level overview of the project. What problem does it solve, who is it for, and what are the key objectives?

- **Project Vision:** A centralized, MERN-stack web portal to streamline the multi-level approval workflow for mandatory student activity points.
- **Problem Statement:** The application addresses the need for a centralized system to manage and track student activity points and enforce a two-level approval workflow
- **Target Audience:** The primary users are students, faculty advisors (FAs), and administrators. Other users include developers, testers, and project evaluators

2. Functional Requirements

Functional requirements listed with IDs:

ID	Requirement Description
F1	The system shall allow users (Student, FA, Admin) to register and login securely. Passwords shall be hashed (bcrypt) and JWT used for session management.
F2	The system shall support three distinct roles: Student, Faculty Advisor (FA), and Admin.
F3	The system shall allow an Admin to assign or map students to their primary FA.
F4	The system shall allow an Admin to designate a specific FA as the verifier for an entire activity category, overriding the student's primary FA.
F5	Upon submission, the system shall automatically route the request to the designated FA (checking for category-specific override, then student's primary FA).
F6	The system shall allow an FA to view all pending requests from their assigned students and Approve (First-Level), Reject, or Request More Information with comments. This decision is NOT final.
F7	The system shall allow an FA to perform bulk approvals for multiple selected requests.
F8	Upon First-Level Approval by the FA, the system shall move the request into the Admin's final approval queue and maintain the student's current accumulated points status as 'Pending Finalization.'
F9	The system shall send email notifications to relevant users upon status changes (e.g., Submitted, FA Approved, Admin Finalized, Rejected, More Info Required).
F10	The system shall validate uploaded proof files for allowed types (pdf, jpg, png) and maximum size (10 MB).
F11	The system shall allow the Admin to view all FA-approved requests and perform the Final-Level Decision (Finalize/Approve or Final Reject) with comments.
F12	Upon Final Approval by the Admin, the system shall update the student's accumulated points for the corresponding category and display the final totals on the Student Dashboard.

2.1. Key Features & Scope

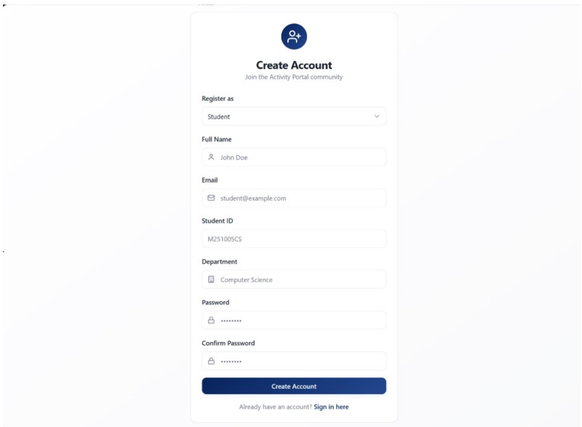
The Student Activity Point Management Portal provides the following major features:

- **User Authentication & Role Management**
  Secure registration and login for Students, Faculty Advisors (FA), and Admins using bcrypt password hashing and JWT-based session management.
- **Multi-Role Access Control**
  Three distinct user roles with tailored dashboards: Students submit activities, FAs perform first-level verification, and Admins perform final approval.
- **Student–Faculty Mapping**
  Admins can assign each student to a primary FA, or designate a category-specific FA to handle certain activity types.
- **Activity Submission & Proof Upload**
  Students can submit activity details (title, category, date, points, description) with proof documents (pdf, jpg, png, $\leq$ 10 MB).
- **Two-Level Approval Workflow**
  Requests flow first to the assigned FA for verification (approve, reject, request info), then to the Admin for final approval.
- **Bulk Actions for Faculty**
  Faculty Advisors can perform bulk approvals on multiple pending student requests for efficiency.
- **Notifications & Status Tracking**
  The system shall send email notifications to students and FAs on every status change (submitted, FA action, admin action, etc.)..
- **Admin Management Tools**
  Admin dashboard provides user management, faculty assignment, request finalization, and analytics/reporting.
- **Audit Logging**
  Comprehensive audit trail of all approval decisions, comments, and status changes for accountability.
- **Points Tracking & Reports**
  Finalized approvals update students' accumulated points, displayed on dashboards along with reports and category-wise analytics.

3. User Interface(UI) Design

This section provides the visual design UI frames necessary to understand the core functionality and user experience of the Student Activity Point Management Portal.

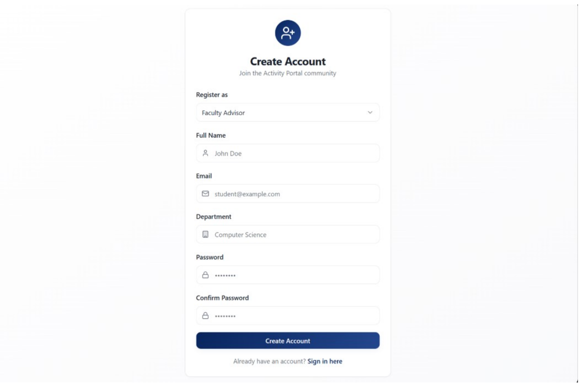
3.1. Registration and Login UI



Create Account
Join the Activity Portal community

Register as: Student
Full Name: John Doe
Email: student@example.com
Student ID: M251005CS
Department: Computer Science
Password: ••••••••
Confirm Password: ••••••••

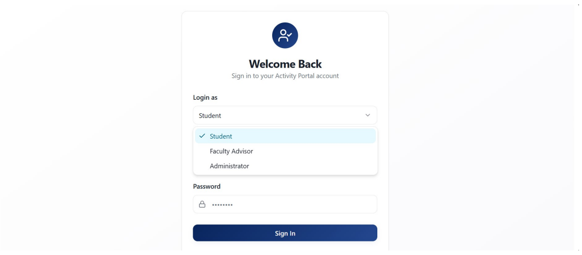
Figure 1: Student Registration



Create Account
Join the Activity Portal community

Register as: Faculty Advisor
Full Name: John Doe
Email: student@example.com
Department: Computer Science
Password: ••••••••
Confirm Password: ••••••••

Figure 2: Faculty Registration

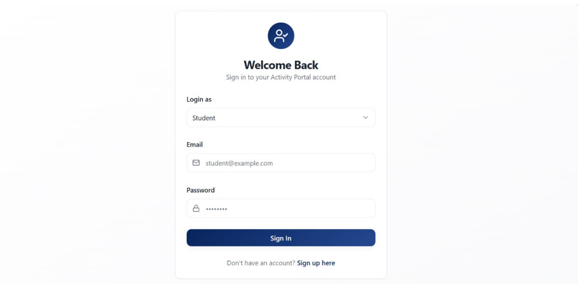


Welcome Back
Sign in to your Activity Portal account

Login as: Student

Password: ••••••••

Figure 3: User's Login Page

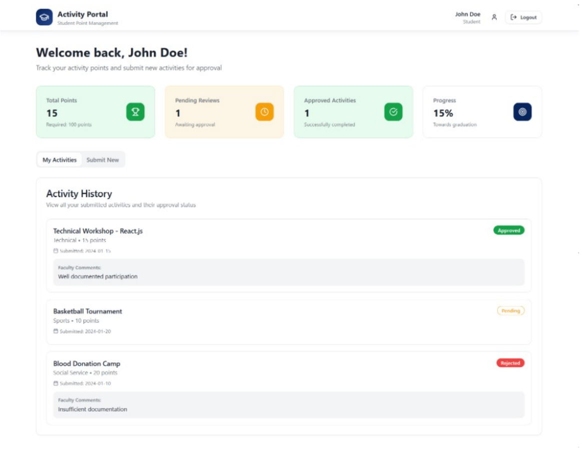


Welcome Back
Sign in to your Activity Portal account

Login as: Student
Email: student@example.com
Password: ••••••••

Figure 4: Student's Login Page

3.2. Student Dashboard UI



Activity Portal
Student Point Management

John Doe
Student

Welcome back, John Doe!
Track your activity points and submit new activities for approval

Total Points: 15 — Required: 100 points
Pending Reviews: 1 — Awaiting approval
Approved Activities: 1 — Successfully completed
Progress: 15% — Towards graduation

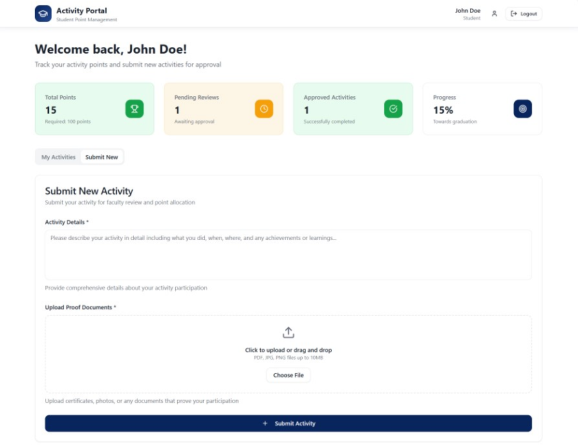
Activity History
View all your submitted activities and their approval status

Technical Workshop - React.js — Approved
Technical • 15 points
Submitted: 2024-01-15
Faculty Comments:
Well documented participation

Basketball Tournament — Pending
Sports • 10 points
Submitted: 2024-01-20

Blood Donation Camp — Rejected
Social Service • 20 points
Submitted: 2024-01-10
Faculty Comments:
Insufficient documentation

Figure 5: Student Activities



Activity Portal
Student Point Management

John Doe
Student

Welcome back, John Doe!
Track your activity points and submit new activities for approval

Total Points: 15 — Required: 100 points
Pending Reviews: 1 — Awaiting approval
Approved Activities: 1 — Successfully completed
Progress: 15% — Towards graduation

Submit New Activity
Submit your activity for faculty review and point allocation

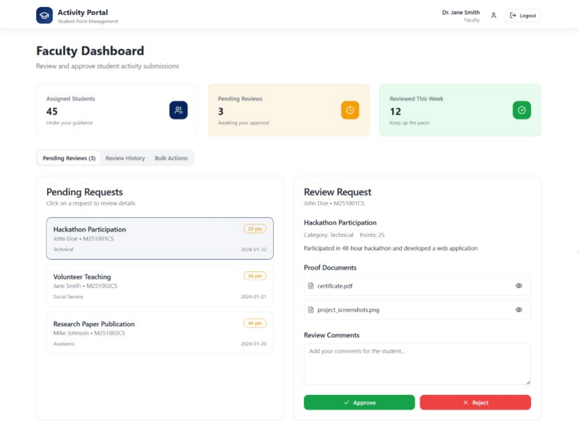
Activity Details *
Please describe your activity in detail including what you did, when, where, and any achievements or learnings...
Provide comprehensive details about your activity participation

Upload Proof Documents *
Click to upload or drag and drop
PDF, JPG, PNG files up to 10MB

Upload certificates, photos, or any documents that prove your participation

Figure 6: Submit New Activity

3.3. FacultyAdvisor Dashboard UI


Activity Portal
Student Point Management

Dr. Jane Smith
Faculty

Logout

Faculty Dashboard

Review and approve student activity submissions

Assigned Students	Pending Reviews	Reviewed This Week
45	3	12
Under your guidance	Awaiting your approval	Keep up the pace!

Pending Reviews (3) | Review History | Bulk Actions

Pending Requests

Click on a request to review details

Hackathon Participation 25 pts
John Doe • M251001CS
Technical 2024-01-22

Volunteer Teaching 30 pts
Jane Smith • M251002CS
Social Service 2024-01-21

Research Paper Publication 40 pts
Mike Johnson • M251003CS
Academic 2024-01-20

Review Request

John Doe • M251001CS

Hackathon Participation

Category: Technical Points: 25

Participated in 48-hour hackathon and developed a web application

Proof Documents

certificate.pdf

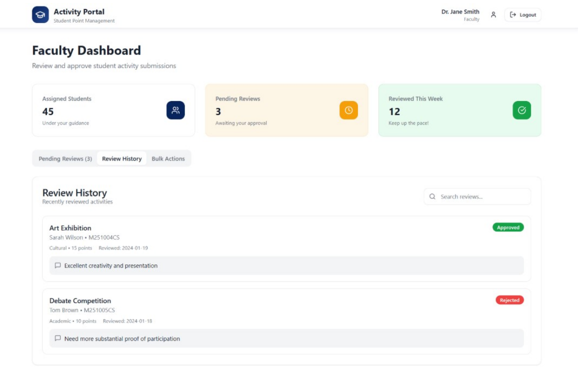
project_screenshots.png

Review Comments

Add your comments for the student...

✓ Approve | ✕ Reject

Figure 7: Faculty Advisor Dashboard


Activity Portal
Student Point Management

Dr. Jane Smith
Faculty

Logout

Faculty Dashboard

Review and approve student activity submissions

Assigned Students	Pending Reviews	Reviewed This Week
45	3	12
Under your guidance	Awaiting your approval	Keep up the pace!

Pending Reviews (3) | Review History | Bulk Actions

Review History

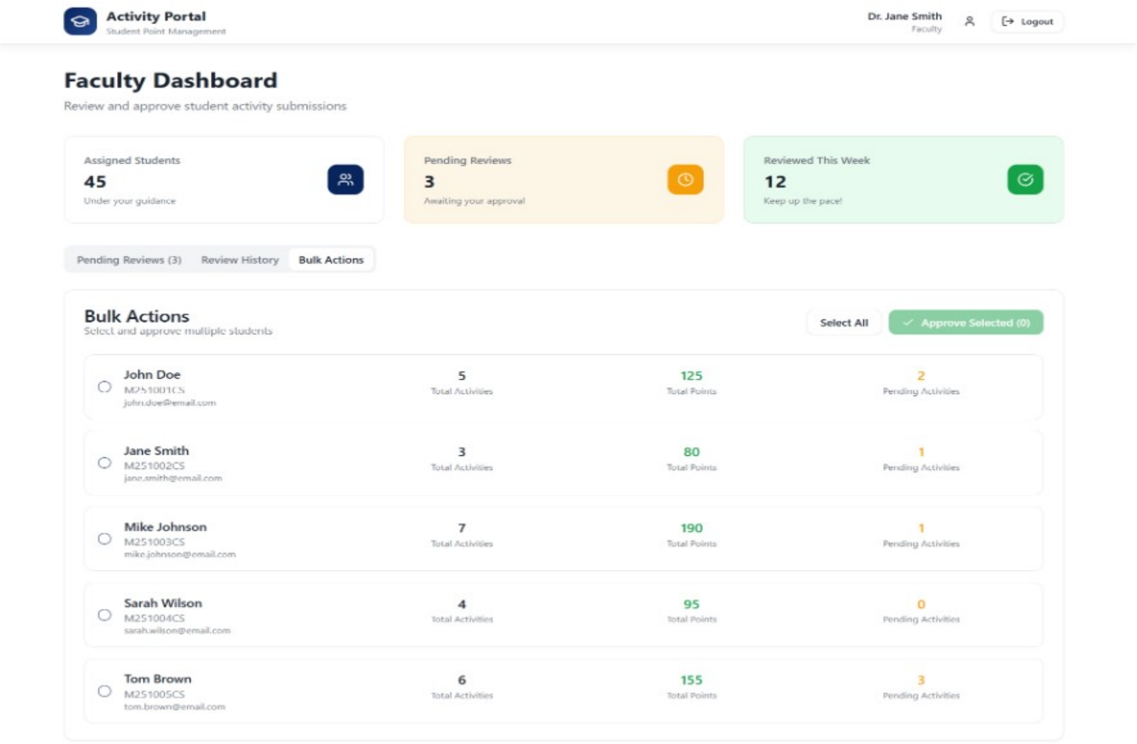
Recently reviewed activities

Search reviews...

Art Exhibition Approved
Sarah Wilson • M251004CS
Cultural • 15 points Reviewed: 2024-01-19
Excellent creativity and presentation

Debate Competition Rejected
Tom Brown • M251005CS
Academic • 10 points Reviewed: 2024-01-18
Need more substantial proof of participation

Figure 8: Review History


Activity Portal
Student Point Management

Dr. Jane Smith
Faculty

Logout

Faculty Dashboard

Review and approve student activity submissions

Assigned Students	Pending Reviews	Reviewed This Week
45	3	12
Under your guidance	Awaiting your approval	Keep up the pace!

Pending Reviews (3) | Review History | Bulk Actions

Bulk Actions

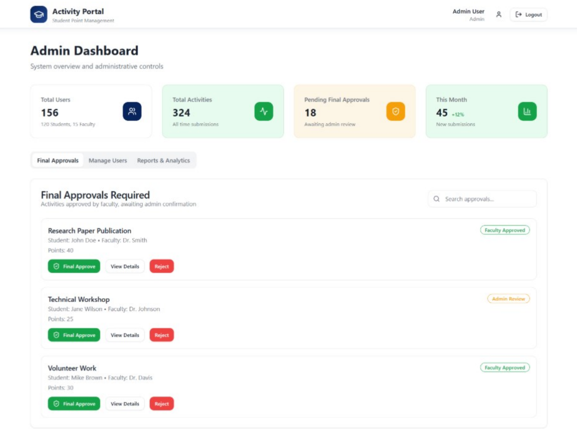
Select and approve multiple students

Select All | ✓ Approve Selected (0)

○	John Doe M251001CS john.doe@email.com	5 Total Activities	125 Total Points	2 Pending Activities
○	Jane Smith M251002CS jane.smith@email.com	3 Total Activities	80 Total Points	1 Pending Activities
○	Mike Johnson M251003CS mike.johnson@email.com	7 Total Activities	190 Total Points	1 Pending Activities
○	Sarah Wilson M251004CS sarah.wilson@email.com	4 Total Activities	95 Total Points	0 Pending Activities
○	Tom Brown M251005CS tom.brown@email.com	6 Total Activities	155 Total Points	3 Pending Activities

Figure 9: Faculty Advisor Bulk Action UI

3.4. Administrator Dashboard UI



Activity Portal
Student Point Management

Admin User
Admin

Logout

Admin Dashboard

System overview and administrative controls

Total Users
156
120 Students, 15 Faculty

Total Activities
324
All time submissions

Pending Final Approvals
18
Awaiting admin review

This Month
45 +12%
New submissions

Final Approvals | Manage Users | Reports & Analytics

Final Approvals Required
Activities approved by faculty, awaiting admin confirmation

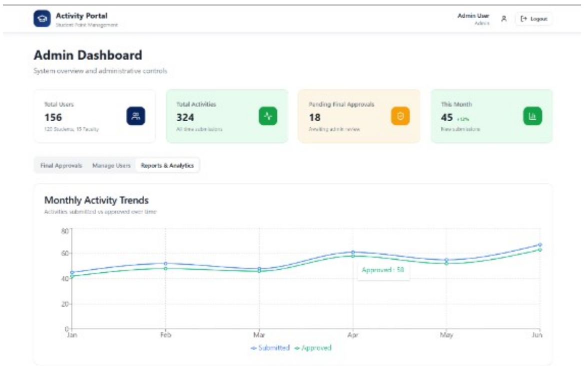
Search approvals...

Research Paper Publication
Student: John Doe • Faculty: Dr. Smith
Points: 40
Faculty Approved
Final Approve | View Details | Reject

Technical Workshop
Student: Jane Wilson • Faculty: Dr. Johnson
Points: 25
Admin Review
Final Approve | View Details | Reject

Volunteer Work
Student: Mike Brown • Faculty: Dr. Davis
Points: 30
Faculty Approved
Final Approve | View Details | Reject

Figure 10: Admin’s Final Approval



Activity Portal
Student Point Management

Admin User
Admin

Logout

Admin Dashboard

System overview and administrative controls

Total Users
156
120 Students, 15 Faculty

Total Activities
324
All time submissions

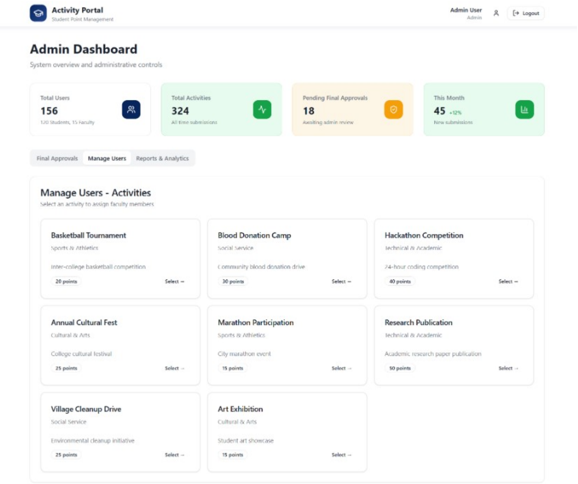
Pending Final Approvals
18
Awaiting admin review

This Month
45 +12%
New submissions

Final Approvals | Manage Users | Reports & Analytics

Monthly Activity Trends
Activities submitted vs approved over time

Figure 11: Reports and Analytics



Activity Portal
Student Point Management

Admin User
Admin

Logout

Admin Dashboard

System overview and administrative controls

Total Users
156
120 Students, 15 Faculty

Total Activities
324
All time submissions

Pending Final Approvals
18
Awaiting admin review

This Month
45 +12%
New submissions

Final Approvals | Manage Users | Reports & Analytics

Manage Users - Activities
Select an activity to assign faculty members

Basketball Tournament
Sports & Athletics
Inter-college basketball competition
20 points | Select →

Blood Donation Camp
Social Service
Community blood donation drive
30 points | Select →

Hackathon Competition
Technical & Academic
24-hour coding competition
40 points | Select →

Annual Cultural Fest
Cultural & Arts
College cultural festival
25 points | Select →

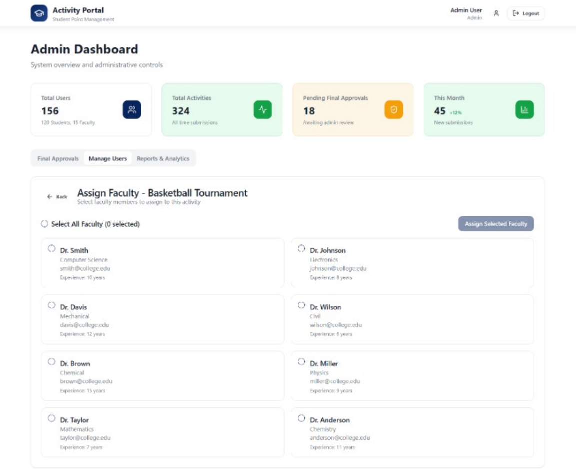
Marathon Participation
Sports & Athletics
City marathon event
15 points | Select →

Research Publication
Technical & Academic
Academic research paper publication
50 points | Select →

Village Cleanup Drive
Social Service
Environmental cleanup initiative
25 points | Select →

Art Exhibition
Cultural & Arts
Student art showcase
15 points | Select →

Figure 12: Manage Users by Admin



Activity Portal
Student Point Management

Admin User
Admin

Logout

Admin Dashboard

System overview and administrative controls

Total Users
156
120 Students, 15 Faculty

Total Activities
324
All time submissions

Pending Final Approvals
18
Awaiting admin review

This Month
45 +12%
New submissions

Final Approvals | Manage Users | Reports & Analytics

← Back

Assign Faculty - Basketball Tournament
Select faculty members to assign to this activity

○ Select All Faculty (0 selected)

Assign Selected Faculty

○ Dr. Smith
Computer Science
smith@college.edu
Experience: 10 years

○ Dr. Johnson
Electronics
johnson@college.edu
Experience: 8 years

○ Dr. Davis
Mechanical
davis@college.edu
Experience: 12 years

○ Dr. Wilson
Civil
wilson@college.edu
Experience: 6 years

○ Dr. Brown
Chemical
brown@college.edu
Experience: 15 years

○ Dr. Miller
Physics
miller@college.edu
Experience: 9 years

○ Dr. Taylor
Mathematics
taylor@college.edu
Experience: 7 years

○ Dr. Anderson
Chemistry
anderson@college.edu
Experience: 11 years

Figure 13: Faculty Assign by Admin

4. System Architecture

Goal: Outline the overall structure, technology choices, and how the different parts of the MERN stack interact.

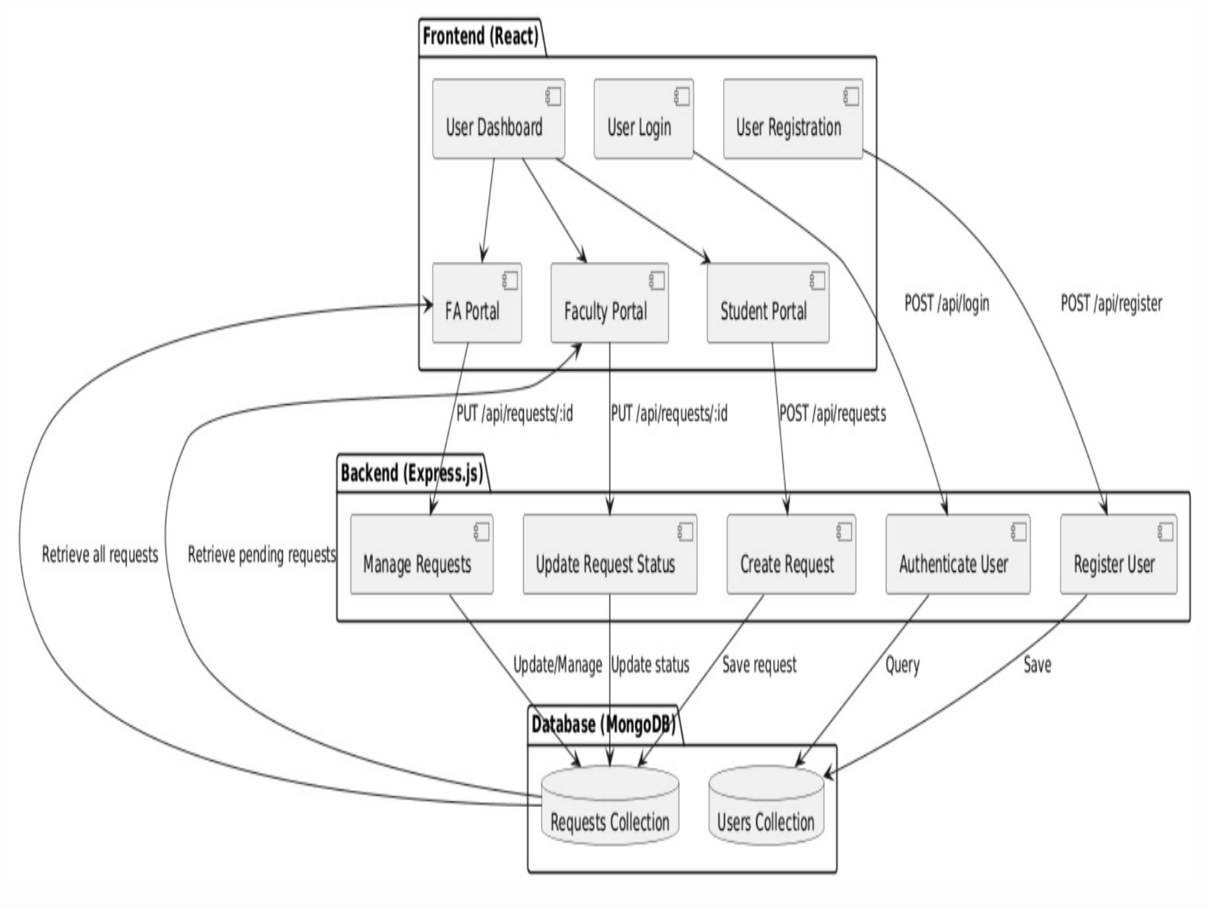


Figure 14: High-level system architecture of the Student Activity Point Portal

4.1. High-Level Diagram

The architecture utilizes a Two-Level Approval flow built on a MERN stack. The React frontend interacts with the Express/Node.js API, which in turn manages data in MongoDB and file storage.

- **Client (React):** Functions as the Single-Page Application (SPA) providing role-based portals (Student, FA, Admin). It communicates with the backend via HTTPS JSON endpoints.
- **Server (Node.js/Express):** A RESTful API server that handles all business logic, enforces role-based access control, interacts with the MongoDB database, and manages user authentication via JWTs.
- **Database (MongoDB):** A NoSQL database used to store application data in the Users Collection and Requests Collection. File storage (proofs) is handled separately (S3/Cloud).

4.2. Technology Stack

The implementation is constrained to the mandatory MERN stack.

Component	Technology / Constraint
Frontend	React, communicates via HTTPS JSON endpoints.
Backend / API	Node.js/Express, RESTful API
Database (DB)	MongoDB for persistence (MongoDB Atlas or campus-hosted).
Authentication	JWT tokens for session management; passwords hashed using bcrypt and strong salt.
External Interfaces	SMTP service (SendGrid or campus mail) for email notifications (F9) Optional AWS S3 for proof file storage.

4.3. Database Schema (MongoDB Collections)

The design includes a minimal set of collections necessary to support the three key use cases: User Management (U3), Request Submission (U1), and Points Tracking (F12).

Collection: Users This collection supports user authentication, roles (F2), and the Student-to-FA mapping (F3).

Field Name	Data Type	Description
_id	ObjectID	Primary key
name	String	User 'Names'
email	String	User's email (unique, used for login)
passwordHash	String	Hashed password (bcrypt)
role	String	User role: 'Student', 'FA', or 'Admin' (F2)
primary_fa_id	ObjectID	FK to Users collection for the student's primary FA (F3)

Collection: Requests This collection tracks all submissions and the state of the two-level approval workflow.

Field Name	Data Type	Description
_id	ObjectID	Request ID
studentId	ObjectID	Reference to the _id of the submitting student
assignedFAId	ObjectID	Reference to the _id of the assigned FA
title	String	Title of the activity
category	String	Category of the activity
date	Date	Date of the activity
points	Number	Points requested
description	String	Description of the activity
proofFile	String	URL or path to the uploaded proof file
status	String	Current status of the request (Submitted, FA Approved, Admin Finalized, Rejected, More Info Required)

Field Name	Data Type	Description
comments	String	Comments from FA or Admin
history	Array	An array of objects to serve as an audit trail, recording status changes, timestamps, and user actions

Collection: Categories This collection supports the Admin's ability to define activity categories and verification rules (F4).

Field Name	Data Type	Description
_id	ObjectID	Primary key
name	String	Category name (e.g., 'Sports', 'NSS')
max_points	Number	Maximum points allowable for this category
override_fa_id	ObjectID	FK to Users (FA) for category-specific verification (F4)

Collection: AuditLog This collection is required to provide a comprehensive, append-only record of all state changes and user actions (4.2).