PES UNIVERSITY

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Capstone Project Report (Phase-1)
on

EduSync: Student-Guide
Project Management System

Submitted by

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Aug 2025 – Jan 2026

under the guidance of

Guide Details

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FACULTY OF ENGINEERING
DEPARTMENT OF COMPUTER APPLICATIONS
PROGRAM – MASTER OF COMPUTER APPLICATIONS

CERTIFICATE

This is to certify that the project entitled.

EduSync: Student-Guide
Project Management System

is a bonafide work carried out by

Thusharguptha G P - (PES1PG24CA330)

in partial fulfillment for the completion of Capstone Project, Phase-1 work in the Program of Study MCA under rules and regulations of PES University, Bengaluru during the period Aug. 2025 – Jan 2026. The project report has been approved as it satisfies the academic requirements of 3rd semester MCA.

Signature with date
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Chairperson
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DECLARATION

I, **Thusharguptha G P,** bearing **PESPG24CA330** hereby declare that the Capstone project phase-1 entitled, ***EduSync: Student-Guide Project Management System,*** is an original work done by me under the guidance of **Mr. Santosh Katti,** Designation, PES University, and is being submitted in partial fulfillment of the requirements for completion of 3rd Semester course in the Program of Study **MCA**. All corrections/suggestions indicated for internal assessment have been incorporated in the report.

PLACE:

DATE:

Thusharguptha G P

ABSTRACT

EduSync is a web-based academic project management and evaluation system designed to automate and streamline the complete lifecycle of student projects in higher educational institutions. The system addresses limitations of existing platforms by providing centralized user management, secure role-based authentication, automated student-guide allocation, project proposal submission and approval, milestone-based progress tracking, multi-level evaluation, and plagiarism checking through API integration. Additionally, EduSync introduces an intelligent, constraint-based viva scheduling mechanism that generates conflict-free panel timetables by considering institutional timetables, faculty availability, student free hours, and room availability. The system also incorporates project title clash detection using natural language processing techniques and provides analytics dashboards for effective academic monitoring. By integrating automation, transparency, and scalability, EduSync aims to significantly reduce administrative overhead while improving the efficiency and reliability of academic project management..

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Chapter 1

INTRODUCTION

1.1 Project Description

EduSync is a web-based Academic Project Management and Evaluation System developed to automate and streamline the complete lifecycle of academic projects in higher educational institutions. The system provides secure role-based authentication, user management, and automated student–guide allocation using uploaded datasets to ensure fair workload distribution. Students can submit project proposals, which are reviewed and approved by guides, while natural language processing techniques are used to detect project title duplication. The system supports milestone-based progress tracking, multi-level evaluation with automated grade computation, and plagiarism checking through API integration. A key feature of EduSync is its constraint-based automated viva scheduling module, which generates conflict-free panel timetables by considering institutional timetables, faculty availability, student free hours, and room availability. Additionally, EduSync includes messaging facilities and analytics dashboards to enhance communication, monitoring, and decision-making, thereby improving efficiency, transparency, and reliability in academic project management.

1.2 Problem Definition

In higher educational institutions, the management of academic projects is often handled using manual processes or disconnected digital tools such as spreadsheets, emails, and generic learning management systems. These approaches lead to inefficient guide allocation, duplication of project titles, lack of structured progress tracking, inconsistent evaluation methods, and frequent scheduling conflicts during viva examinations. Manual viva scheduling does not consider institutional timetables, faculty availability, student free hours, or room constraints, resulting in clashes and administrative overhead. Existing platforms fail to provide end-to-end academic project lifecycle management with automation, transparency, and analytical insights.

thereby highlighting the need for an integrated system that can efficiently manage project workflows, evaluations, and scheduling in a scalable and reliable manner.

1.3 Proposed Solution

The proposed solution is EduSync, a centralized web-based Academic Project Management and Evaluation System that automates the complete lifecycle of academic projects. The system provides secure role-based authentication, automated student–guide allocation using uploaded datasets, and structured project proposal submission with approval workflows. It incorporates milestone-based progress tracking, multi-level evaluation with automatic grade computation, and plagiarism checking through external API integration. EduSync introduces a constraint-based automated viva scheduling mechanism that generates conflict-free panel timetables by considering institutional timetables, faculty availability, student free hours, and room availability. Additionally, the system employs natural language processing techniques for project title clash detection, offers messaging facilities for effective communication, and provides analytics dashboards for academic monitoring, thereby ensuring efficiency, transparency, and scalability in academic project management.

1.4 Purpose

The purpose of this project is to design and develop a centralized and automated system that efficiently manages academic projects in higher educational institutions. EduSync aims to reduce manual effort and administrative overhead by automating guide allocation, project approval, progress tracking, evaluation, and viva scheduling. The system seeks to ensure transparency, fairness, and accuracy in academic processes while minimizing scheduling conflicts and duplication of project titles. By providing structured workflows, secure access control, and analytical insights, EduSync supports effective monitoring and decision-making, ultimately enhancing the quality and reliability of academic project management.

1.5 Scope

The scope of EduSync extends to any academic environment where students are required to undertake project work as part of their curriculum. The system can be effectively used in colleges, universities, and technical institutes to automate and manage the complete academic project workflow, including guide allocation, proposal management, progress tracking, evaluation, and viva scheduling. EduSync is suitable for implementation across various departments such as Computer Science, Master of Computer Applications (MCA), Engineering, Management, and Science, and can be adapted to different institutional project management requirements.

Chapter 2

LITERATURE SURVEY

2.1 Domain Survey

The domain of academic project management focuses on the planning, execution, monitoring, and evaluation of student projects within educational institutions. With increasing student strength and project complexity, institutions are moving from manual and semi-automated methods to web-based management systems to improve efficiency and transparency. This domain integrates concepts from web application development, database management, authentication and authorization, scheduling algorithms, data analytics, and natural language processing. Recent advancements emphasize automation in guide allocation, progress monitoring, evaluation workflows, and conflict-free scheduling. The academic project management domain also increasingly incorporates analytics and plagiarism detection to maintain academic integrity and support informed decision-making, making it a critical area for digital transformation in higher education.

2.2 Related Work

This includes reviewing research papers and journals, with the literature survey conducted based on the following studies.

- **Z. Yan, "University Research Project Management System Based on Cloud Platform"**

  Journal**:** *IEEE Access*, vol. 8, pp. 12345–12353, March 2020.

  This paper presents a university research project management system leveraging a cloud-based infrastructure to streamline proposal approval, progress tracking, and workflow management. The author designed a modular system for supervisors, students, and administrators, enabling centralized data storage and real-time progress visibility.

The system's workflow and role-based access model directly inform EduSync's design for proposal handling, project stage approval, and centralized project tracking.

- **R. Mukhamadiev, "Specifics of Project Management System Development for Higher Education Institutions"**

  Journal: *IEEE Transactions on Education*, vol. 64, no. 4, pp. 456–461, August 2020.

  The author discusses the academic constraints in managing projects—like multi-level approvals, periodic evaluations, and supervision structure. A model for modular, policy-driven workflows is presented.

  Relevance to EduSync: This study provides a foundation for building EduSync's multi-stage proposal and approval system aligned with academic processes.

- **Intelligent Role-Based Access Control Model and Framework Using Semantic Business Roles in Multi-Domain Environments**

  Journal: *Education*, vol. 186, pp. 112003–112018, February 2024.

  The paper introduces an Intelligent Role-Based Access Control (I-RBAC) model that improves traditional RBAC by dynamically generating and managing user roles using semantic analysis and intelligent agents. It ensures secure, flexible access control across multi-domain systems.

  EduSync also uses role-based access for Student, Guide and Admin to manage access level based on their role.

- **C. Marnewick et al., "Digitalization of Project Management: Opportunities in Education"**

  Journal: *Procedia Computer Science*, vol. 199, pp. 1234–1241, May 2022.

  The paper focuses on how digital transformation reshapes academic project management, emphasizing real-time scheduling and resource synchronization.

  Relevance to EduSync: Guides EduSync in implementing a live scheduling dashboard that updates supervisors, students, and panels instantly when schedules or evaluations change.

- **Enhancing Academic Project Management with PAMS**

  Year: 2025

  The paper presents a Project Allocation and Management System (PAMS) that automates student project tracking, guide evaluation, and coordinator review scheduling. It improves efficiency, transparency, and collaboration compared to manual project management processes.

  Highly relevant to EduSync, as it supports similar features like project tracking, guide feedback, review scheduling, and overall project lifecycle management. It validates the need for a digital system to replace manual academic project handling.

- **An Improved Text Similarity Calculation Method Combining TF-IDF and LexRank**

  2024 10th International Conference on Computer and Communications

  The paper enhances text similarity by combining improved TF-IDF weighting with LexRank's semantic graph approach, resulting in more accurate and stable similarity detection than using either method alone.

  This supports your title-clash detection feature, as hybrid TF-IDF help identify similar or duplicate project titles more effectively

2.3 Existing Systems

- **Google Classroom:**

  Google Classroom is a widely used learning management platform that enables instructors to create classes, share assignments, collect student submissions, and provide feedback. While it simplifies content distribution and report submission, it does not support academic project-specific workflows such as project registration, automated guide allocation, milestone-based tracking, multi-level evaluation, or viva scheduling. The platform is designed for general coursework rather than structured final-year project management.

- **Microsoft Teams**

  Microsoft Teams provides communication, file sharing, and collaboration features for educational institutions through chat, video conferencing, and integration with Microsoft Office tools. It supports basic assignment tracking and scheduling through calendars; however, it lacks specialized modules for project proposal management, automated guide allocation, structured evaluation processes, and conflict-free viva scheduling. Teams functions more as a collaboration tool than a comprehensive academic project management system.

- **Moodle:**

  Moodle is an open-source learning management system that supports course management, assignments, quizzes, and grading. It offers flexibility through plugins and supports basic progress tracking and assessments. However, Moodle does not natively provide automated guide allocation, project title clash detection, milestone-based project workflows, or automated viva scheduling. Custom development is required to adapt Moodle for complex academic project lifecycle management.

Table 2.3 Comparative study of Existing systems

Application	Project Registration	Guide Allocation	Tracking	Multi-Level Evaluation	Report Submission	Scheduling
Google Classroom	✗	✗	✗	✗	✓	✓
Microsoft Teams	✗	✗	✓	✗	✓	✓
Moodle	✗	✗	✓	✗	✓	✓
EduSync	✓	✓	✓	✓	✓	✓

A comparative analysis of existing platforms such as Google Classroom, Microsoft Teams, and Moodle reveals that these systems primarily support content sharing, communication, and report submission, with limited capabilities for structured academic project management. While Microsoft Teams and Moodle provide basic tracking and scheduling support, none of these platforms offer integrated project registration, automated guide allocation, or multi-level academic evaluation. In contrast, EduSync provides a comprehensive solution by supporting project registration, automated guide allocation, milestone-based tracking, multi-level evaluation, report submission, and conflict-free scheduling within a single platform. This comparison highlights that EduSync addresses critical gaps in existing systems by offering end-to-end automation and academic workflow management tailored specifically for institutional project environments.

2.4 Technology Survey

This application includes technologies like: -

- **Backend Development:** The backend of the EduSync system is developed using Node.js with Express, which handles core functionalities such as user authentication, role-based authorization, project proposal management, automated student–guide allocation, milestone tracking, evaluation workflows, messaging, and viva scheduling. Secure RESTful APIs are exposed to enable seamless communication between the frontend, database, and external services such as plagiarism detection APIs. JSON Web Tokens (JWT) are used to implement secure authentication and role-based access control for administrators, teachers, and students..

- **Frontend Interface:** A responsive web-based user interface is developed using React.js, along with HTML, CSS, and JavaScript, to provide an intuitive and user-friendly experience. The frontend includes role-specific dashboards for students, teachers, and administrators, allowing users to submit proposals, track progress, evaluate projects, schedule vivas, and view analytics. Emphasis is placed on usability, accessibility, and responsiveness to ensure smooth interaction across different devices.

- **Automated Allocation and Scheduling Logic:** The system incorporates algorithmic logic for automated student–guide allocation by processing uploaded datasets of students and faculty members. Load balancing and capacity constraints are applied to ensure fair distribution of students among guides. For viva scheduling, a constraint-based scheduling approach is used to generate conflict-free panel timetables by considering institutional timetables, faculty availability, student free hours, and available rooms.

- **Natural Language Processing (NLP) Module:** Natural language processing

techniques are employed for project title clash detection. Submitted project titles are preprocessed using tokenization and normalization, and similarity measures such as Cosine Similarity are applied to identify duplicate or closely related titles. This helps prevent redundancy and ensures originality in project topics.

- **Natural Language Processing (NLP) Module:** A relational database such as MySQL is used to store structured data including user profiles, project details, guide allocations, milestones, evaluations, schedules, messages, and reports. The database design ensures data integrity, efficient querying, and scalability to support large numbers of users and projects.

Chapter 3

HARDWARE AND SOFTWARE REQUIREMENTS

Development Environment

3.1 Hardware Requirements

Table 3.1: Hardware requirements

Hardware Specification	
Specification	**Desired Value**
Processor	AMD Ryzen 5 4600H
RAM	8GB Minimum
Hard Disk	500 GB Minimum

3.2 Software Requirements

Table 3.2: Software requirements

Software Specification	
Specification	**Desired value**
Operating System	Windows 10 or higher
Frontend Tool	React js v18
Backend Tool	Node js v18, Express js v4
Database	MongoDB
Development Tool	Vs code

Chapter 4

SOFTWARE REQUIREMENTS SPECIFICATION

4.1 System User

These are the following types of system user:

1. **Administrator:**

   The administrator is responsible for managing the overall functioning of the EduSync system. This includes creating, updating, and deleting user accounts, uploading student and teacher datasets for automated guide allocation, configuring project milestones and evaluation criteria, generating conflict-free viva schedules, monitoring analytics dashboards, and overseeing system operations.

2. **Teacher:**

   The teacher acts as a project guide and evaluator. Teachers review and approve or reject project proposals submitted by students, define milestones, monitor progress reports, evaluate submissions, enter marks, participate in viva examinations, and communicate with students through the messaging system.

3. **Student:**

   The student registers on the EduSync platform to submit project proposals, upload progress reports and final documents, track project milestones, view evaluation results and viva schedules, and communicate with the assigned guide. Students are the primary users who interact with the system throughout the project lifecycle.

4.2 Functional requirement

These are the functional requirements.

Admin Module:

- Manage student and teacher user accounts.
- Upload student and teacher datasets for automated guide allocation.
- Automatically allocate students to guides.
- Generate automated and conflict-free viva schedules.

Teacher Module:

- Review and approve or reject student project proposals.
- Define project milestones and monitor student progress.
- Evaluate student projects and approve.
- Communicate with assigned students.

Student Module:

- Submit project proposals and abstracts.
- Upload progress reports and final project documents.
- Track project progress and milestone status.
- Communicate with the assigned guide.

4.3 Non-Functional requirement

These are the following non-functional requirement:

- **Security:**
  The system ensures secure handling of user credentials, project data, and evaluation records through role-based access control and token-based authentication. Secure communication and controlled access prevent unauthorized data access and modification.

- **Performance:**

The application is designed to provide fast response times for user authentication, project submissions, proposal reviews, and schedule generation, ensuring smooth and efficient interaction for all users.

- **Scalability:**

  The system supports a large number of students, teachers, and projects without performance degradation by using efficient database design and modular architecture, making it suitable for institutional-level deployment.

- **Reliability:**

  EduSync ensures consistent and accurate processing of project workflows, evaluations, and scheduling operations, maintaining system stability even during peak usage periods.

- **Usability:**

  The web-based interface is intuitive and user-friendly, enabling students, teachers, and administrators to easily navigate the system and perform their tasks without requiring technical expertise.

Chapter 5

SYSTEM DESIGN

5.1 Architecture Diagram
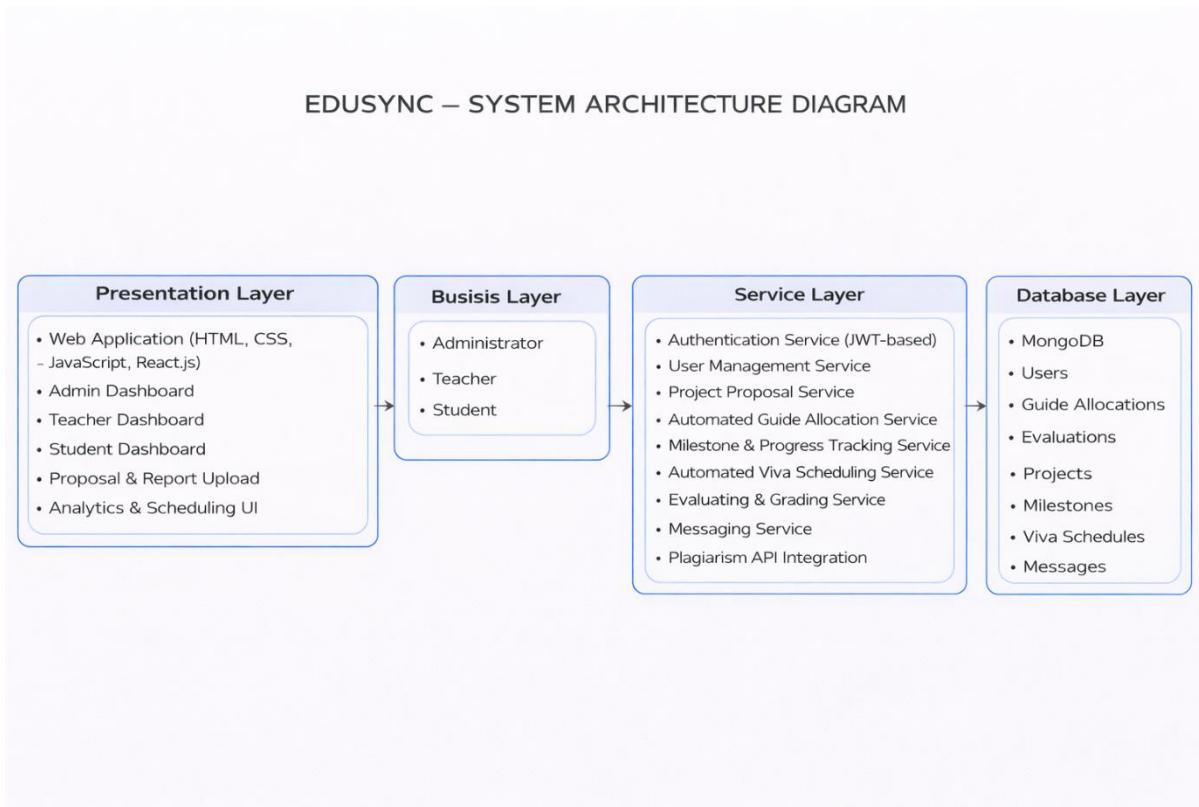
Figure 1 Architecture diagram of EduSync

The EduSync system follows a layered architecture consisting of Presentation, Business, Service, and Database layers. The Presentation Layer provides a web-based user interface for administrators, teachers, and students to interact with the system through dashboards, proposal submission, and scheduling features. The Business Layer represents the primary system users and governs role-specific interactions. The Service Layer implements the core application logic, including authentication, project proposal

management, automated guide allocation, progress tracking, evaluation, messaging, and automated viva scheduling. The Database Layer uses MongoDB to store all persistent data such as user details, projects, guide allocations, evaluations, milestones, messages, and viva schedules. This layered approach ensures modularity, scalability, and ease of maintenance.

5.2 Context Flow Diagram
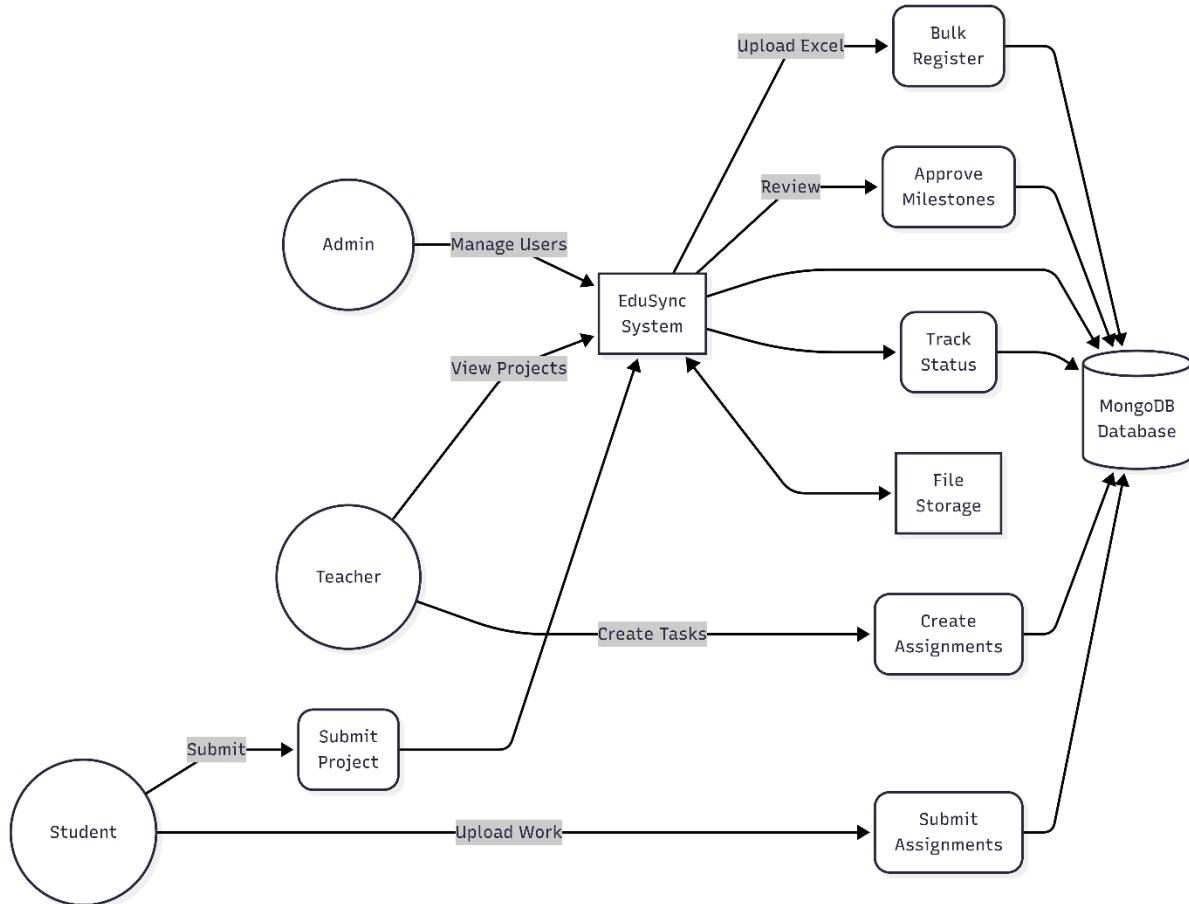
Figure 2 Context Flow Diagram of EduSync

The context flow of the FootChain system illustrates how the platform functions as a centralized blockchain-based verification and traceability system interacting with multiple external entities. Manufacturers upload product and batch information to FootChain, which is securely recorded and prepared for QR-based authentication. Warehouses, delivery partners, and retailers update the system with storage, logistics, and sales-related events to maintain an immutable supply-chain history. Customers interact with the system by scanning QR codes to verify product authenticity and view

provenance details. Administrators oversee system operations and access control, ensuring data integrity, role-based participation, and smooth execution of the FootChain ecosystem.

Chapter 6

DETAILED DESIGN

6.1 Use Case Diagram
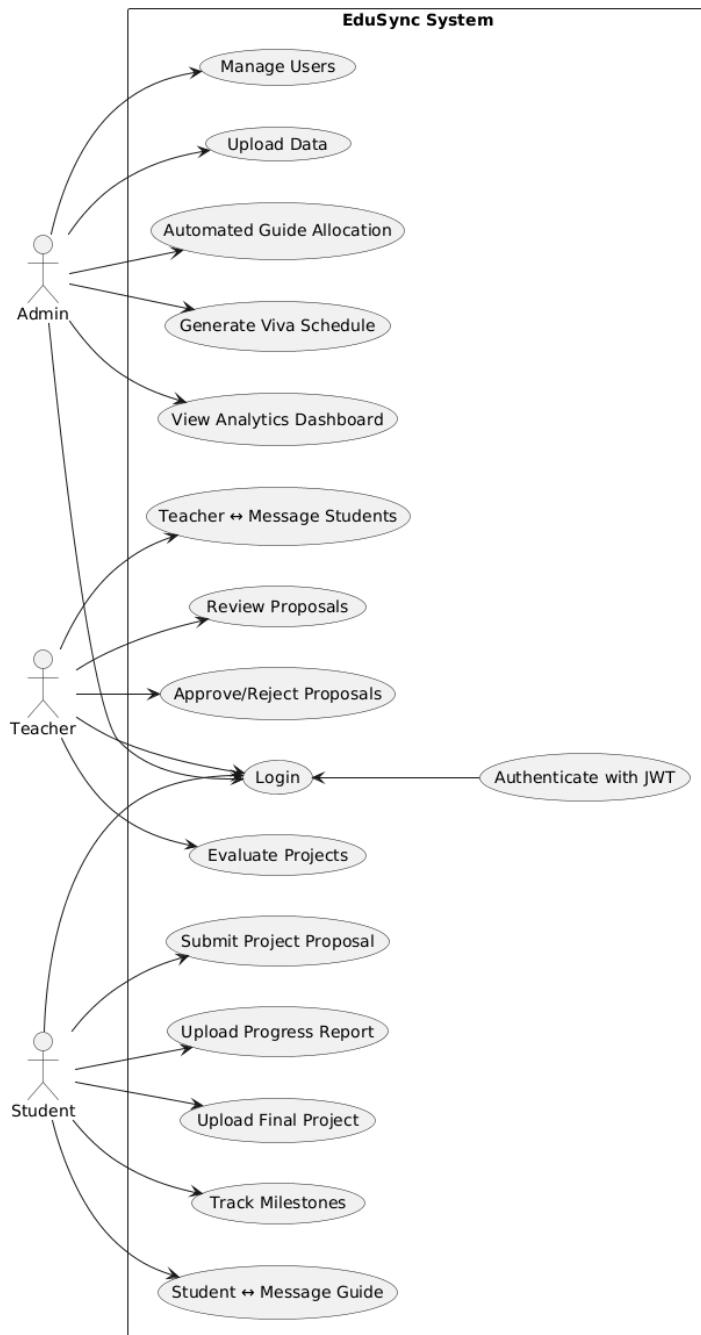
Figure 3 Use case Diagram of EduSync

The use case diagram illustrates the role-based interactions within the FootChain System, a blockchain-enabled platform designed for footwear supply-chain traceability and authentication. Manufacturers initiate the workflow by uploading product batches and generating QR codes; both actions mandatorily include signing product data to ensure integrity before blockchain registration. Warehouses interact with the system by updating storage status and verifying product batches as they move through inventory. Delivery partners update delivery status and confirm shipments, maintaining an auditable logistics trail. Retailers confirm product sales and update ownership details once products reach the point of sale. Administrators oversee the system by managing users, assigning validator roles under Proof-of-Authority, and monitoring system logs for security and compliance. Customers interact in a read-only manner by scanning QR codes to verify product authenticity, with the option to view the complete product history, thereby enabling trust and anti-counterfeiting through transparent blockchain verification.

6.2 Activity Diagram
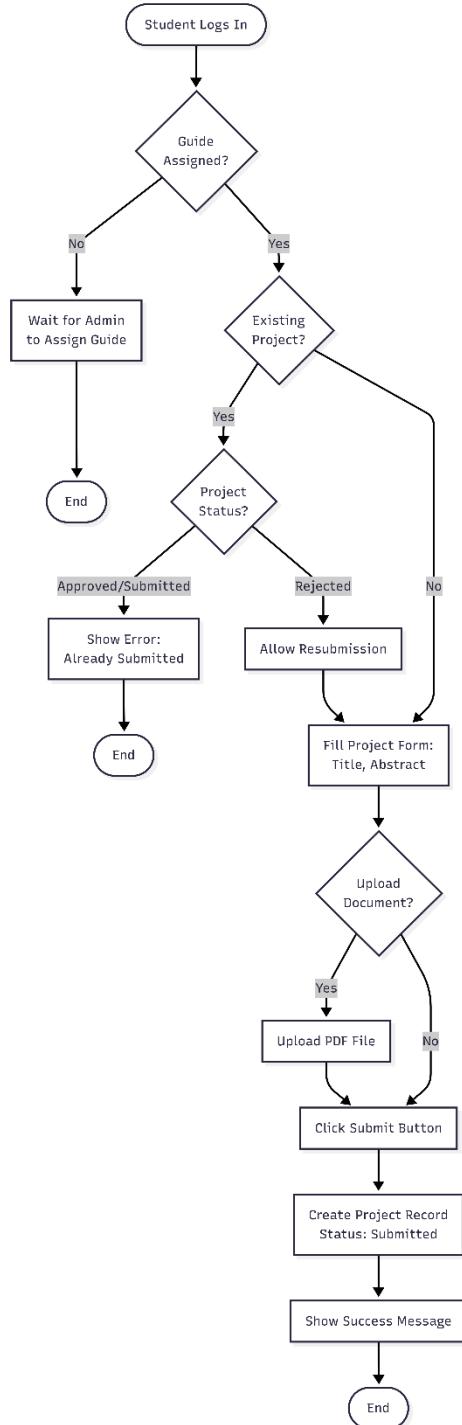
Figure 4 Activity Diagram of Student Project Submission

6.3 DATABASE DESIGN
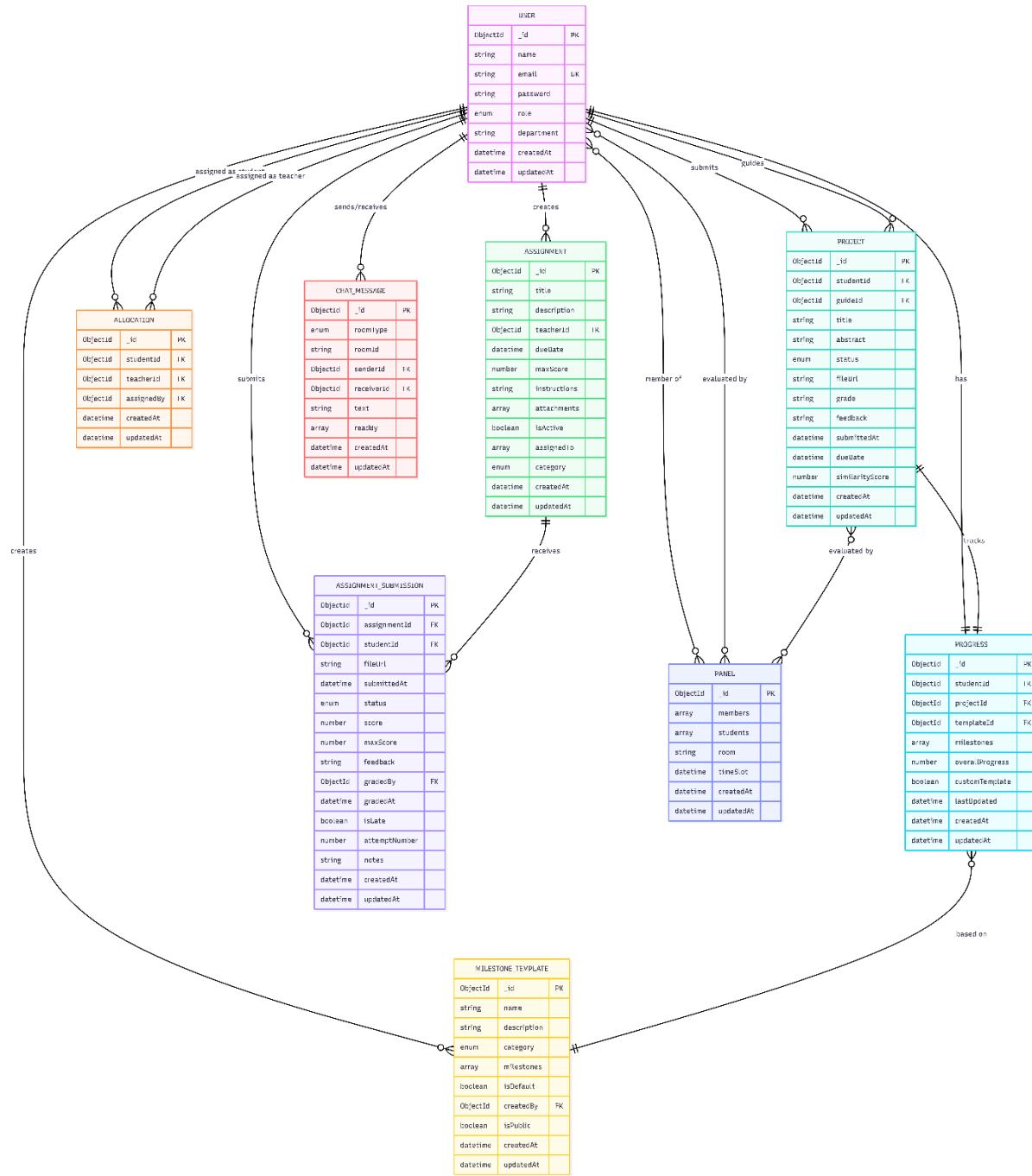
Figure 5 Database design of EduSync

Chapter 7

IMPLEMENTATION

7.1 Screenshots

- **Login Page**
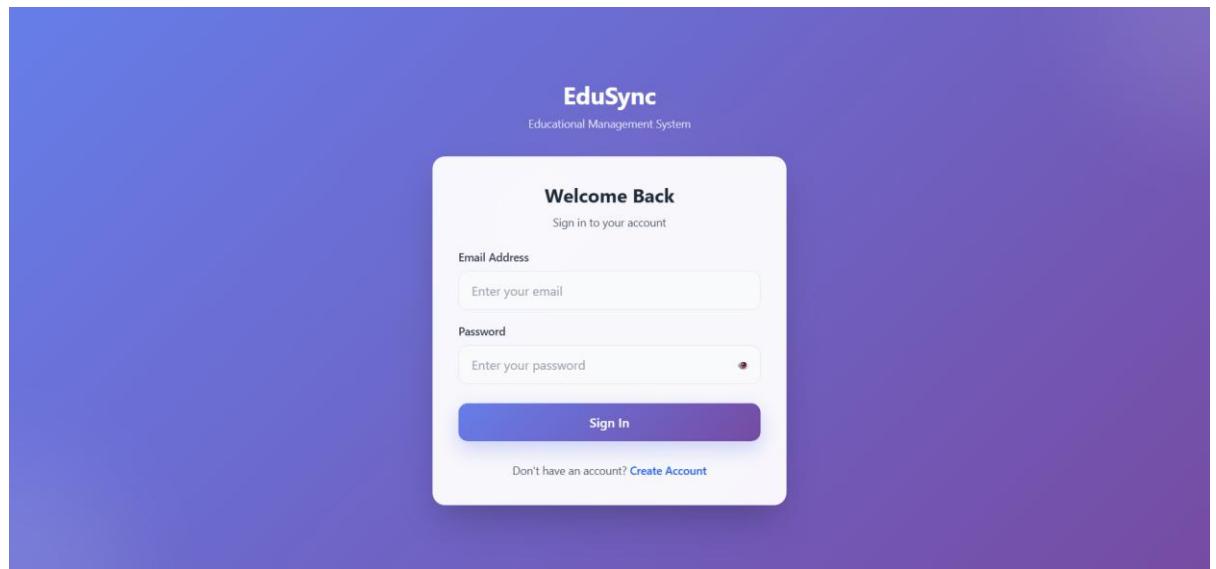
*Figure 7.1 Login Page for Student, Teacher and Admin*

- **Admin Dashboard**
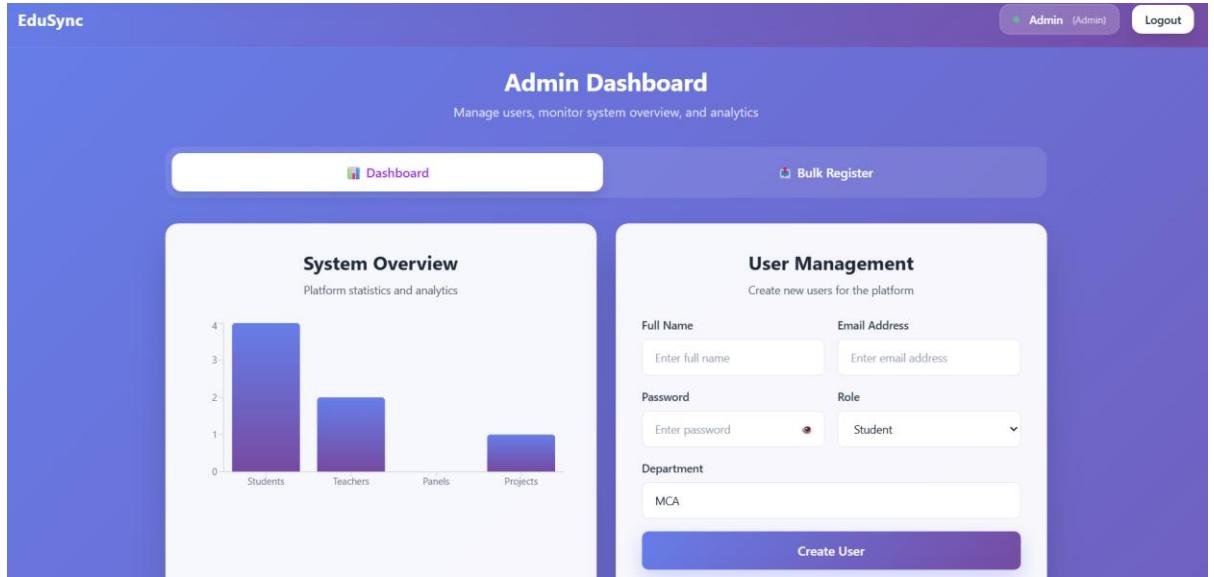
Figure 7.2 Admin Dashboard

- **Bulk registration page**

Figure 7.3 Bulk Registration Page

- **Student Dashboard**
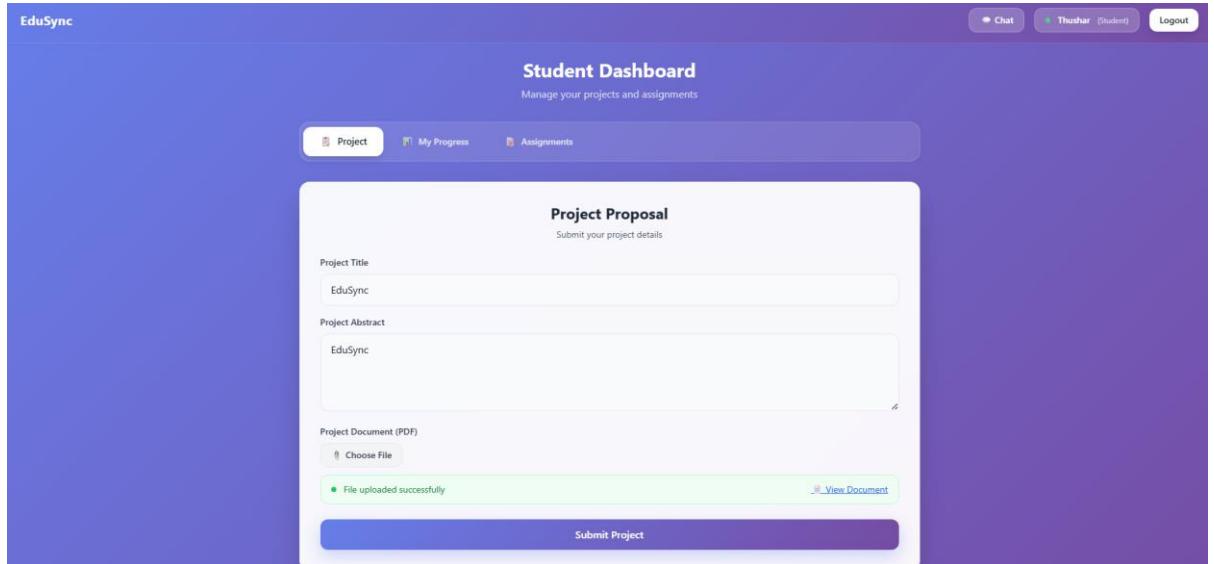
Figure 7.4 Student Dashboard

- **Teacher Dashboard**
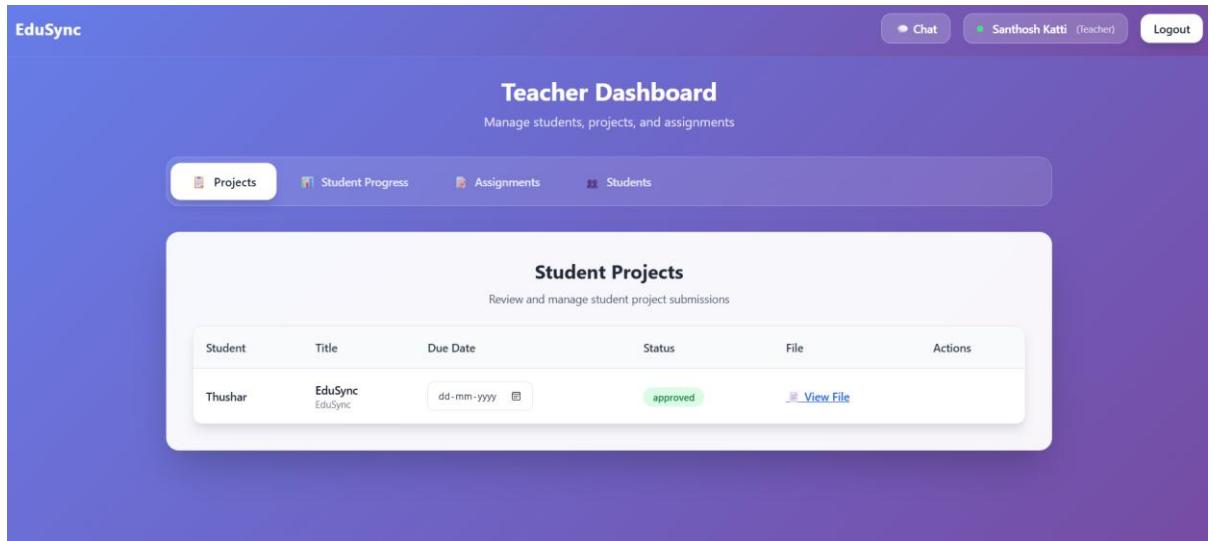
Figure 7.5 Teacher Dashboard

Appendix A

BIBLIOGRAPHY

1. *Z. Yan, "University Research Project Management System Based on Cloud Platform"*
2. *R. Mukhamadiev, "Specifics of Project Management System Development for Higher Education Institutions"*
3. *O. Ali et al., "The Effects of Artificial Intelligence Applications in Project Management"*
4. *C. Marnewick et al., "Digitalization of Project Management: Opportunities in Education"*
5. *L. Zhang et al., "A Constraint Satisfaction Problems Based Scalable Scheduling Framework"*
6. *M. Cao et al., "Energy-Aware Intelligent Scheduling for Deadline-Driven Applications"*
7. *G. Oliveira et al., "Evaluation of Scheduling Algorithms for Embedded Systems"*
8. *A. Amirzhanov et al., "Plagiarism Types and Detection Methods: A Systematic Review"*
9. *B. Krishna et al., "Plagiarism Checker for Academic Project Abstracts"*