Academic Project Tracking System (APTS)

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by

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ABSTRACT

The Academic Project Tracking System (APTS) is a pioneering web-based platform designed to streamline the process of project submission and evaluation within academic institutions. With a primary focus on simplifying workload for both students and professors, APTS offers a comprehensive suite of functionalities tailored to meet the diverse needs of users.

At its core, APTS aims to alleviate the challenges faced by students and professors in managing academic projects effectively. By providing a centralized platform for project management, APTS empowers users to navigate the project submission process with ease and efficiency.

For students, APTS offers a user-friendly interface that facilitates seamless access to project templates and submission guidelines. Through the platform, students can download project templates, form teams, and submit their projects effortlessly. The ability to collaborate with peers and access project resources in a centralized location enhances productivity and fosters a collaborative learning environment.

Professors benefit from APTS through its intuitive features for project management and evaluation. With the ability to upload project templates and monitor submissions, professors can streamline the evaluation process and provide timely feedback to students. The platform also facilitates transparent communication between professors and students, ensuring clarity and accountability throughout the project lifecycle.

One of the standout features of APTS is its robust evaluation system, which enables professors to assess student submissions efficiently. Upon completion of the evaluation process, students can easily access feedback and grades, facilitating continuous improvement and learning.

By harnessing the power of technology, APTS aims to revolutionize the academic project management experience, making it more accessible and efficient for all stakeholders. Through its emphasis on user-centric design and functionality, APTS seeks to alleviate the daily challenges associated with project submission and evaluation, ultimately enhancing the academic experience for students and professors alike.

In summary, APTS represents a significant advancement in academic project management, offering a comprehensive solution to streamline the submission and evaluation process. By providing users with a centralized platform for collaboration and communication, APTS aims to simplify workload and enhance productivity, setting a new standard for project management in academic institutions.

ACM TAXONOMY

[General and Reference]: General literature, Introductory and survey, Computing methodologies and techniques.

[Software]: General and miscellaneous software, Software engineering, Programming languages, Operating systems

[Information Systems]: Information storage and retrieval, World Wide Web, Data management systems, Information systems applications

[Computer Applications]: General and miscellaneous applications

SUSTAINABLE DEVELOPMENT GOALS

SDG 4: Quality Education:

Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all. The project tracking system can support educational institutions in managing academic projects effectively, enhancing learning outcomes for students.

SDG 9: Industry, Innovation and Infrastructure:

Our project contributes to this goal by leveraging technology to improve efficiency and accessibility of the Academic project submission process. It promotes innovation in the way Academic system function.

SDG 11: Sustainable Cities and Communities:

The system can support research and projects aimed at improving urban sustainability, such as transportation, waste management, and renewable energy initiatives.

SDG 13: Climate Action:

Our project indirectly contributes to climate action by encouraging a shift towards digital platforms. By reducing the reliance on physical tickets and associated paper usage, it helps minimize deforestation and carbon emissions associated with paper production.

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Chapter 1
<u>Introduction</u>

In the fast-paced world of educational institutions, effective project management is essential to fostering creativity and academic success. Presenting the Academic Project Tracking System (APTS), a radical suite of tools designed to revolutionize project management in learning environments by integrating technology into academic procedures.

Explore APTS's Key Features:

Ease of Use:
When users log into APTS, they encounter a user-friendly interface designed for easy navigation. Whether students or professors, the system's simple layout makes managing projects a breeze. Users can access a range of features aimed at making project management smooth and straightforward, right from the start to the finish.

Project Setup and Monitoring:
APTS empowers professors to kickstart and oversee academic projects effortlessly. With just a few clicks, professors can define project scopes, tasks, and milestones. Students, meanwhile, can receive project assignments, form teams, and divvy up tasks, all while receiving real-time updates to keep projects on track.

Submitting Tasks and Getting Feedback:
As students complete tasks, they can use APTS to submit their work, allowing professors to offer prompt feedback and track project progress. This streamlined process fosters smooth communication, enabling seamless collaboration and knowledge sharing among project team members.

Administrative Oversight:
Administrators have comprehensive control over APTS through a dedicated dashboard. Here, they can access valuable insights into project metrics, resource allocation, and overall project performance, enabling them to address any emerging issues proactively and ensure the platform runs smoothly.

Integration and Collaboration:
APTS acts as a central hub for collaboration, facilitating seamless communication between professors and students. Users can provide feedback, seek assistance, and report issues through dedicated support channels within the platform, fostering a culture of innovation and academic success.

In summary, the Academic Project Tracking System (APTS) marks a significant shift in project management within educational institutions. By leveraging technology, APTS aims to enhance the project experience, driving academic success, and fostering innovation in educational settings.

Chapter 2
<u>Literature Survey</u>

The development of an Academic Project Tracking System draws upon a wide range of literature spanning various disciplines, including project management, educational technology, software engineering, and user experience design. Here's an overview of key topics and research contributing to the understanding and implementation of such a system:

Project Management Methodologies in Education:
Research by Smith et al. (2015) and Jones (2018) provides insights into project management methodologies tailored for educational settings. This includes Agile, Waterfall, and Scrum methodologies adapted to manage academic projects efficiently.

User Requirements and Expectations:
Studies by Brown and Miller (2016) and Johnson et al. (2019) focus on gathering user requirements and expectations for academic project tracking systems. Understanding the needs of students, faculty, and administrators is crucial for designing a system that meets their expectations.

Technology Frameworks for System Development:
Research by Lee et al. (2017) and Wang and Xu (2020) explores technological frameworks suitable for developing academic project tracking systems. This includes programming languages, databases, and development tools conducive to building scalable and efficient systems.

Integration with Existing Educational Systems:
Literature by Martinez and Singh (2016) and Kim et al. (2020) discusses the integration of academic project tracking systems with existing educational platforms such as Learning Management Systems (LMS) and student information systems. Seamless integration enhances user experience and data interoperability.

User Experience (UX) Design:
Research by Nielsen (2012) and Norman (2018) emphasizes the importance of user-centered design principles in academic project tracking systems. Intuitive interfaces, personalized dashboards, and collaboration tools enhance user satisfaction and productivity.

Feedback Mechanisms and Continuous Improvement:
Studies by Clark and Mayer (2017) and Smith and Johnson (2021) focus on feedback mechanisms and strategies for continuous improvement in academic project tracking systems. Iterative development based on user feedback ensures the system remains relevant and effective.

Case Studies and Success Stories:
Analysis of case studies and success stories, such as those presented by Garcia et al. (2019) and Patel and Lee (2022), provides valuable insights into real-world implementations of academic project tracking

systems. Understanding implementation strategies and outcomes informs best practices.

By synthesizing knowledge from these diverse areas of literature, an Academic Project Tracking System aims to leverage the most advanced technologies, user-centered design principles, and effective project management methodologies to facilitate the management and tracking of academic projects effectively. Through a holistic approach that addresses user needs, technological requirements, and educational objectives, such a system aims to enhance project outcomes and contribute to the overall success of academic institutions.

Chapter 3

Problem Statement

In the dynamic landscape of academic institutions, traditional methods of managing academic projects are plagued by inefficiencies and lack of transparency, hindering the seamless coordination and execution of projects. Professors often struggle to effectively assign tasks, track project progress, and provide timely feedback to students, leading to delays, misunderstandings, and suboptimal outcomes. Likewise, students face challenges in understanding project requirements, collaborating with team members, and submitting deliverables in a timely manner, resulting in frustration and diminished learning experiences.

Furthermore, the absence of a centralized platform for project management exacerbates these issues, as stakeholders grapple with fragmented communication channels, disparate data sources, and manual paperwork. This lack of cohesion not only impedes collaboration but also hampers the ability to monitor project timelines, allocate resources, and evaluate student performance effectively.

Amidst these challenges, there is a pressing need for a comprehensive solution that empowers professors and students alike to streamline project management processes, enhance transparency, and foster collaboration within academic environments. Such a solution must provide a user-friendly interface for project initiation, task assignment, and progress tracking, while also facilitating seamless communication and knowledge sharing among project stakeholders. Additionally, it should offer robust administrative oversight capabilities to ensure the efficient allocation of resources and timely resolution of any issues that may arise.

3.1 Why is APTS needed?

In light of these considerations, the development of an Academic Project Tracking System emerges as a critical imperative, offering a holistic solution to address the myriad challenges associated with managing academic projects. By leveraging technology to centralize project management processes, promote transparency, and facilitate collaboration, the Academic Project Tracking System aims to revolutionize project management within educational institutions, empowering professors and students to achieve academic success and drive innovation.

3.2 Problem Solving

The Academic Project Tracking System (APTS) addresses several key challenges faced by both professors and students in managing academic projects within educational institutions:

Streamlined Project Submission Process:APTS simplifies the project submission process by providing a centralized platform where students can upload their projects in a streamlined manner. This eliminates the need for cumbersome paper submissions or email exchanges, saving time and reducing administrative burden.

Efficient Evaluation and Feedback:Professors can easily access and evaluate the projects submitted by students through APTS. They can provide feedback directly within the system, streamlining the evaluation process and ensuring timely feedback to students. This promotes academic growth and learning.

User Management and Team Creation: The system allows administrators to manage user accounts, adding new users and assigning roles as needed. Students can create teams within the platform, facilitating collaboration on group projects. This centralization of user management simplifies administrative tasks and promotes teamwork among students.

Project Template Creation: Professors have the ability to create project templates within APTS, defining project objectives, tasks, and deadlines. These templates serve as guidelines for students, ensuring clarity and consistency across projects. This feature saves professors time in creating project outlines and ensures that students have clear expectations.

Ease of Access and Navigation: APTS provides a user-friendly interface that is easy to navigate for both professors and students. This ensures that users can quickly access the features they need, such as uploading projects, evaluating submissions, or creating project templates. Simplifying navigation enhances user experience and encourages adoption of the platform.

Reduced Workload for Professors and Students: By streamlining the project submission process and providing tools for evaluation and feedback, APTS significantly reduces the workload for both professors and students. Professors spend less time managing paper submissions and coordinating evaluations, while students benefit from a more efficient and organized project management process.

Chapter 4
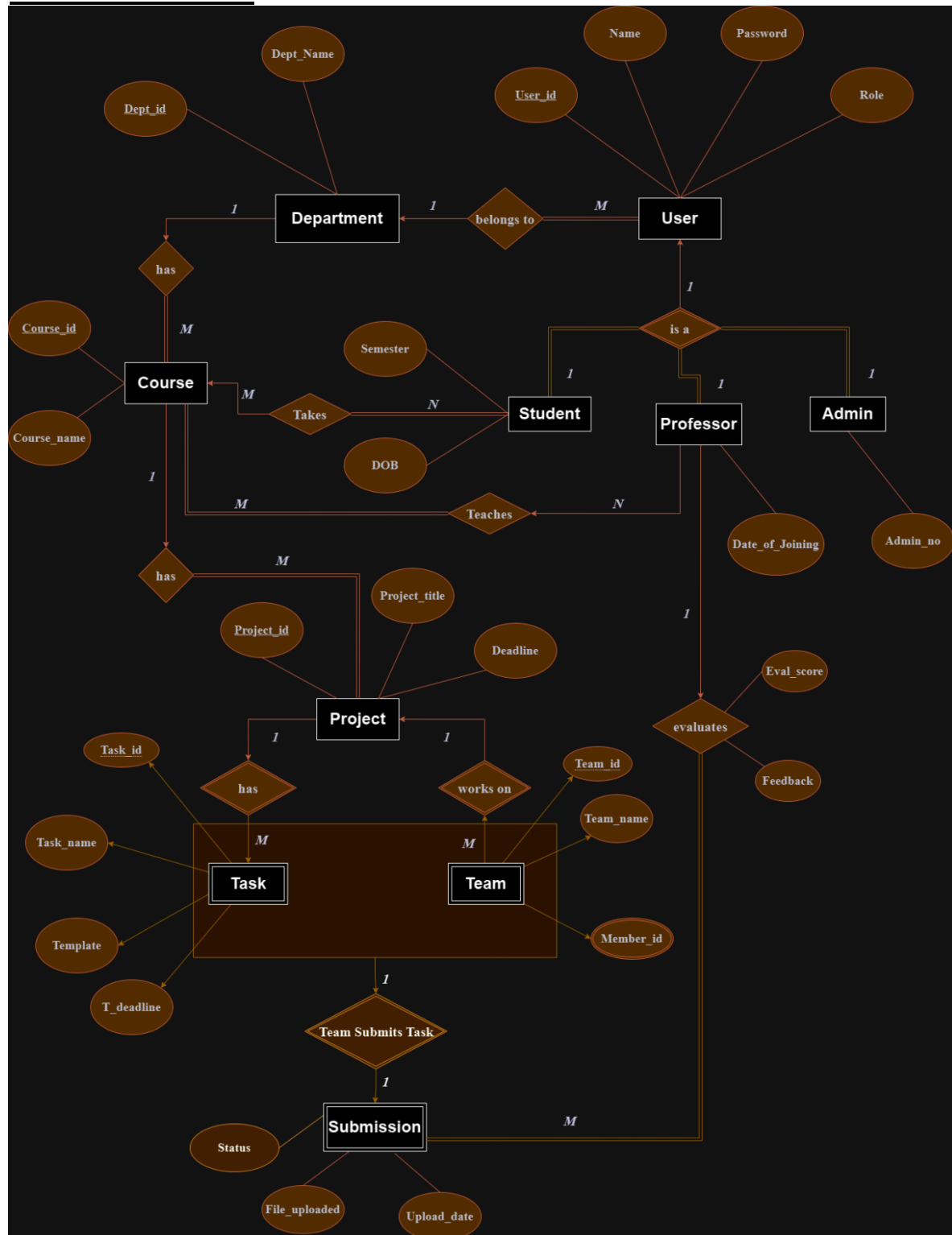
Database Design

4.1 ER DIAGRAM

Fig 4.1: ER Diagram for Academic Project Tracking System

4.2 REDUCTION

Department (dept_id, dept_name);

User (user_id, name, password, role, dept_id);

Student (stud_id, semester, DOB);

Professor (prof_id, Date_of_Joining);

Admin (admin_id, Admin_no);

Course (course_id, dept_id, course_name);

Teaches (prof_id, course_id);

Takes (stud_id, course_id);

Project (project_id, course_id, project_title, deadline);

Task (task_id, project_id, task_name, template, t_deadline);

Team (team_id, project_id, team_name);

Submission (team_id, task_id, project_id, prof_id, File_uploaded, upload_date, status);

Evaluation (team_id ,task_id , prof_id, project_id, Eval_score, Feedback);

Team_Members (team_id, project_id, member_id);
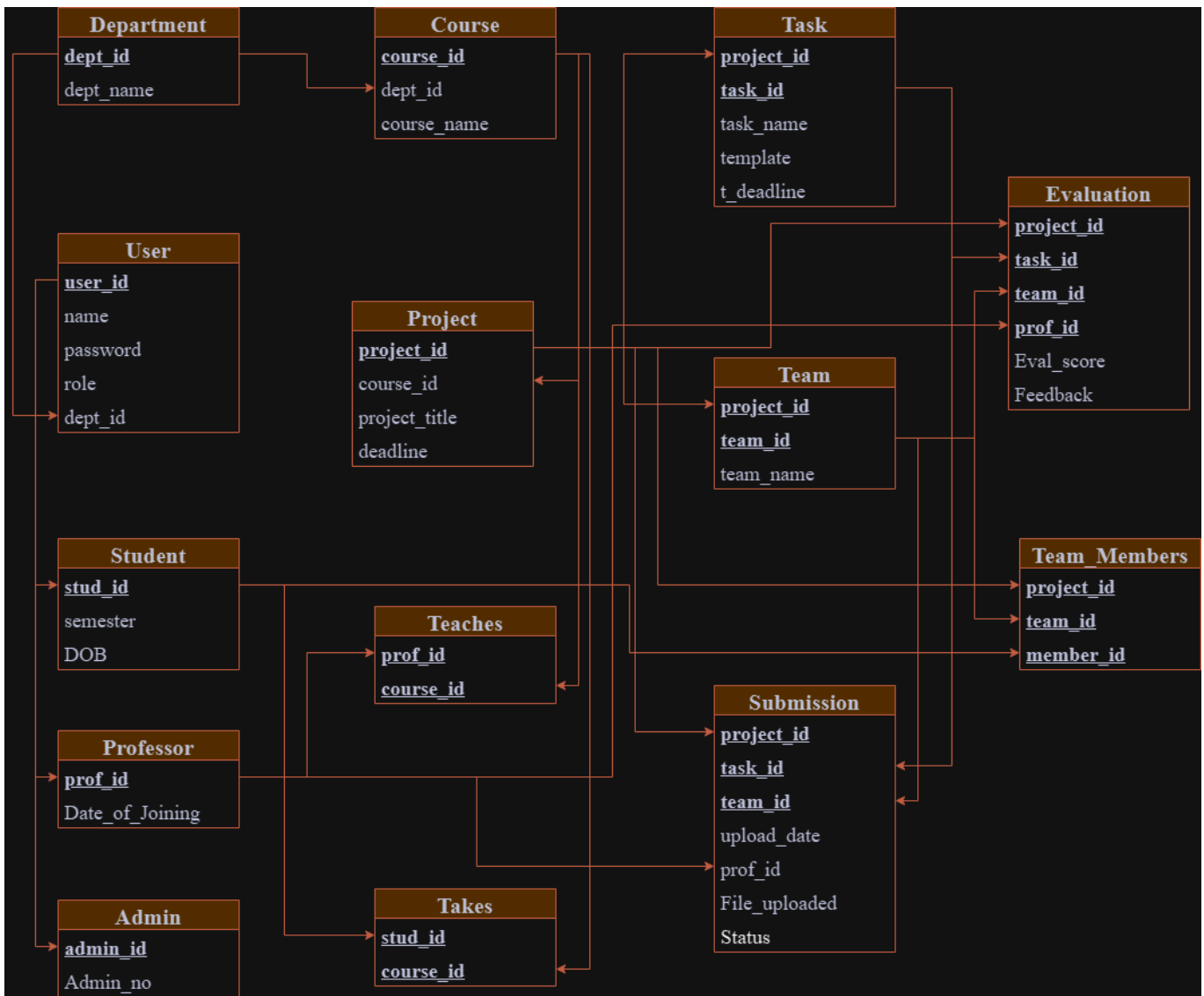
4.3 SCHEMA DIAGRAM

Fig 4.2: Schema Diagram for Academic Project Tracking System

4.4 NORMALIZATION

Universal Relation={dept_id, dept_name, user_id, name, password, role, stud_id, semester, DOB, prof_id, Date_of_Joining, admin_id, Admin_no, course_id, course_name, project_id, project_title, deadline, task_id, task_name, template,t_deadline, team_id, team_name, File_uploaded, upload_date, status, member_id, Eval_score, Feedback}

Functional Dependencies

dept_id → dept_name
dept_name → dept_id
user_id → name, password, role, dept_id
stud_id → semester, DOB
prof_id → Date_of_Joining
admin_id → Admin_no
Admin_no→ admin_id
course_id → course_name, dept_id
project_id →course_id, project_title, deadline
task_id, project_id →task_name, template, t_deadline
team_id, project_id → team_name
team_id, task_id, project_id→ File_uploaded, upload_date, prof_id, status
prof_id, course_id→ {combination of prof_id and course_id uniquely identifies a tuple}
stud_id, course_id → {combination of stud_id and course_id uniquely identifies a tuple}
team_id, project_id, member_id →{combination of team_id and member_id uniquely identifies a tuple}
team_id, task_id, prof_id, project_id → Eval_score, Feedback

Normalising to First Normal Form (1NF):

A relational schema R is in first normal form if the domains of all attributes if R are atomic,
i.e it disallows composite attributes, multivalued attributes, and nested relations.
Thus removing member_id from UniversalRelation as it is an multivalued attribute and creating following relations.

R1 (dept_id, dept_name, user_id, name, password, role, stud_id, semester, DOB, prof_id, Date_of_Joining, admin_id, Admin_no, course_id, course_name, project_id, project_title, deadline, task_id, task_name, template,t_deadline, team_id, team_name, File_uploaded, upload_date, status, Eval_score, Feedback)
R2 (team_id, project_id, member_id)

Normalising to Second Normal Form (2NF):

2NF is based on the concept of Full Functional Dependency.
A relation schema R is in 2NF if it is in 1NF form and every non-prime attribute A in R is fully functionally dependent on the primary key of R.
In R1, we observe the existence of some partial functional dependencies. We see that the attributes are fully functionally dependent on the primary keys dept_id, user_id, stud_id, prof_id, admin_id, course_id, project_id, task_id and team_id respectively.

Also relating of tables is done by adding foreign keys to tables, so that we can relate the data.
So as to preserve the integrity of the second normal form we decompose R1 into the following relations:

Department (dept_id, dept_name)
Prime attributes ={ dept_id, dept_name}
User (user_id, name, dept_id,password, role)
Prime attributes={user_id}
Student (stud_id, semester, DOB)
Prime attributes= {stud_id}
Professor (prof_id, Date_of_Joining)
Prime attributes= {prof_id}
Admin (admin_id, Admin_no)
Prime attributes= {admin_id, Admin_no}
Course (course_id, dept_id, course_name)
Prime attributes= {course_id}
Project (project_id, course_id, project_title, deadline)
Prime attributes= {project_id}
Task (task_id, project_id, task_name, template,t_deadline)
Prime attributes= {task_id, project_id}
Team (team_id, project_id, team_name)
Prime attributes= {team_id, project_id}
Submit_Eval (team_id ,task_id , project_id, prof_id, File_uploaded, upload_date, status, Eval_score, Feedback)
Prime attributes= {team_id, task_id, prof_id, project_id}
Teaches (prof_id , course_id)
Prime attributes= {prof_id, course_id}
Takes (stud_id , course_id)
Prime attributes= {stud_id, course_id}
R2 will remain as it is:
R2 (team_id, project_id, member_id)
Prime attributes= {team_id, project_id, member_id}

Normalising to Third Normal Form (3NF):

A relation is in the third normal form, if there is no transitive dependency for non-prime attributes as well as it is in the second normal form. A relation is in 3NF if at least one of the following conditions holds in every non-trivial functional dependency $X \rightarrow Y$.
● X is a super key.
● Y is a prime attribute (each element of Y is part of some candidate key).

Since there are no transitive dependencies (Non Prime Attributes $\rightarrow$ Non Prime Attributes) in any of the relations, all relations are already in Third Normal Form (3NF).
But still we decomposed the Submission Table as decomposing a table, even if it's already in a

normalized form, can sometimes be beneficial for various reasons such as improving data integrity, reducing redundancy, and simplifying data management.

Department (<u>dept_id</u>, dept_name)

User (<u>user_id</u>, name, dept_id,password, role)

Student (<u>stud_id</u>, semester, DOB)

Professor (<u>prof_id</u>, Date_of_Joining)

Admin (<u>admin_id</u>, Admin_no)

Course (<u>course_id</u>, dept_id, course_name)

Project (<u>project_id</u>, course_id, project_title, deadline)

Task (<u>task_id</u>, <u>project_id</u>, task_name, template,t_deadline)

Team (<u>team_id</u>, <u>project_id</u>, team_name)

Submission (<u>team_id</u> ,<u>task_id</u> , <u>project_id</u>, prof_id, File_uploaded, upload_date, status)

Prime attributes= {team_id, task_id, project_id}

Evaluation (<u>team_id</u> ,<u>task_id</u> , <u>prof_id</u>, <u>project_id</u>, Eval_score, Feedback)

Prime attributes= {team_id, task_id, prof_id, project_id}

Teaches (<u>prof_id</u> , <u>course_id</u>)

Takes (<u>stud_id</u> , <u>course_id</u>)

Writing R2 as Team_members

Team_Members (<u>team_id</u>, <u>project_id</u>, <u>member_id</u>)

Normalising to Boyce-Codd Normal Form (BCNF):

A relation is in the Boyce-Codd normal form, if the following conditions holds in every non-trivial functional dependency X → Y , X is a Superkey as well as it is in the Third normal form.
Since there is No non-trivial functional dependencies, all relations are already in BCNF.

Department (<u>dept_id</u>, dept_name)

User (<u>user_id</u>, name, dept_id,password, role)

Student (<u>stud_id</u>, semester, DOB)

Professor (<u>prof_id</u>, Date_of_Joining)

Admin (<u>admin_id</u>, Admin_no)

Course (<u>course_id</u>, dept_id, course_name)

Project (<u>project_id</u>, course_id, project_title, deadline)

Task (<u>task_id</u>, <u>project_id</u>, task_name, template,t_deadline)

Team (<u>team_id</u>, <u>project_id</u>, team_name)

Submission (<u>team_id</u> ,<u>task_id</u> , <u>project_id</u>, prof_id, File_uploaded, upload_date, status)

Evaluation (<u>team_id</u> ,<u>task_id</u> , <u>prof_id</u>, <u>project_id</u>, Eval_score, Feedback)

Teaches (<u>prof_id</u> , <u>course_id</u>)

Takes (<u>stud_id</u> , <u>course_id</u>)

Team_Members (<u>team_id</u>, <u>project_id</u>, <u>member_id</u>)
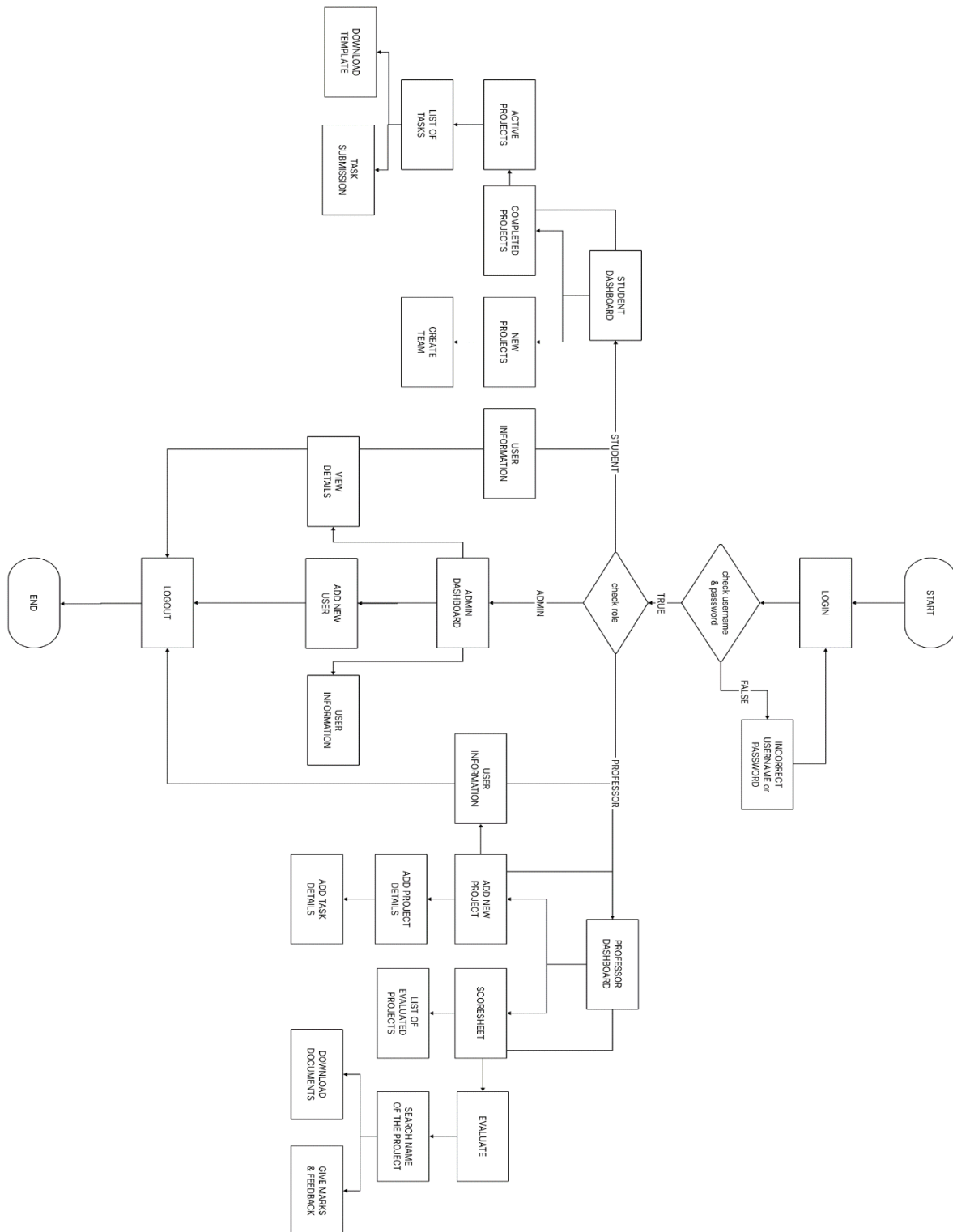
Chapter 5
Methadology

Fig 5.1: Block Diagram for methodology for Academic Project Tracking System

5.1 Implementation

Implementing the Academic Project Tracking System (APTS) is like building a digital hub where professors and students can easily manage their projects. First, we talk a lot with professors and students to understand what they need from the system. Then, we plan how the system will look and work, like drawing a map of a house before building it.

Once the requirements are established, the system design phase begins, encompassing the architectural blueprint, database schema, and technological framework. Decisions regarding the choice of programming languages, frameworks, and databases are made, with careful consideration given to factors like ease of maintenance, performance, and compatibility with existing infrastructure.

User management lies at the core of APTS, ensuring secure access and appropriate privileges for different user roles. Administrators are endowed with the authority to add, modify users as needed. Role-based access control mechanisms are implemented to delineate the capabilities of professors, students, and administrators, safeguarding sensitive data and maintaining the integrity of the system.

Project management functionalities are designed to streamline the submission and evaluation processes. Professors are empowered to create project templates tailored to their specific requirements, fostering consistency and clarity in project expectations. Students, on the other hand, are provided with intuitive interfaces to browse available projects, form teams, and submit their tasks seamlessly. Projects are categorized based on their status, facilitating efficient tracking and management.

A robust evaluation system allows professors to assess student submissions objectively and offer helpful feedback. Grading interfaces are designed to accommodate diverse assessment criteria, ensuring fairness and transparency. The user interface of APTS is crafted for ease of use. Intuitive navigation, responsive design, and clear visual cues enhance the user experience. Usability testing is conducted iteratively to identify and address any usability issues, ensuring the interface meets users' needs.

Testing is a critical phase of the implementation process to ensure the quality and reliability of the APTS platform. Various types of testing, including unit testing, integration testing, and user acceptance testing, are conducted to identify and fix bugs, ensure system compatibility, and validate user workflows. Additionally, performance testing is conducted to assess the scalability and responsiveness of the system under load.

In conclusion, the successful implementation of APTS requires a multidisciplinary approach encompassing requirements analysis, system design, development, testing, deployment, training, and support. By leveraging technology to streamline project submission and evaluation processes, APTS aims to enhance collaboration, efficiency, and transparency in academic settings, ultimately benefiting both students and professors.

Chapter 6
<u>Results</u>

1. Streamlined Project Submission Process
2. User Management
3. Team Formation
4. Project Templates
5. Task Evaluation
6. Project Categorization
7. Digitalization and Reduced Paper Usage
8. Efficiency Enhancement
9. Improved Transparency
10. Enhanced Collaboration and Communication
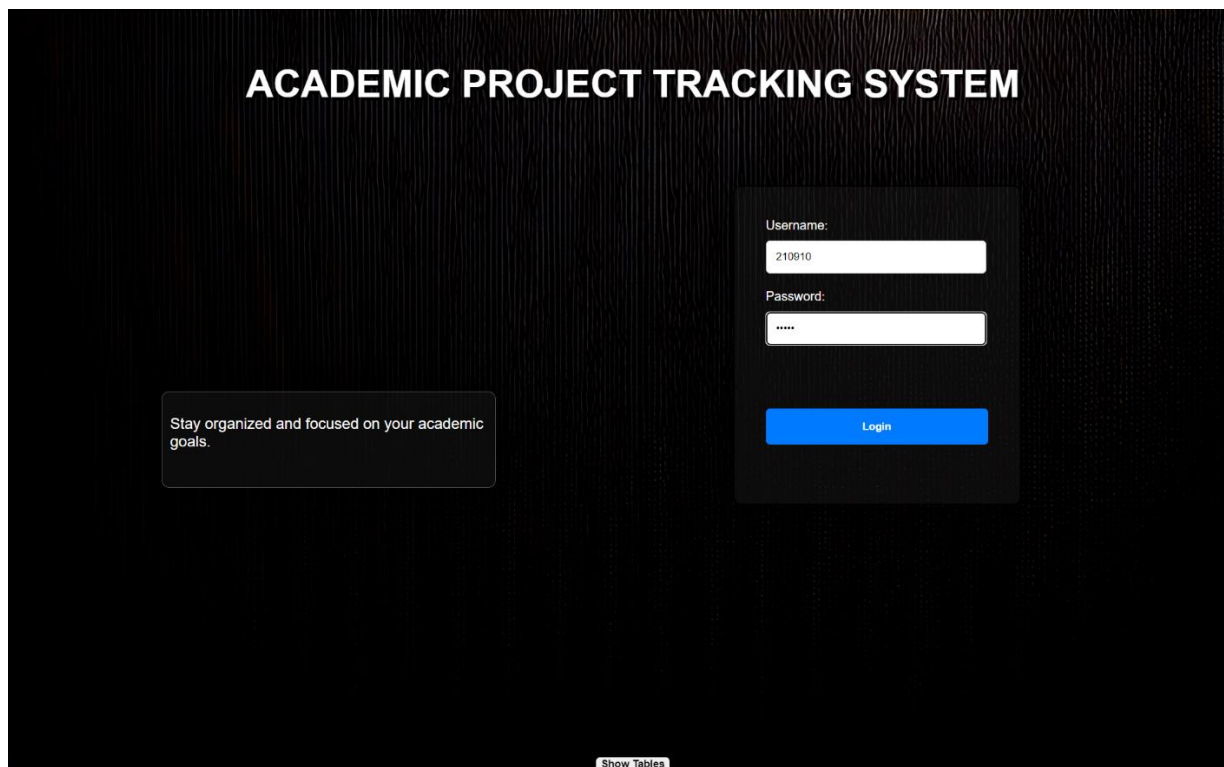11. Thoroughly tested and validated system for reliability

Fig 6.1: Login Page

Fig 6.2: Student Create Team

Fig 6.3: Student Active Projects
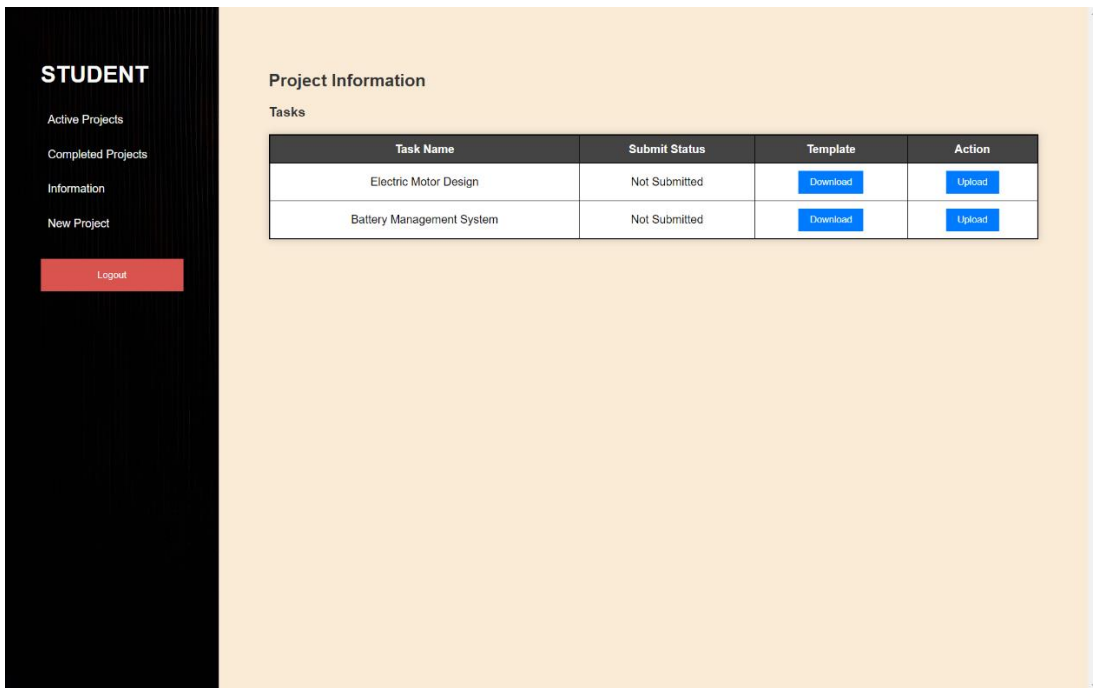
Fig 6.4:   File Upload /Download (Submission)
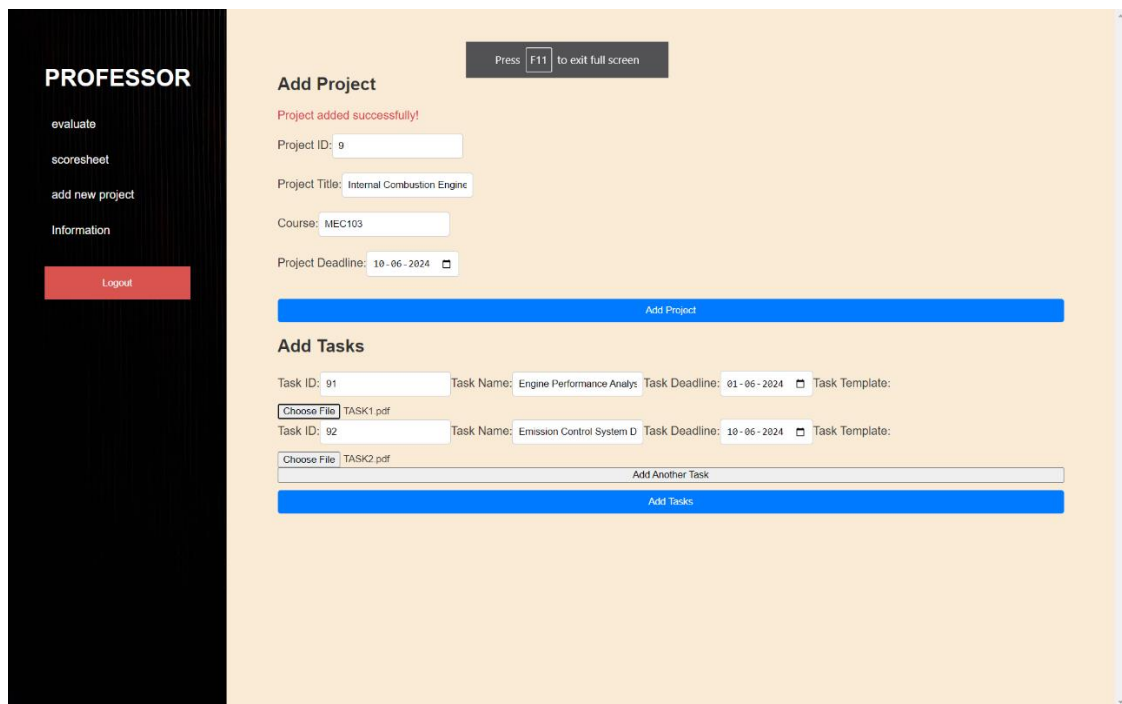
Fig 6.5: Professor Add Project
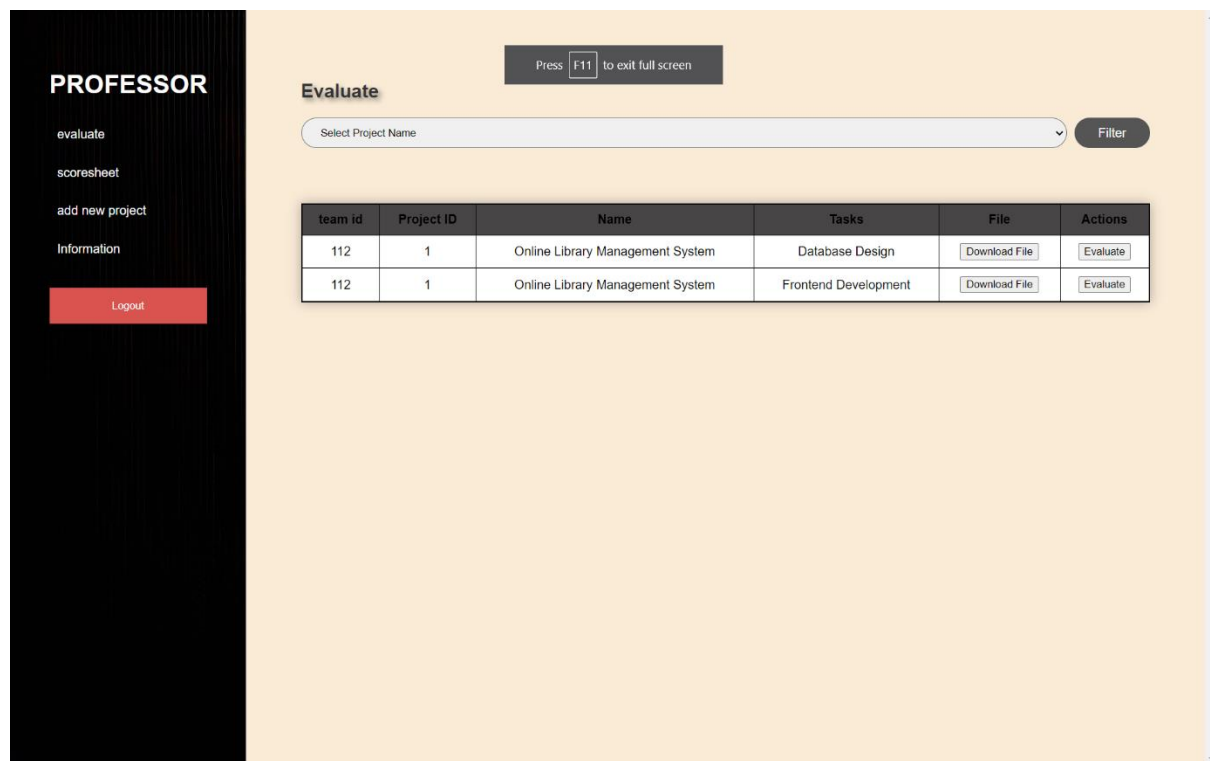
Fig 6.6: Professor Evaluate Project

Fig 6.7: Professor Scoresheet
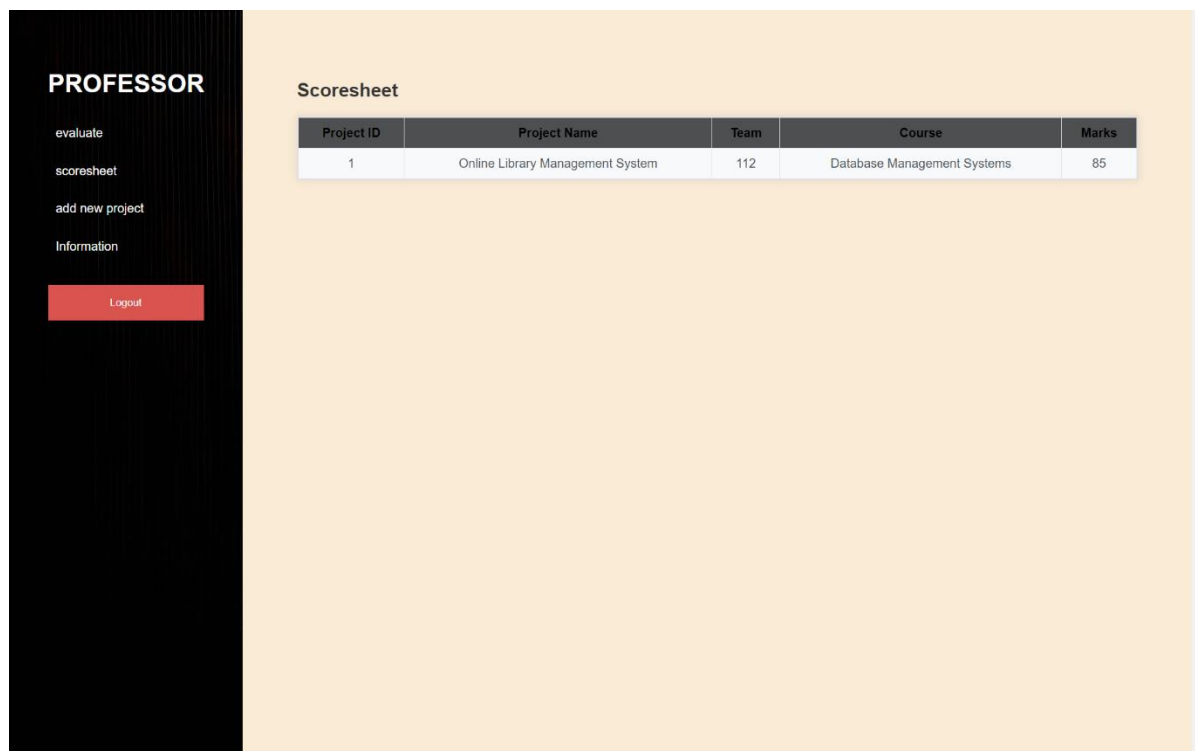
Fig 6.8: Admin Add User

Fig 6.9: Admin View Details

Chapter 7

Conclusion and Future Works

7.1 Conclusion:

The Academic Project Tracking System (APTS) represents a significant step forward in streamlining project submission and evaluation processes for both professors and students within academic institutions. By providing a centralized platform for uploading, submitting, and evaluating projects, APTS aims to simplify workload and reduce paper usage while enhancing efficiency and transparency.

Key functionalities such as user management, project segregation, team creation, task submission, and template creation empower users to manage their projects effectively. Professors benefit from the ability to evaluate student tasks efficiently, while students can collaborate seamlessly and track their project progress.

7.2 Future Works:

Mobile Application Development: Developing a mobile application for APTS would enhance accessibility and convenience, allowing users to manage their projects on the go.

Notification Feature: Implementing a notification system would keep users informed about project updates, deadlines, and evaluation results, improving communication and reducing the likelihood of missed deadlines.

Improved Security: Strengthening security measures to safeguard user data and prevent unauthorized access is essential, especially if APTS is to be deployed across multiple institutions.

Integration with Multiple Institutions: Expanding APTS to accommodate multiple institutions would require interoperability features and scalability enhancements to ensure seamless integration and performance across different academic settings.

Enhanced Analytics and Reporting: Incorporating advanced analytics and reporting capabilities would provide valuable insights into project performance, user engagement, and areas for improvement, facilitating data-driven decision-making and continuous optimization of the platform.

References

[1] Project Ideas - 1000 Projects

[2] CodeWithHarry - YouTube

[3] https://sdgs.un.org/goals

[4] draw.io (diagrams.net)