ResearchTrack: A Tailored Web Solution for Project Management in Health Information Labs

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FINAL YEAR DESIGN PROJECT REPORT

This Report Presented in Partial Fulfillment of the Requirements for the Degree of Bachelor of Science in Computer Science and Engineering

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APPROVAL

This project, titled "**ResearchTrack: A Tailored Web Solution for Project Management in Health Information Labs**" was submitted by **Md. Imran Hasan ID:181-15-11178** to the Department of Computer Science and Engineering, Daffodil International University, has been accepted as satisfactory for partial fulfillment of the requirements for the degree of B.Sc. in Computer Science and Engineering and approved as to its style and contents. The presentation was held on 12/13 January 2025.

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We hereby declare that this project has been done by me under the supervision of **Shahadat Hossain, Assistant Professor, Department of Computer Science and Engineering, Daffodil International University**. I also declare that neither this project nor any part of this project has been submitted elsewhere for the award of any degree or diploma.

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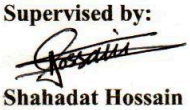

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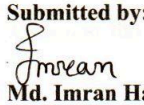

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ABSTRACT

The ResearchTrack: A Tailored Web Solution for Project Management in Health Information Labs is a web application designed to optimize lab operations through effective task management and progress tracking, supporting three user roles: Superadmin, Admin, and Researchers, each with distinct dashboards and functionalities. Superadmin oversees the system by managing Admin accounts, while Admins handle lab operations, manage Researchers, assign projects and tasks, and customize system behaviors. Researchers complete tasks, submit reports, and track project progress. The system's structure enables one Superadmin to manage multiple Admins, who in turn oversee multiple Researchers, each handling various projects and tasks. With role-specific access and streamlined workflows, this system provides a user-friendly and efficient solution for communication and task organization in lab environments

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CHAPTER 1

Introduction

1.1 Overview

In this chapter, I introduce **ResearchTrack: A Tailored Web Solution for Project Management in Health Information Labs**, a web-based platform developed to streamline and organize laboratory operations. The chapter highlights the motivation, objectives, methodology, scope, and expected outcomes of the project.

Designed to address challenges in academic and research labs, the system automates tasks such as assignments, progress tracking, and report submissions, providing a user-friendly and efficient solution. Tailored to meet the needs of modern research environments, it aims to enhance productivity and collaboration while ensuring seamless management of lab activities.

1.2 Background and Present State

Laboratory management is a critical aspect of academic and research institutions, yet many universities lack dedicated systems to streamline these operations. Manual handling of tasks such as assigning projects, tracking research progress, and managing communication between administrators and researchers often leads to inefficiencies and errors. Recognizing this gap, I developed **ResearchTrack: A Tailored Web Solution for Project Management in Health Information Labs** as my Final Year Project to address these challenges and enhance the productivity of lab workflows.

The system was conceptualized based on the specific needs of my university's labs. By analyzing existing processes and researching similar systems, I identified key areas for improvement, such as task assignments, progress monitoring, and report submissions. This formed the foundation for designing a scalable, user-friendly platform tailored to academic labs.

My system is fully operational, featuring two distinct user roles: **Superadmin, Admin,** and **Researchers**. The system was developed using **Laravel [2]** for the backend, **Blade, HTML [4], CSS [5], JavaScript [6]** for the frontend, and **MySQL [3]** for the database.

Key functionalities include:

- **Superadmin Dashboard**: Enables administrators to create and manage Admins.
- **Admin Dashboard**: This enables administrators to create and manage researchers, projects, and tasks, track project progress, and customize default tasks.
- **Researcher Dashboard**: This allows researchers to view and complete assigned tasks, submit reports, and track progress.

The system has been rigorously tested to ensure reliability and usability, incorporating feedback from experienced testers and supervisors. Designed with scalability in mind, it can accommodate future enhancements to meet evolving needs.

My system serves as a practical solution to the challenges of academic lab operations, providing an efficient and adaptable platform for managing research activities.

1.3 Problem Statement

In many academic and research institutions, laboratory operations often lack centralized management, leading to inefficiencies in task allocation, progress tracking, and communication among lab members. This results in disorganized workflows missed deadlines, and difficulty monitoring ongoing projects' status. The absence of a dedicated system for managing research tasks, assigning roles, and tracking progress hinders the productivity of lab personnel and complicates administrative oversight.

There is a need for an integrated, web-based system that streamlines these processes, improves communication, and provides a centralized platform for task management and project tracking. The system must cater to different user roles—Superadmins, Admins, and Researchers—ensuring secure, role-specific access, and promoting efficiency in

managing projects, assigning tasks, and monitoring progress.

1.4 Objectives

The key objectives of this project are:

1. To develop a user-friendly web-based platform to manage lab operations efficiently.
2. To implement role-specific dashboards for Superadmins, Admins, and Researchers.
3. To incorporate features for task assignment, real-time progress tracking, and report submission.
4. To provide customizable default tasks to suit diverse research needs.
5. To ensure secure role-based access and allow users to edit their profiles (e.g., name, photo, phone, email).
6. To improve communication, collaboration, and productivity within the lab environment.

1.5 Motivation

The motivation behind this project arises from the growing demand for automated tools in complex research environments. Challenges such as delays in task completion, errors in task tracking, and poor communication between team members often hinder lab productivity. By addressing these issues, the **ResearchTrack: A Tailored Web Solution for Project Management in Health Information Labs** aims to:

- Reduce administrative burdens.
- Improve communication and collaboration among lab members.
- Enable a shift in focus toward research rather than operational challenges.

1.6 Project Scope:

This system is a web-based application designed to streamline the management of laboratory operations, focusing on task allocation, progress tracking, and user role management. The scope of this project includes the following key features and functionalities:

1. **User Roles and Permissions:**
    - **Superadmin:** The Superadmin will have full access to the system, including the ability to create, edit, and delete Admin accounts. The Superadmin will also manage the overall system settings and user permissions.
    - **Admin:** Admins will manage lab operations, including assigning tasks and projects to Researchers, overseeing their progress, and maintaining system customization settings (e.g., task templates, and project structures).
    - **Researchers:** Researchers will be responsible for completing assigned tasks, submitting reports, and tracking the progress of their projects.
2. **Task and Project Management:**
    - Admins will be able to create, assign, edit, and delete projects and tasks.
    - Researchers will track and update the status of their tasks, submit reports, and view their project progress.
    - The system will allow project creation with multiple tasks, and each task will have specific due dates and progress-tracking options.
3. **Role-based Access Control:**
    - The system will provide role-specific access, ensuring that each user (Superadmin, Admin, or Researcher) can only access the features relevant to their role.
    - Security protocols will be implemented to ensure data privacy and integrity for all users.
4. **Profile Management:**
    - All users will be able to manage and update their profiles, including

contact information, role, and system preferences.

5. **Reporting and Monitoring:**
    - Admins and Superadmins will have access to comprehensive reports on task completion, project statuses, and researcher performance.
    - Researchers will be able to view detailed progress on their tasks and projects.
6. **System Customization:**
    - Admins will have the ability to customize default task templates, workflows, and other system settings to fit specific lab requirements.
7. **Usability:**
    - The system will be designed with a user-friendly interface that allows for easy navigation and operation by users with varying levels of technical expertise.
8. **Data Storage and Security:**
    - All user data, tasks, and project information will be securely stored in a MySQL [3] database.
    - Regular backups and data recovery protocols will be in place to ensure data integrity.

The system will be developed using a Laravel [2] backend, Blade frontend, and MySQL [database, with a focus on scalability and future adaptability to accommodate additional features or system updates.

1.7 Project Outcome

The project delivers an efficient lab management system that:

1. Simplifies lab operations and reduces inefficiencies.
2. Enhances collaboration and communication among Superadmins, Admins, and Researchers.
3. Provides a scalable, customizable platform adaptable to various research needs.
4. Allows all users to personalize their profiles, ensuring a better user experience.

By streamlining workflows and promoting eco-friendly practices, the system supports labs in achieving greater precision, efficiency, and innovation.

1.8 Report Organization

- Introduction
- Literature Review
- Requirement Analysis and Design Specification
- Implementation
- Result and Analysis
- Impact on Society, Environment, and Sustainability
- Conclusion and Future Work
- References
- Plagiarism report

1.9 Summary

This system addresses inefficiencies in traditional lab operations by providing a web-based platform with role-specific dashboards for Superadmins, Admins, and Researchers. The system enhances collaboration, automates task management, and supports profile customization for all users. By reducing operational hurdles and promoting eco-friendly practices, the system fosters a streamlined, scalable, and productive environment for modern research lab

CHAPTER 2

Background Study

2.1 Overview

This chapter provides an in-depth review of existing literature relevant to the **ResearchTrack: A Tailored Web Solution for Project Management in Health Information Labs**. It explores related works, compares their features and limitations, identifies open issues, and highlights how this project addresses these gaps. The aim is to establish a foundation for the proposed system by analyzing prior efforts and identifying opportunities for improvement.

2.2 Related Works

Several systems have been developed to manage lab operations, including research tracking, task assignment, and progress monitoring. Notable examples include:

1. **My System**
   A streamlined, budget-friendly solution designed for academic and small research labs. It offers task assignments, role-specific dashboards, progress tracking, report submission, and user profile customization. While it is highly customizable and user-friendly, scalability for enterprise-level labs remains a limitation.

- **Related Site Links**: This is a custom solution designed for this project and does not have an external website.

2. **LabGuru [8]**
   A popular laboratory management system that integrates task management, inventory tracking, and experiment documentation. LabGuru [8] is comprehensive and widely adopted but lacks flexibility for customized workflows and is expensive for small-scale labs.
   - **Related Site Links**: LabGuru Official Website

3. **Benchling [9]**

   Benchling [9] focuses on collaborative research tracking, enabling researchers to record progress and share data seamlessly. However, it offers limited administrative control over task assignments and lacks task-specific dashboards, making it less suitable for academic labs.

   - **Related Site Links**: Benchling Official Website
4. **LabWare [10]**

   LabWare [10] is an enterprise-level Laboratory Information Management System (LIMS) with powerful automation tools and scalability. Despite its strengths, the system is overly complex for smaller labs and comes with a high price tag.

   - **Related Site Links**: LabWare Official Website

2.3 Comparison between existing works

System	Features	Strengths	Weaknesses	Target Audience	Suitability for Academic Labs
My System	Task assignment, role-specific dashboards, progress tracking, report submission,	User-friendly, cost-effective, customizable, eco-friendly	Limited scalability for enterprise-level labs	Academic and small research labs	High: Tailored for academic labs with budget-friendly features

	user profile customization				
LabGuru [8]	Task management, inventory, experiment documentation	Comprehensive, widely adopted	Limited customization, high cost	Research labs, enterprises	Moderate: Useful but costly for academic budgets
Benchling [9]	Collaborative research tracking	Promotes teamwork and data sharing	Minimal admin control, lack of task-specific dashboards, high cost	Biotech and pharma teams	Low: Not ideal due to high cost and limited admin control
LabWare [10]	Enterprise-level LIMS	Scalable, powerful automation	Overly complex for smaller labs, and	Large enterprises	Low: Overkill for most academic

		tools	expensive		settings

Table 2.3.1: Comparative analysis of my work

2.4 Open Issues

Despite advancements in existing systems, several gaps persist:

Limited Role-Specific Dashboards
Most systems fail to provide distinct dashboards tailored for different roles (e.g., Superadmin, Admins, Researchers). This results in inefficiencies in task management and unclear role definitions.

Customization Challenges
Few systems allow admins to enable or disable default tasks or customize workflows to suit specific lab needs, limiting flexibility for diverse use cases.

Cost and Complexity
Professional lab management tools are often prohibitively expensive or too complex for small labs, requiring significant training and resources.

Granular Progress Tracking
Researchers often lack tools for detailed tracking of their tasks and project progress. Admins also face challenges in monitoring multiple projects in real-time.

Integration with Smaller Labs
Systems like OpenLab, while modular and open-source, lack comprehensive features for small labs, particularly those requiring hierarchical task structures and real-time updates.

Knowledge requirements:

Laboratory Operations

Understanding lab workflows, task assignments, and project tracking to create an efficient system tailored to academic and research labs.

Role-Based Access Control

Defining user roles (Admin, Researcher) and managing permissions for secure system access.

Database Design

Designing efficient databases to manage tasks, projects, and user roles.

Data Privacy and Security

Ensuring secure handling of sensitive data and compliance with privacy regulations.

These key areas are essential for building a functional and secure lab management system.

Needed part on the field:

My supervisor helps in developing this project by providing valuable information about the features and guiding the implementation process.

Connect with a professional developer to get enough knowledge on web development

2.5 Summary

This chapter reviewed the strengths and limitations of existing lab management systems. While tools like LabGuru [8], Benchling [9], and Labware [10] address some aspects of lab management, they fall short in areas such as customization, role-specific dashboards, and affordability for smaller labs. These gaps underscore the need for a tailored lab management system designed to streamline lab operations, enhance collaboration, and offer budget-friendly solutions. By addressing these issues, this project aims to provide a system that is both efficient and adaptable, meeting the unique demands of academic and small research labs.

CHAPTER 3

Requirement Analysis and Design Specification

3.1 Overview

This chapter outlines the methodology for developing the **ResearchTrack: A Tailored Web Solution for Project Management in Health Information Labs**. It covers the process of requirements gathering, system design, and the technical specifications essential for implementation. Additionally, it discusses hardware and software requirements, project management strategies, and financial analysis. These elements collectively ensure that the system is efficient, scalable, and adaptable to meet the needs of both Admins and Researchers in the lab environment.

3.2 Requirements Analysis

The lack of a dedicated lab management system at the Specialized Research Lab has led to inefficiencies in the manual process of managing tasks, tracking project progress, and coordinating between Admins and Researchers. This results in delays, miscommunication, and difficulty in monitoring ongoing lab activities. A lab management system is proposed to address these issues to provide a structured and efficient workflow.

3.2.1 Objectives

The primary objectives of this system are:

1. To streamline the management of lab operations through role-based dashboards.
2. To enable Admins to assign tasks, track progress, and customize task templates.
3. To allow researchers to manage their assigned tasks, submit reports, and monitor their project progress.
4. To provide centralized control through a Superadmin role for managing system

users and ensuring overall functionality.

3.2.2 Roles and Responsibilities

Superadmin

The Superadmin is responsible for overseeing the entire system. Their tasks include:

- Creating, editing, and deleting Admin accounts.
- Updating profiles (e.g., name, email, phone, and profile picture).
- Monitoring the system's integrity and functionality.

Admin

The Admin manages the operational aspects of the lab, including:

- Creating, editing, and deleting Researchers.
- Assigning tasks to Researchers.
- Customizing default task templates (adding, editing, deleting, enabling/disabling tasks).
- Tracking project progress and task timelines through dashboards.

Researcher

The Researcher focuses on task completion and progress reporting. Their responsibilities include:

- Viewing assigned tasks and project timelines.
- Submitting task completion reports to the Admin.
- Tracking project progress and ensuring task deadlines are met.

3.2.3 Functional Requirements

The system is designed with the following key functionalities:

1. **Role-based Access Control:**
    - Dedicated dashboards for Superadmin, Admin, and Researcher roles.
2. **Task Management:**
    - Admin can assign tasks directly to Researchers or projects.
    - Researchers can view, complete, and submit tasks.
3. **Progress Tracking:**
    - Bar charts visualize project timelines and task progress.
    - Automatic updates of progress bars based on task completion (e.g., split percentages for multiple tasks).
4. **Default Task Customization:**
    - Admin can enable/disable default tasks or create custom tasks.
5. **User Management:**
    - Superadmin can manage Admin accounts.
    - Admin can manage Researcher accounts.

3.2.4 Non-Functional Requirements

1. **Scalability:**
   The system should handle multiple Researchers and Admins efficiently.
2. **Security:**
   User roles and data should be protected using authentication and authorization mechanisms.
3. **Usability:**
   A user-friendly interface with intuitive dashboards for all roles.
4. **Performance:**
   The system should provide real-time updates for progress tracking and task management.

3.3 System Design:

This system was designed to streamline lab operations by providing tailored tools and features for distinct user roles: Super Admin, Admin, and Researcher. The design emphasizes modularity, scalability, and user-friendliness while ensuring security and performance.

Key Features

1. Super Admin Features

The Super Admin oversees the entire system and manages critical configurations:

- **User Management**: Responsible for creating, updating, and removing Admin accounts with role-based access control (RBAC) to ensure proper authorization.
- **Activity Monitoring**: Tracks system activity logs, including user logins and key actions, to maintain transparency and auditing capabilities.
- **System Configuration**: Allows customization of default tasks, templates, and system settings for flexibility in adapting to different lab needs.

2. Admin Dashboard

The Admin Dashboard serves as the operational control center for managing researchers and tasks:

- **Researcher Management**: Admins can assign tasks, track researcher progress, and monitor project status.
- **Task Customization**: Admins can create custom task templates, set deadlines, and modify workflows to meet project requirements.

3. Researcher Dashboard

The Researcher Dashboard offers tools to streamline task management and report submission:

- **Task Overview**: Displays assigned tasks with details such as deadlines, descriptions, and current status.
- **Progress Tracking**: Enables researchers to update task progress and submit

reports directly through the dashboard.

4. Profile Management

All user roles can update their personal information securely:

- Edit contact details (email, phone number).
- Upload or replace profile pictures.
- Reset passwords through a secure, encrypted process.

Database Design

A relational database was developed to ensure consistency, data integrity, and efficient management of entities like users, tasks, projects, and reports.

- **Entities and Relationships**:
  - Super Admin oversees multiple Admins.
  - Admins manage Researchers and assign them tasks and projects.
  - Researchers submit reports linked to their assigned tasks.
- **Key Tables**:
  - Users (stores credentials and role information).
  - Tasks (stores details about tasks and their status).
  - Projects (tracks project information and associated researchers).

The database design adheres to normalization principles to minimize redundancy and ensure efficient data retrieval.

Technology Stack

- **Frontend**: HTML [4], CSS [5], JavaScript [6], and Blade templates for responsive and interactive user interfaces.
- **Backend**: Laravel [2] (PHP framework) for secure user authentication, task management, and report submission workflows.
- **Database**: MySQL [3] for structured data storage and retrieval.

Testing and Validation

- **Manual Testing**: Focused on user authentication, task assignment, and data submission to ensure a seamless experience.
- **Scalability Testing**: Collaborated with experienced testers to evaluate system performance under varying loads.
- **Supervisory Review**: The final system was reviewed by the supervisor for functionality and usability improvements.

Deployment

The system was deployed on a cloud platform to provide real-time access and scalability. Deployment steps included:

- Configuring the production environment.
- Establishing a secure connection to the database.
- Enabling role-based access control to safeguard sensitive information.

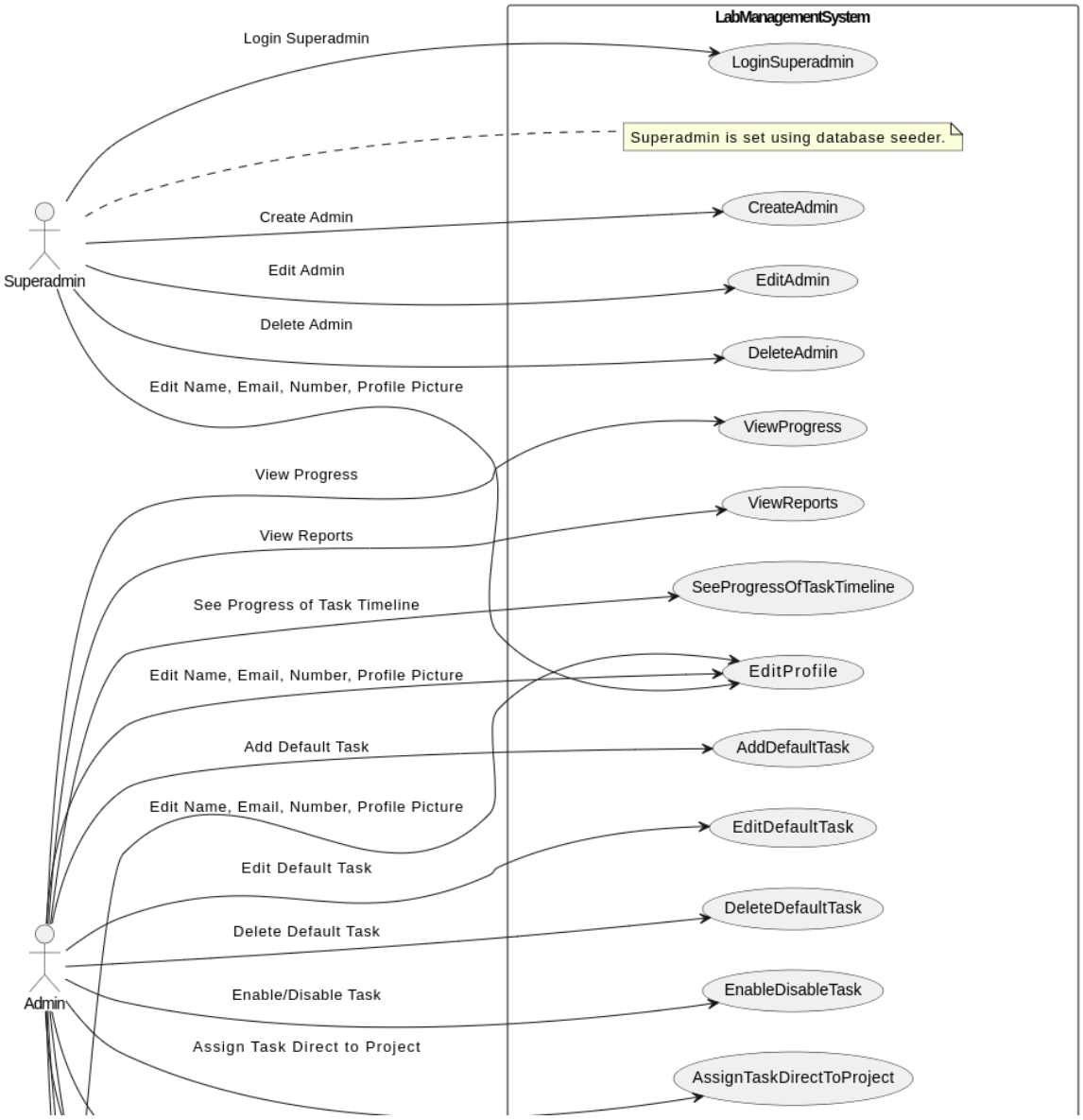
Due to budget constraints, hosting was suspended after the initial deployment, but the system remains functional in local environments.

This system design ensures flexibility, usability, and scalability, making it adaptable to various lab environments while addressing the unique needs of users.

Diagrams are given below

3.3.1 Use Case Diagram [7]

Use Case Diagram of My System.



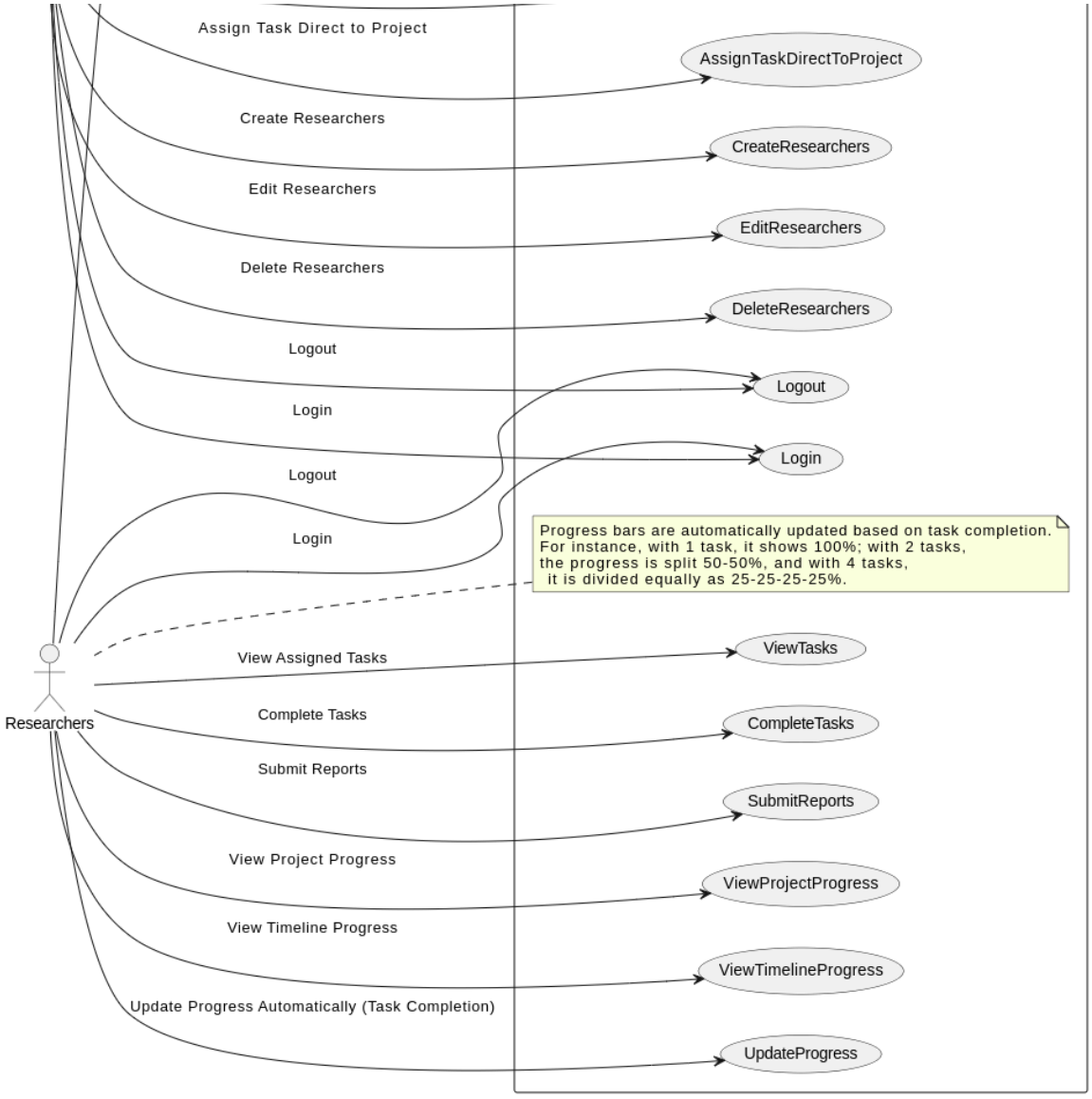


Fig 3.3.1: Use case diagram [7]

Detailed description of Use Case diagram

Actor: Superadmin

- **Login Superadmin**: The superadmin logs into the system using credentials. This role is pre-configured in the database using a seeder.
- **Create Admin**: The superadmin creates admin accounts, granting access and

permissions to manage tasks, researchers, and projects.

- **Edit Admin**: The superadmin updates admin details like name, email, or other information.
- **Delete Admin**: The superadmin removes admin accounts that are no longer needed.
- **View Progress**: The superadmin can view the overall progress of tasks and projects managed by admins.
- **View Reports**: The superadmin can access submitted reports to evaluate project or task details.
- **See Progress of Task Timeline**: The superadmin monitors the progress of task timelines to ensure efficiency and adherence to deadlines.
- **Edit Profile**: The superadmin updates their profile details, including name, email, phone number, and profile picture.

Actor: Admin

- **Add Default Task**: Admins create default tasks that are automatically included in projects.
- **Edit Default Task**: Admins modify default task details like title, description, or status.
- **Delete Default Task**: Admins remove unnecessary default tasks from the system.
- **Enable/Disable Task**: Admins enable or disable default tasks, determining whether these tasks are included in newly created projects.
- **Assign Task Direct to Project**: Admins assign specific tasks directly to a project, in addition to default tasks.
- **Create Researchers**: Admins add new researchers who will work on assigned tasks and projects.
- **Edit Researchers**: Admins update researcher details, such as name, email, and profile information.
- **Delete Researchers**: Admins remove researchers who are no longer involved in the system.

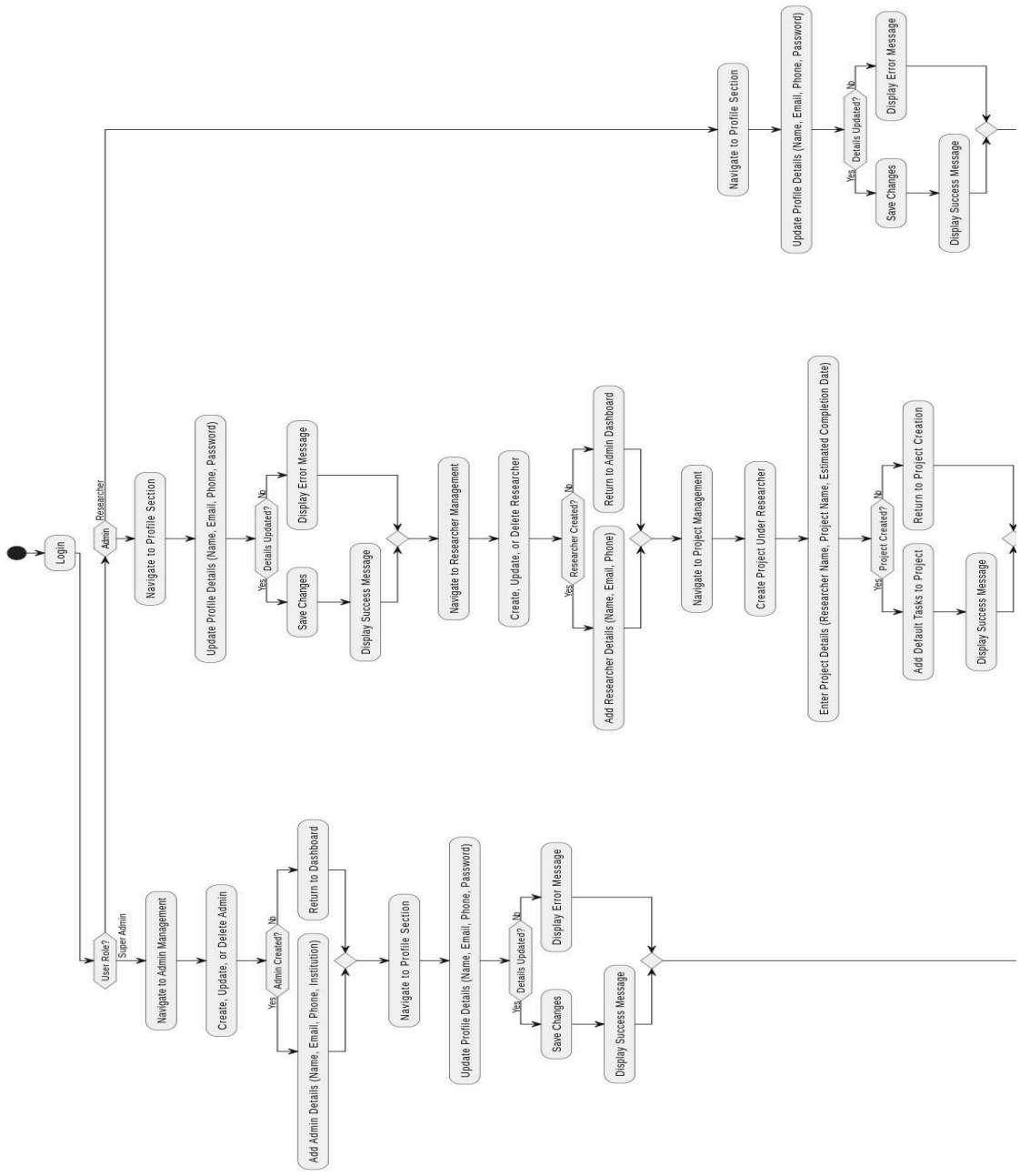
- **Logout**: Admins log out of the system to end their session securely.
- **View Progress**: Admins track the progress of ongoing tasks and projects assigned to researchers.
- **View Reports**: Admins review reports submitted by researchers detailing task completions and project progress.
- **See Progress of Task Timeline**: Admins monitor the progress of tasks in the timeline view to ensure deadlines are met.
- **Edit Profile**: Admins update their profile details, such as name, email, phone number, and profile picture.

Actor: Researchers

- **Login**: Researchers log in to the system to access their assigned tasks and submit reports.
- **Logout**: Researchers securely end their session by logging out.
- **View Assigned Tasks**: Researchers view the tasks assigned to them by the admin.
- **Complete Tasks**: Researchers mark tasks as completed, indicating their progress on the project.
- **Submit Reports**: Researchers submit detailed reports for the tasks they have completed.
- **View Project Progress**: Researchers view the progress of their assigned projects, including completed and pending tasks.
- **View Timeline Progress**: Researchers monitor the progress of their assigned tasks within the project timeline.
- **Update Progress Automatically (Task Completion)**: As researchers complete tasks, the progress bar updates automatically. The logic adjusts the progress percentage based on the total number of tasks, e.g., 1 task = 100%, 2 tasks = 50-50%, and 4 tasks = 25-25-25-25%.

3.3.2 Flowchart Diagram [7]

Flowchart Diagram of My System



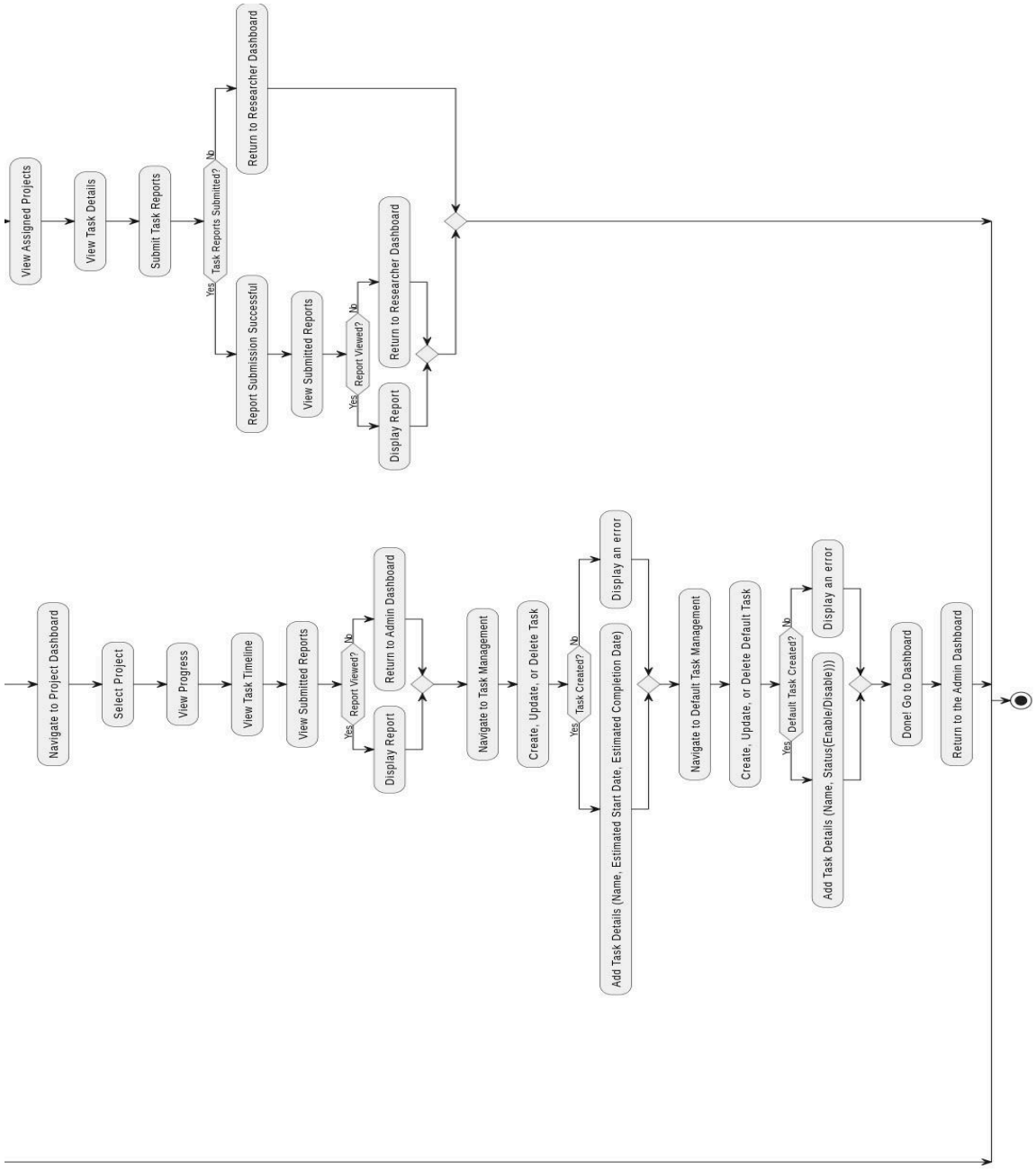


Fig 3.3.2: Flowchart Diagrams [7]

Detailed description of Flowchart Diagram

The following flowchart illustrates the login process and the actions available to each user role within the system. The system supports three roles: **Super Admin**, **Admin**, and **Researcher**, each with varying levels of access and functionality.

1. Login Process

The process begins with the user logging into the system. The system checks the user's role to determine the appropriate actions that follow.

2. Super Admin Role

Upon login, if the user is a **Super Admin**, the following tasks are available:

- **Admin Management**:
    - The Super Admin can create, update, or delete **Admin** users. After successfully creating an Admin, the Super Admin enters the Admin's details, such as name, email, phone, and institution.
    - If Admin creation fails, the process returns to the dashboard.
- **Profile Section**:
    - The Super Admin can update personal profile details, including name, email, phone, and password. A success message is displayed upon successful update, or an error message is shown if the update fails.
- **Researcher Management**:
    - The Super Admin can manage **Researchers** by creating, updating, or deleting them. If a researcher is created successfully, the Super Admin enters the researcher’s details. If the creation fails, the process returns to the Admin Dashboard.
- **Project Management**:
    - The Super Admin can create projects under researchers, input project details, and assign default tasks. Success in project creation results in a success message, while failure returns to the project creation page.

- **Project Dashboard**:
    - The Super Admin can view project progress, task timelines, and submitted reports. Submitted reports can be viewed, and if successful, they are displayed; otherwise, the process returns to the Admin Dashboard.
- **Task Management**:
    - The Super Admin can create, update, or delete tasks. Details like task name and estimated dates are entered, and any errors in task creation prompt an error message.
- **Default Task Management**:
    - The Super Admin manages default tasks, including task name and status (enable/disable). If default task creation fails, an error message is displayed.
- **Return to Admin Dashboard**:
    - The flow ends with the Super Admin returning to the Admin Dashboard.

3. Admin Role

For **Admin** users, the following operations are available:

- **Profile Section**:
    - Admins can update their personal profile details. Successful updates result in a success message, while failures display an error message.
- **Researcher Management**:
    - Admins can manage researchers by creating, updating, or deleting them. Successful researcher creation involves entering the researcher's details; failure leads to returning to the Admin Dashboard.
- **Project Management**:
    - Admins can create projects, assign default tasks, and input project details. Successful creation leads to adding tasks and displaying a success message.
- **Project Dashboard**:
    - Admins can view assigned projects, track progress, and view task

timelines. Admins also have access to view and display submitted reports.

- **Task Management**:
    - Admins manage tasks by creating, updating, or deleting them. Task details like name and dates are entered, with errors prompting an error message.
- **Default Task Management**:
    - Admins can manage default tasks by adding task details, including enabling or disabling them.
- **Return to Admin Dashboard**:
    - The Admin returns to the Admin Dashboard after completing tasks.

4. Researcher Role

The **Researcher** role provides the following actions:

- **Profile Section**:
    - Researchers can update their profile details, and a success or error message is displayed after attempting to save changes.
- **Assigned Projects**:
    - Researchers can view their assigned projects, check task details, and submit task reports.
- **Report Submission**:
    - Once reports are successfully submitted, researchers can view the submitted reports. If the report is not viewed, the researcher is returned to the dashboard.
- **Return to Researcher Dashboard**:
    - After report submission, researchers are directed back to their dashboard.

3.3.3 Activity Diagram

Activity Diagrams for "**My system**".

Create a Superadmin Diagram [7]

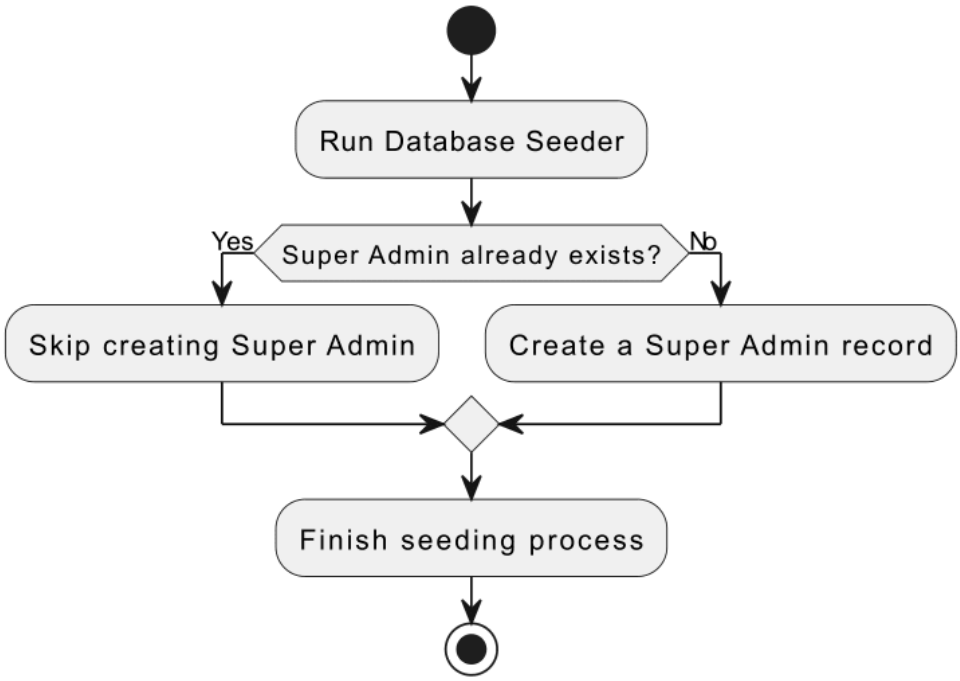


Fig 3.3.3.1: Create Superadmin Activity Diagram [7]

Create Superadmin:

- Create a seeder file for adding the Super Admin to the database.
- Define the necessary Super Admin details (name, email, phone, etc.) in the seeder file.
- Run the seeder to insert the predefined data into the database.
- Confirm the successful creation of the Super Admin in the system.

Create Admin Diagram [7]

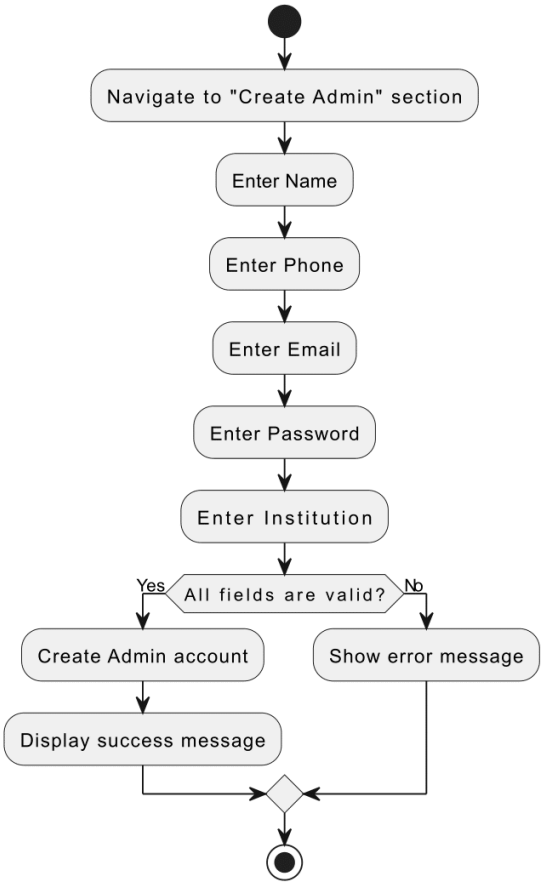


Fig 3.3.3.2: Create Admin Activity Diagram [7]

Create Admin:

- Navigate to Admin Management.
- Input Admin details (name, email, phone, etc.).
- Save the details to create the Admin.

Create a Researcher Diagram [7]

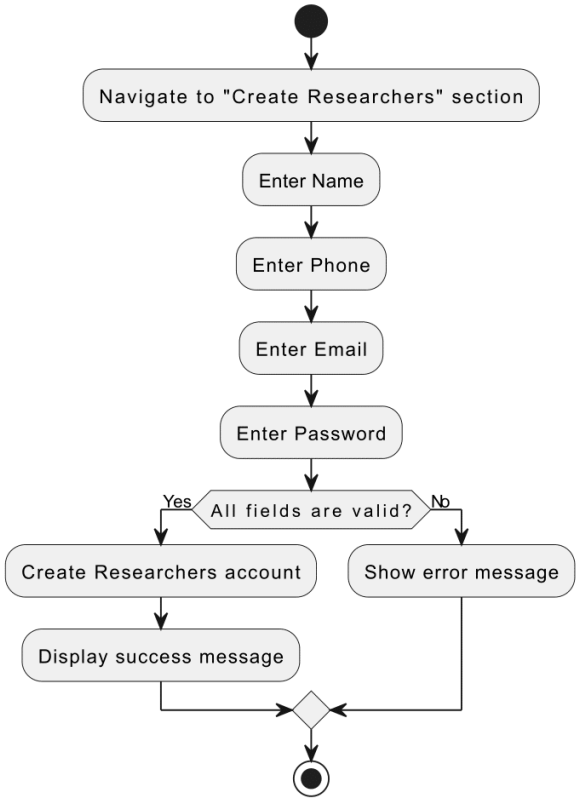


Fig 3.3.3.3: Create Researcher Activity Diagram [7]

Create Researchers:

- Navigate to Researcher Management.
- Input Researcher details (name, email, phone).
- Save the details to create the Researcher.

Create a Project Diagram [7]

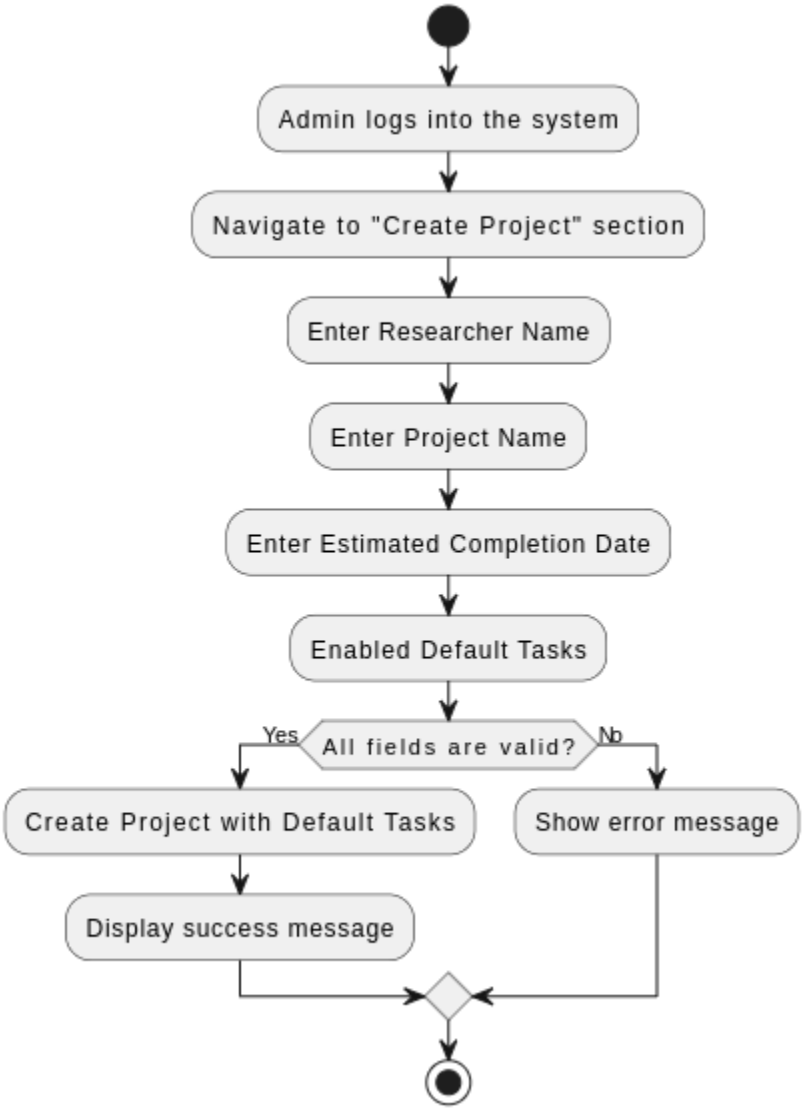


Fig 3.3.3.4: Create Project Activity Diagram [7]

Create Project:

- Assign a project to a selected Researcher.
- Enter project details (name, completion date).
- Add default tasks to the project and save.

Create a Task Diagram [7]

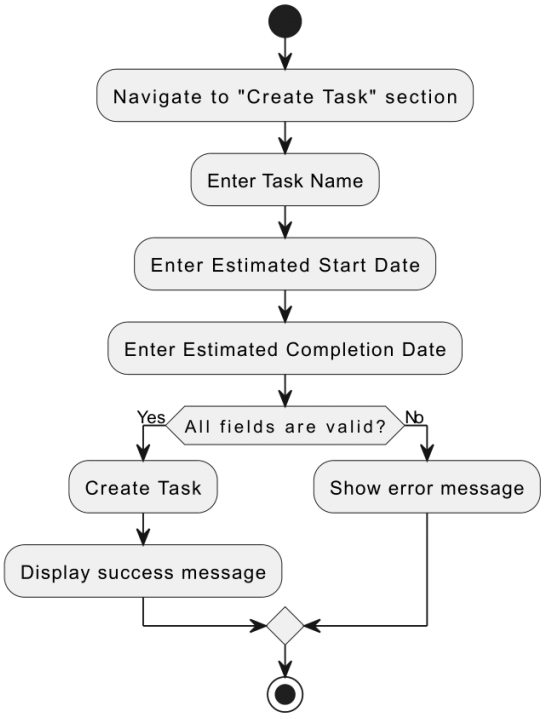


Fig 3.3.3.5: Create Task Activity Diagram [7]

Create Task:

- Navigate to Task Management.
- Input task details (name, description, dates).
- Save to create a new task.

- **Create Default Task Diagram [7]**

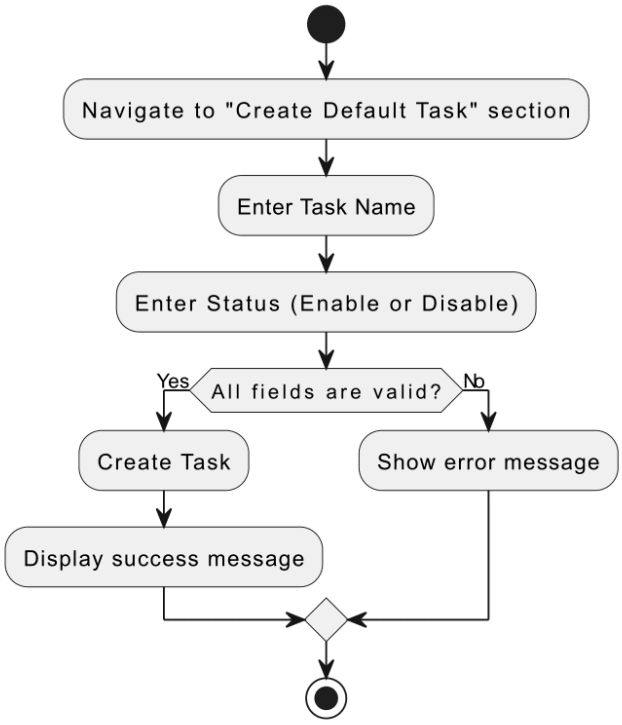


Fig 3.3.3.6: Create Default Task Activity Diagram [7]

Create Default Task:

- Navigate to Default Task Management.
- Define task details (name, priority).
- Save to create a default task template.

Project Dashboard Diagram [7]

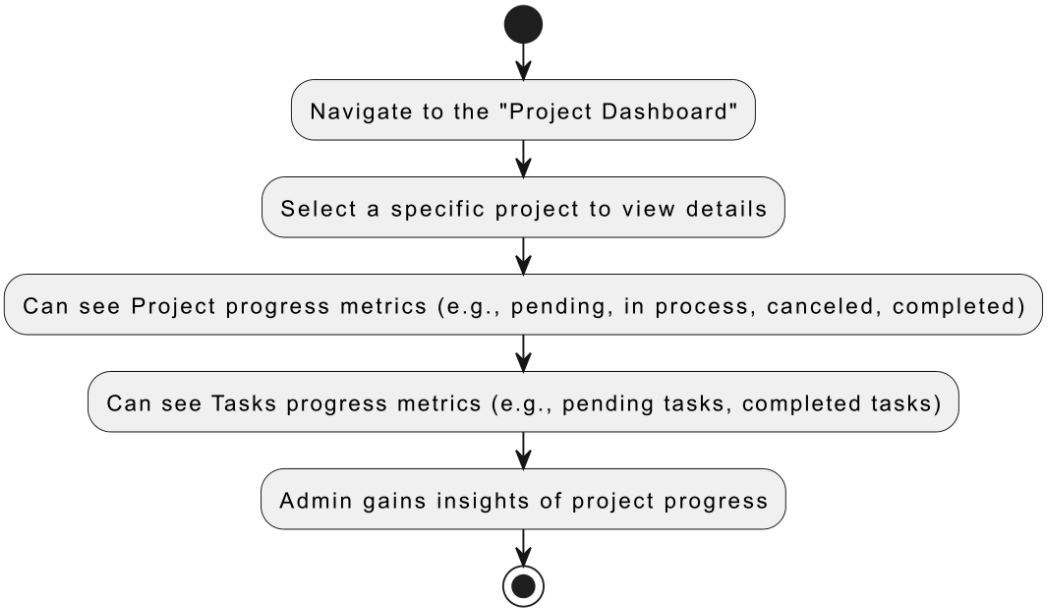


Fig 3.3.3.7: Project Dashboard Activity Diagram [7]

Admin Inspect Certain Projects:

- Navigate to Project Management.
- Select a project to inspect.
- View project progress, task timeline, and associated reports.

View Report Diagram [7]

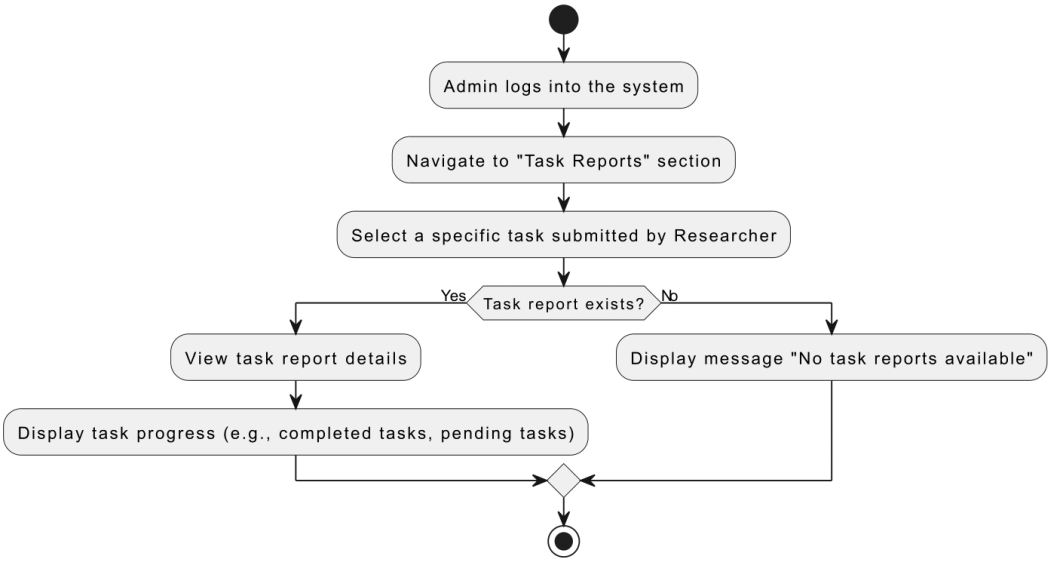


Fig 3.3.3.8: View Report Activity Diagram [7]

Admin View Task for Inspection:

- Navigate to Task Management.
- Select a task to inspect.
- Review the task's progress and submit reports.

View Task Diagram [7]

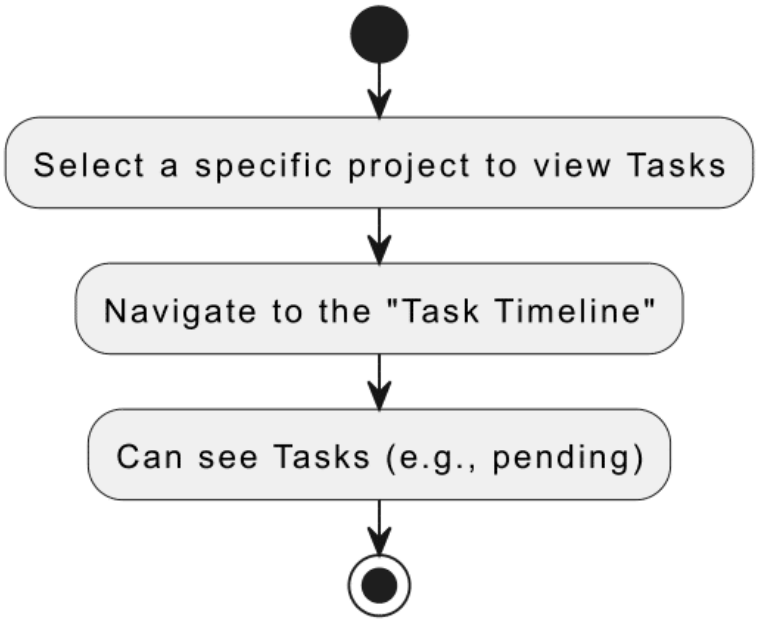


Fig 3.3.3.9: View Task Activity Diagram [7]

Researcher View Assigned Task:

- Researchers log in and navigate to their assigned tasks.
- View task details, progress, and deadlines.

Report Submit Diagram [7]

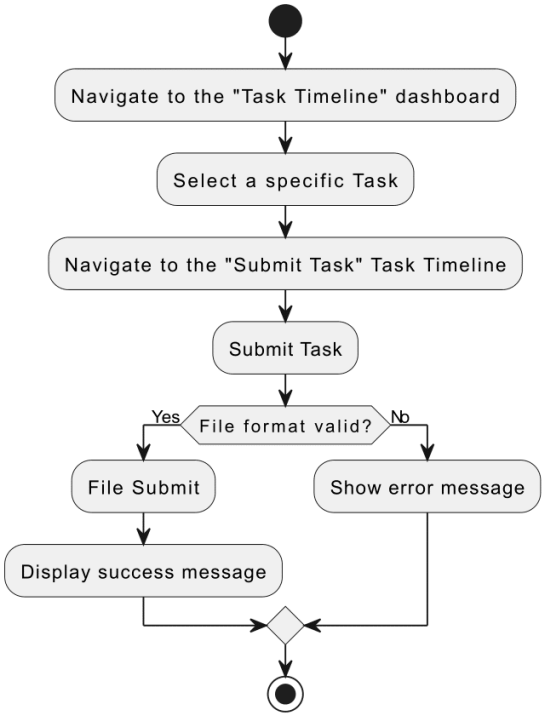


Fig 3.3.3.10: Report Submit Activity Diagram [7]

Report Submit:

- Researchers access the task submission interface.
- Upload task reports and confirm submission.
- Successfully submit the task report.

Profile Update Diagram [7]

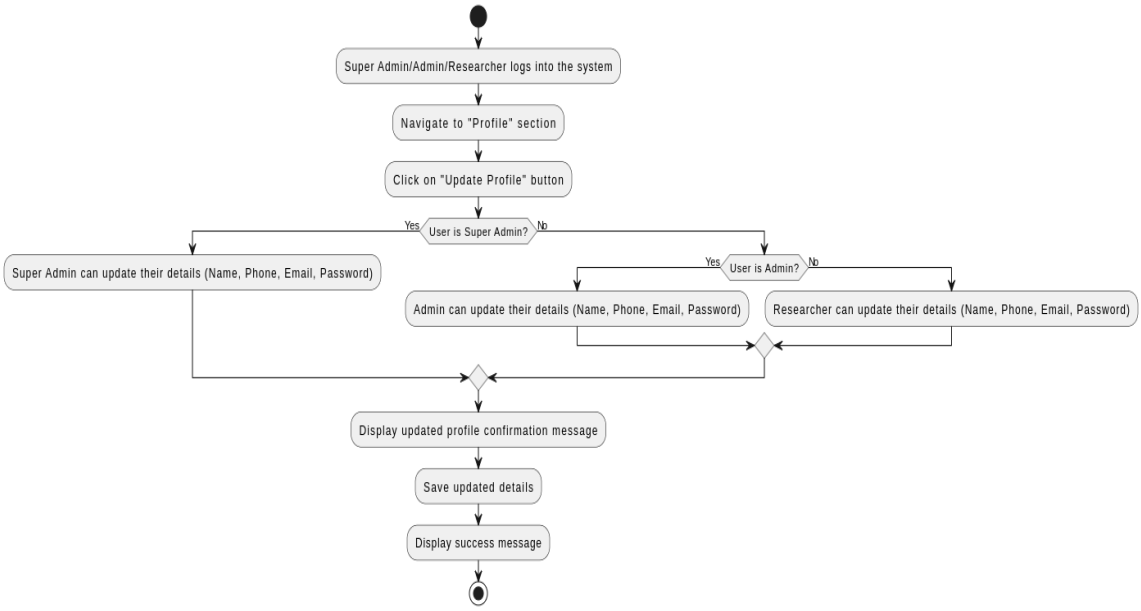


Fig 3.3.3.11: Profile Update Activity Diagram [7]

Profile Update:

- Users navigate to the profile section.
- Update personal details (name, email, etc.).
- Save changes to apply updates.

3.3.4 Entity Relationship Diagram [7]

Here is the Entity Relationship Diagram of my system

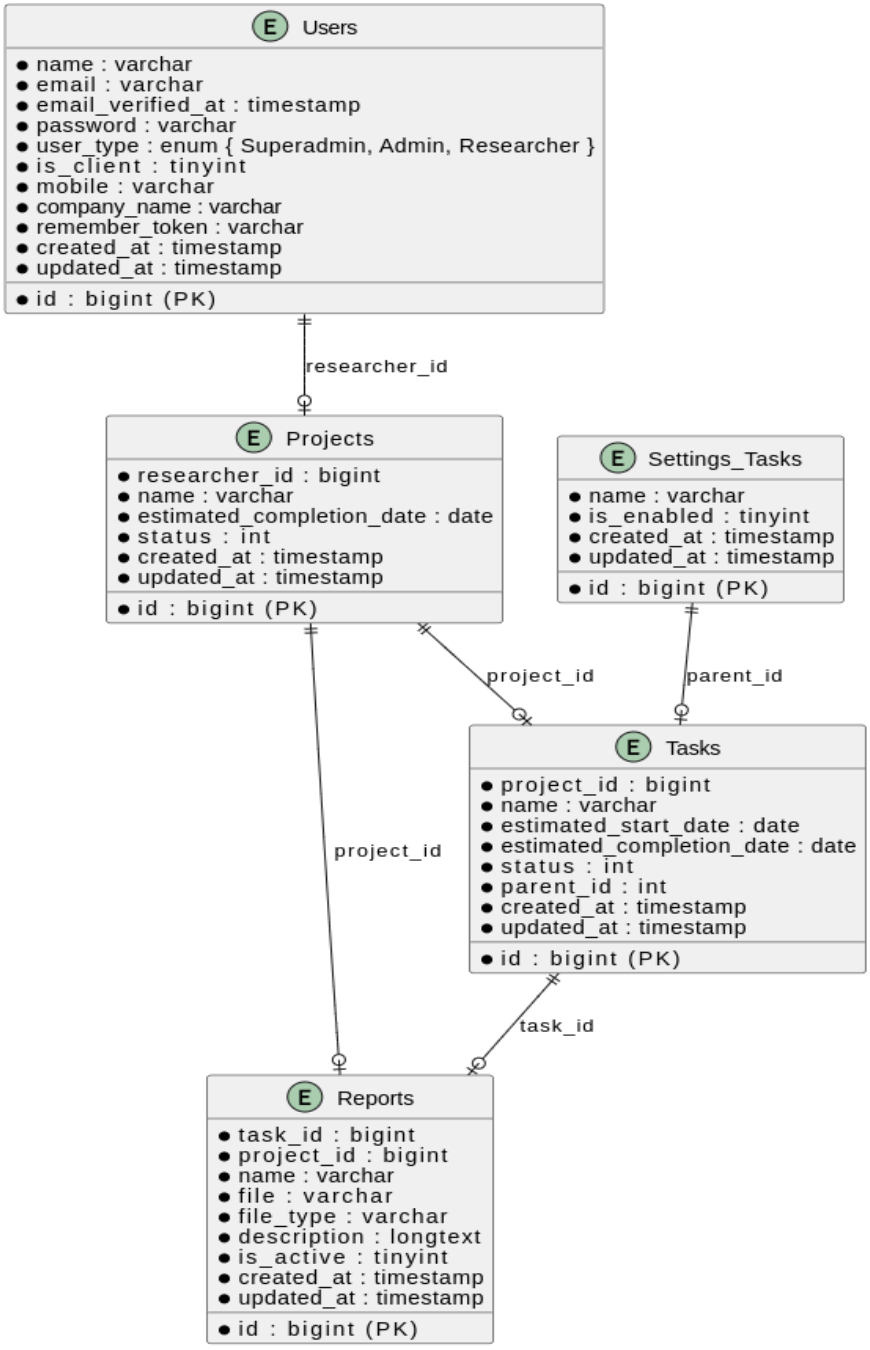


Fig 3.3.4: Entity Relationship Diagram [7]

3.4 Hardware / Software Requirements

Hardware Requirements

1. **Server:** A minimum of 2 GB RAM, 2 CPU cores, and 50 GB storage to ensure smooth operation and data handling.

2. **Client Devices:** Desktops, laptops, or tablets with internet connectivity for Admin and Researcher access.

3. **Backup Storage:** An additional storage device or cloud-based backup solution for data redundancy and recovery.

4. **Scalability Support:** Options to scale server capacity or switch to cloud hosting (e.g., AWS, Azure [11], or Google Cloud)to handle future growth.

Software Requirements

1. **Operating System:** Compatible with Windows, Linux, or MacOS.

2. **Web Server:** Apache or Nginx for hosting the application.

3. **Database:** MySQL [3] for robust and efficient data management.

4. **Programming Languages:**

    - **Frontend:** HTML5 [4], CSS3 [5], JavaScript [6] for user interface design.

    - **Backend:** PHP [1] and Laravel [2] framework for application logic and functionality.

5. **Version Control:** Git for source code management and collaboration.

6. **SSL Certificate:** Essential for secure communication over HTTPS (e.g., Let's Encrypt).

7. **Browser Compatibility:** Ensure functionality across modern browsers like Chrome, Firefox, Safari, and Edge.

8. **Testing Tools:**

    - PHPUnit for backend unit testing.

    - Selenium or Cypress for end-to-end testing.

9. **Monitoring Tools:** Implement tools like New Relic or Prometheus to monitor server health and application performance.

10. **Security Measures:** Web Application Firewall (e.g., ModSecurity) and antivirus software to protect the system from potential threats.

11. **API Tools:** Tools like Postman for testing any APIs used or provided by the system.

12. **CI/CD Pipeline Tools:** Optional tools such as Jenkins or GitHub [12] Actions for automating deployment and testing.

3.4 Project Management and Financial Analysis

Project Management Approach:

The project followed an Agile methodology to deliver incremental progress and maintain flexibility.

Timeline:

- **Phase 1:** Design and Requirements Gathering (1 month).

- **Phase 2:** Development (2.5 months).

- **Phase 3:** Testing and Bug Fixes (20 days).

- **Phase 4:** Deployment and Final Review (20 days).

Team Structure:

The project was primarily developed by me, with support from:

- Software engineer friends and colleagues for frontend design and testing.
- My supervisor for guidance.

Risk Management:

- **Potential Risks:**

    1. **System Downtime:** Unexpected downtime due to server issues or technical failures could disrupt lab operations.
    2. **Data Security:** Potential threats to sensitive lab data, including unauthorized access or data breaches.
    3. **Budget Overruns:** Hosting and maintenance costs may exceed the budget if not carefully managed, particularly with increased usage.
    4. **User Adoption Challenges:** Difficulty in training users or resistance to change could hinder the system's effective implementation.

- **Mitigation Strategies:**

    1. **System Downtime:** Implement regular backups, use reliable hosting providers, and ensure there is a clear protocol for system recovery.
    2. **Data Security:** Employ strong encryption methods for data storage and transmission, and implement multi-factor authentication for user accounts.
    3. **Budget Overruns:** Monitor hosting and maintenance costs regularly and scale the system as needed to avoid unnecessary expenses. Seek

cost-effective solutions for institutions with limited budgets.

4. **User Adoption Challenges:** Provide comprehensive training for users and offer continuous support to ensure smooth transition and usage.

Financial Analysis:

- **Labor Costs:**
    - Development: No cost (self-developed).
    - Testing: No cost (self-tested with help from experienced colleagues).
    - UI/UX Design: No cost (friend assistance).
- **Software and Tools:**
    - Development Tools: PHPStorm. [13]
    - Hosting and Server: $X/month(varies depending on the server provider).
- **Contingency:**
    - Allocated 10-15% of the budget for unexpected expenses.

3.5 Summary

This chapter detailed the methodology for developing the **ResearchTrack: A Tailored Web Solution for Project Management in Health Information Labs**, covering the SDLC stages of requirements gathering, system design, and implementation. It also outlined hardware and software requirements, project management practices, and financial analysis. This structured approach ensured the project's efficiency, scalability, and adaptability to meet the needs of Admins and Researchers in the lab environment.

CHAPTER 4

Implementation

4.1 Overview

This chapter provides an in-depth explanation of the implementation of the **ResearchTrack: A Tailored Web Solution for Project Management in Health Information Labs**, including the design and development phases, system testing, and evaluation. The implementation was carried out to create a user-friendly and efficient platform to streamline lab operations, focusing on scalability, security, and usability.

4.2 Prototype Design

The design of the system was based on a clear understanding of the functional requirements. The frontend was developed using HTML [4], CSS [5], JavaScript [6], and Blade, creating an intuitive and responsive interface. The backend was developed using PHP [1] and Laravel [2], ensuring a robust structure for task management, project tracking, and user management.

A working prototype was created to validate the core functionalities of the system. The prototype included key features such as:

- **Role-Based Dashboards:**
  The system provides distinct dashboards for Superadmin, Admin, and Researchers, ensuring each user has access to the appropriate features and functionalities based on their role.

- **Admin Creation and Management by Superadmin:**
  Superadmins can create and manage Admin users, overseeing their access and ensuring proper system functionality.

- **Researcher Creation and Management by Admin:**
  Admins can create and manage Researchers, assigning them tasks and monitoring their progress within the system.

- **Task Creation, Assignment, and Submission Features:**
  Admins can create tasks, assign them to Researchers, and track their submission status. Researchers can complete and submit tasks through their personalized dashboard.

- **Progress Tracking for Individual Projects and Tasks:**
  Both Admins and Researchers can monitor the progress of individual tasks and overall projects, with real-time updates on task completion and project milestones.

- **Secure User Authentication System:**
  The system ensures secure login and authentication for all users, protecting sensitive data and ensuring authorized access to features based on user roles.

- **Profile Update Feature for Every User:**
  Each user (Superadmin, Admin, and Researcher) can update their personal profile details, ensuring that the system remains up-to-date with the correct user information.

The design process was iterative, with feedback from my supervisor and colleagues incorporated to refine the system's interface and functionality.

4.3 System Testing

Testing played a critical role in ensuring that the system met both functional and non-functional requirements. A combination of manual testing and feedback from experienced testers was used to evaluate the system.

The testing phases included:

- **Unit Testing**: Ensuring individual components worked as intended.
- **Integration Testing**: Verifying that different parts of the system communicate correctly.
- **Usability Testing**: Assessing the user interface and user experience to ensure ease of use.
- **Performance Testing**: Checking the system's scalability and load handling.

Throughout the testing phase, the system was evaluated for performance, security, and ease of use, with necessary adjustments made to optimize the workflow and ensure a seamless user experience. The testing results confirmed the system's readiness to handle the lab's operational needs effectively.

4.4 Summary

This chapter presented the detailed implementation process of the **ResearchTrack: A Tailored Web Solution for Project Management in Health Information Labs**, including the design, development, and testing phases. The system was built using modern technologies to provide an efficient and user-friendly solution for managing lab tasks and progress. Rigorous testing and evaluation ensured that the system met the necessary functional, performance, and usability standards, confirming its suitability for deployment.

CHAPTER 5

Result and Analysis

5.1 Overview

This chapter presents the results obtained from the development and testing phases of the **ResearchTrack: A Tailored Web Solution for Project Management in Health Information Labs**. It includes an analysis of the system's functionality, performance, and usability, supported by experimental results and a comparative evaluation with traditional lab management methods.

5.2 Experimental:

The system underwent rigorous testing, conducted by me in collaboration with experienced software engineers. The testing process validated critical functionalities such as role management, task assignment, progress tracking, report submission, user authentication, and profile updates, ensuring the system's reliability and effectiveness.

- **Superadmin Role:**

  The Superadmin was responsible for managing Admin accounts. This role ensured effective oversight and smooth operations in the lab management process.

- **Admin Role:**

  Admins successfully managed researchers, created tasks, and tracked project progress using a dedicated dashboard. All administrative tasks were completed without issues, ensuring efficient oversight of lab operations.

- **Researcher Role:**

  Researchers were able to effectively complete assigned tasks, submit reports, and monitor project progress. The ease of use and clear navigation allowed for efficient task completion and reporting.

  The results confirmed that the system is capable of meeting the operational needs of a specialized lab. It demonstrated scalability and adaptability, essential features for long-term usability in dynamic lab environments.

5.3 Performance

The system's performance was evaluated against typical requirements for lab management tools, focusing on key aspects such as efficiency, user-friendliness, and scalability.

- **Problem Solving:**

  The system effectively addressed common challenges faced in lab management, such as inconsistent task assignments, lack of progress tracking, and manual errors in report submissions. By providing centralized control and real-time updates, it ensured tasks were completed on time, project statuses were easily monitored, and researchers could focus on their work without administrative hurdles.

- **Efficiency:**
  The system significantly reduced manual workloads by automating task management processes, ensuring smoother and faster operations.
- **User-Friendliness:**
  The simplified interface made it easy for both Admins and Researchers to navigate and perform their tasks with minimal training, enhancing the overall user experience.

- **Scalability:**
  The system was able to handle multiple users and projects simultaneously, with no noticeable performance degradation. This capability ensures the system can grow alongside the increasing demands of the lab.

When compared to traditional manual processes, the system showed significant improvements:

- **Improved Task Tracking and Collaboration:**
  Automated tracking made it easier for Admins to monitor progress, and Researchers benefited from clear task assignments and deadlines.
- **Faster Response Times:**
  The system reduced the time required to manage lab operations, enabling quicker responses to task completions and report submissions.
- **Enhanced Accuracy:**
  Automated progress monitoring and reporting minimized human error, ensuring more accurate tracking of tasks and project milestones.

5.4 Summary

This chapter summarized the results of the **ResearchTrack: A Tailored Web Solution for Project Management in Health Information Labs**'s implementation and testing. The experimental results validated its efficiency, usability, and scalability, confirming its potential as a reliable solution for streamlining lab operations. The comparative analysis demonstrated its significant advantages over traditional manual methods, suggesting the system’s potential for wider adoption in similar environments.

CHAPTER 6

Impact on Society, Environment, and Sustainability

6.1 Impact on Life

The **ResearchTrack: A Tailored Web Solution for Project Management in Health Information Labs** significantly impacts administrators (Superadmin and Admin) and researchers by streamlining complex lab workflows. Researchers can dedicate more time to their core tasks, free from administrative burdens, while Admins and Superadmins can manage tasks, track progress, and oversee operations more efficiently without relying on manual processes. The system enhances productivity, reduces stress, and encourages better time management, creating a more efficient and balanced work environment for all users.

6.2 Impact on Society & Environment

- By optimizing lab operations, the system not only facilitates advancements in research but also benefits society at large by enabling the development of innovative solutions and technologies. The transition from paper-based processes to digital workflows minimizes waste, contributing to environmentally friendly practices.

- Additionally, the system significantly reduces the workload for Admins, Superadmins, and Researchers by automating routine tasks and offering a user-friendly interface. This helps users maintain focus and work more efficiently. The system's flexibility—allowing updates and task management from any location—ensures convenience and adaptability, making it a valuable tool for modern, mobile work environments.

6.3 Ethical Aspects

This system upholds strong ethical standards, particularly regarding user data security and privacy. Role-based dashboards ensure that sensitive information is only accessible to authorized users (Superadmin, Admin, and Researcher), safeguarding privacy and maintaining confidentiality. The transparency of task assignments and progress tracking fosters trust and accountability among users. The system was developed following ethical guidelines, ensuring that no resources or intellectual property were exploited during its creation.

6.4 Sustainability Plan

This system is designed with scalability and adaptability in mind, ensuring it remains relevant and useful in various lab environments for the long term. It can be easily updated to incorporate new features or technologies, ensuring its sustainability as future needs evolve. The system's versatility, capable of functioning in both cloud-based and local environments, makes it cost-effective and accessible, even for resource-constrained settings, thus promoting long-term sustainable usage.

6.5 Summary

This chapter highlights the significant impact of the **ResearchTrack: A Tailored Web Solution for Project Management in Health Information Labs** on individuals, society, and the environment. It emphasizes the system's contributions to improving productivity, fostering eco-friendly practices, adhering to ethical standards, and ensuring long-term sustainability. With its adaptable design, the system is well-positioned to meet future requirements, making it a dependable and forward-thinking solution and future Work.

CHAPTER 7

CONCLUSION AND FUTURE WORK

7.1 Conclusions

The **ResearchTrack: A Tailored Web Solution for Project Management in Health Information Labs** was developed to address inefficiencies in traditional lab operations by offering a streamlined, user-friendly solution for task management and progress tracking. By clearly defining roles between **Superadmin**, **Admins**, and **Researchers**, the system ensures secure and efficient workflows tailored to each user's responsibilities. The **Superadmin** manages the highest level of access and control, overseeing Admins, who in turn manage Researchers. Automation of manual processes and real-time updates improve productivity, foster collaboration, and enhance the overall user experience. Its scalability and adaptability make it a viable solution for a wide range of lab environments, supporting both small and large operations with ease.

7.2 Further Suggested Works

Building upon the success of the current system, the following enhancements could be considered for future improvements:

- **Integration with Third-Party Tools:**
  Adding compatibility with external tools such as Slack, Trello, or Google Calendar would improve communication and task synchronization across platforms, enhancing overall efficiency.
- **Advanced Analytics:**
  Implementing data analytics features would enable the system to generate insights into project progress, team performance, and task efficiency, empowering Admins and Superadmins with data-driven decision-making.
- **Mobile Application:**
  Developing a mobile app version would allow users to manage tasks and track

progress on the go, offering greater flexibility and convenience for both Admins and Researchers.

- **Multi-Lab Support:**
  Expanding the system to support multiple labs within an organization would allow Superadmins to manage lab operations at a larger scale, providing centralized control over multiple lab environments.
- **AI-Powered Task Suggestions:**
  Introducing artificial intelligence to automate task assignments and provide intelligent recommendations for optimizing workflows could further streamline task management and improve operational efficiency.

7.3 Limitations/Conflict of Interests

While this system provides significant benefits, it does have some limitations:

- **Cost Constraints:**
  Despite being a low-budget maintenance web application, the hosting and maintenance costs may still pose challenges for institutions with limited budgets, potentially hindering its widespread adoption. Furthermore, the system may not be suitable for small-scale labs with minimal management requirements, as its features are tailored for more complex and larger-scale operations.
- **Dependency on Internet Connectivity:**
  The system's reliance on a stable internet connection may limit its usability in regions with poor or unreliable connectivity, potentially hindering access in certain environments.
- **Limited Customization:**
  Although many features are coming soon to the system, it currently offers only basic customization options. This limitation may not fully meet the needs of labs with highly specific operational requirements or advanced functionalities, potentially restricting its applicability in specialized environments.
- **Conflict of Interests:**

There are no significant conflicts of interest related to this project. It was developed with a primary focus on educational and research purposes, without external funding or competing interests influencing its development.

Reference

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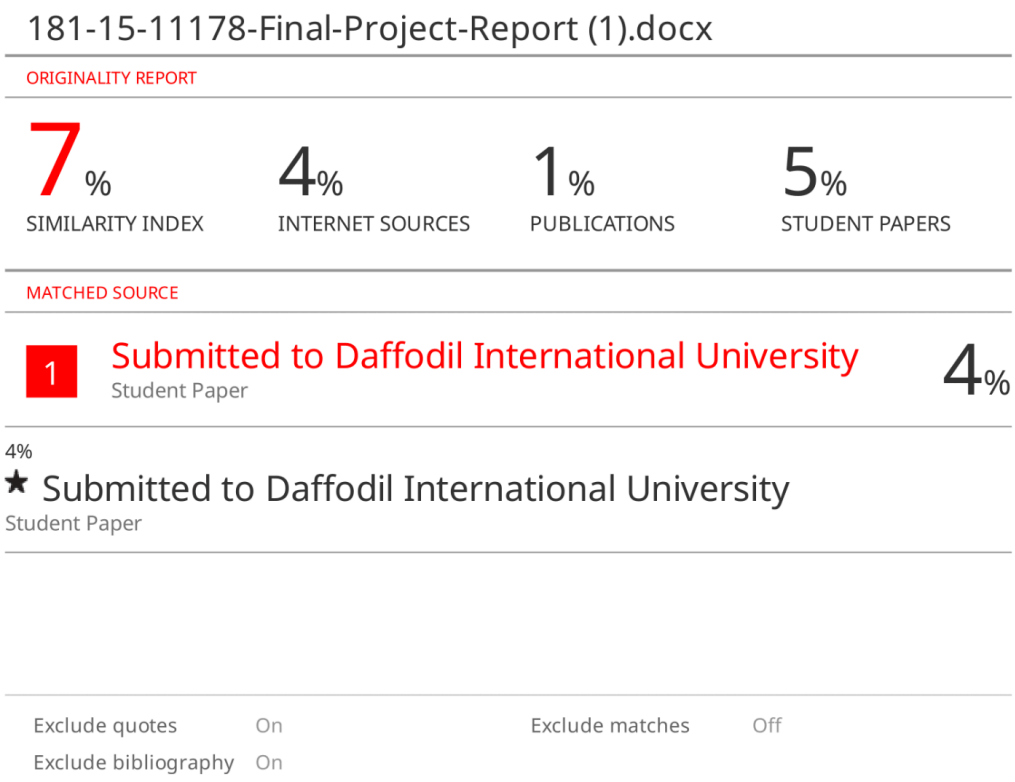
Appendix



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