PROJECT MANAGEMENT SYSTEM

A PROJECT REPORT

Submitted by

KANNAN R R (TKM21MCA-2026)

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In partial fulfillment of the requirements for the award of the degree of

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DEPARTMENT OF COMPUTER APPLICATION

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DECLARATION

I undersigned hereby declare that the project report on **PROJECT MANAGEMENT SYSTEM**, submitted for partial fulfillment of the requirements for the award of degree of Master of Computer Application of the APJ Abdul Kalam Technological University, Kerala is a bonafide work done by me under supervision of **Prof.Natheera Beevi M**. This submission represents my ideas in my own words and where ideas or words of others have been included,I have adequately and accurately cited and referenced the original sources. I also declare that I have adhered to ethics of academic honesty and integrity and have not misrepresented or fabricated any data or idea or fact or source in our submission. I understand that any violation of the above will be a cause for disciplinary action by the institute and/or the University and can also evoke penal action from the sources which have thus not been properly cited or from whom proper permission has not been obtained. This report has not previously served as the basis for the award of any degree, diploma, or similar title by any other University.

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KANNAN R R

DEPARTMENT OF COMPUTER APPLICATION

TKM COLLEGE OF ENGINEERING

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CERTIFICATE

This is to certify that the report entitled **PROJECT MANAGEMENT SYSTEM** submitted by **KANNAN R R** (TKM21MCA-2026) to the APJ Abdul Kalam Technological University in partial fulfillment of the Masters degree in Computer Application is a bonafide record of the project work carried out by him under our guidance and supervision. This report, in any form, has not been submitted to any other University or Institute for any reason.

Internal Supervisor Head of the Department External Examiner

Incture Technologies Pvt Ltd
No 27/ B, Konappana Agrahara, Begur Hobli, Electronic City
Bangalore KA 560100 IN
CIN – U72200KA2005PTC037156

Phone: +91-80-67833033
E-mail: info@incture.com
www.incture.com

17 May 2023

Dr. Fousia M Shamsudeen
Head of Department
Master of Computer Applications
TKM College of Engineering
Kollam - 691005
Kerala

Dear Madam,

Kannan R R is undergoing Academic Internship for a duration of 6 months from 9th January 2023 onwards.

During his internship, he has been trained in 'Java' competency. He is currently working on external client-related projects.

He is interning under the leadership of Anuradha Vidyarthi and is being mentored by Sai Prabhath.

Thank you,
For Incture Technologies (P) Ltd.

Hanumantrao Kulkarni
Senior Manager – Learning & Development
hanumant@incture.com

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KANNAN R R

ABSTRACT

PROJECT MANAGEMENT SYSTEM, is a web application for companies to manage their project. It provides an intuitive UI experience to easily track and monitor the progress for the projects. It enables the user to create Tasks for the created project and assign them to the corresponding team members. Usually Managers create the tasks and the team members for the project works on it .

Both the managers and the team members are able to track the progress of the tasks and the project which they are assigned .Both the users get a different set of metrics shown in visual format to quickly access their progress of work .

In this application the tasks move through different stages ranging from New, Reserved, Pending, Assigned, Completed and Cancelled.By having these statuses for tasks,its easier to have an overall view of the stage at which the project has progressed.

Altogether this website provides a simple and interactive solution to manage Projects, Tasks and the team who are working in the project .Since this application provides an analytical visual for the progress made by the team members, this enables a self-evaluation also .

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Chapter 1

Introduction

PROJECT MANAGEMENT SYSTEM is a system that enables users to manage and collaborate on Projects and Tasks .Mainly the system has three users which are Managers, Team members and Admin.Each of those users has different functionalities to work with . Managers and Team members are provided with the capability of viewing tasks and managing them . The Admin manages the users , access levels of the users and view logs of the schedulers.

Specifically, the Manager has the most access to the system . The workflow of the application starts from the creation of projects by the manager . Manager creates a project with Title, description and the corresponding team members . After the creation of the project, the manager can create tasks for the team members to work on . As a Team member,they can move the tasks through different statuses . When the task is created it will be in new state,when the user request to reserve a task the task moves to the reserved state.

When the Manager approves the reserve request that particular task gets assigned to the requester. After the task gets assigned the state of the task becomes Assigned. After that, the Team member can determine whether to complete or cancel the task . Task has one more state which is pending,which indicated that a particular task is pending for that particular team member.

This application also provides a Dashboard to both Managers and Team Members which let them to analyze their progress in their work .For a Manager its shows how much the project is completed,how many tasks are pending in each projects,and other various metrics .

1.1 Company Profile

Digital process automation, SAP consulting, digital integration, and application development are all part of Incture Technologies' service offering. The business provides a variety of cutting-edge products and platforms, such as the Cherrywork digital transformation platform, which enables businesses to quickly and effectively design and deploy enterprise-grade applications and workflows.

1.1.1 Products

- **Cherrywork Studio**

  A low-code development platform that makes it simple for developers to create enterprise-grade applications and workflows, Cherrywork Studio is one such tool. It offers a collection of reusable components, pre-built templates, and an intuitive drag-and-drop interface that helps speed up development. Without writing a lot of code, developers may easily design and customise applications. Additionally, it offers a set of automated tests that guarantee the application's quality before deployment.

- **Cherrywork Engage**

  Cherrywork Engage is a platform for consumer engagement that aids businesses in developing deep connections with their clientele. It offers resources for automating customer journeys, monitoring customer contacts, and generating customer feedback. It enables businesses to interact with customers via a variety of channels, including social media, chat, and email. By gathering information from customers, it aids businesses in better understanding their clients.

- **Cherrywork Insights**

  Cherrywork Insights is a data analytics platform that aids businesses in understanding their operations and business processes. It offers real-time dashboards, reporting, and analytics to assist businesses in making wise choices. It lets businesses to use data-driven insights to monitor and improve their operational procedures. Additionally, it offers predictive analytics that assist businesses in forecasting trends and planning ahead.

- **Cherrywork Connect** Cherrywork Connect is an integration platform that assists businesses in integrating their internal business apps and systems. For well-known

business platforms like SAP, Salesforce, and Microsoft Dynamics, it offers pre-built interfaces. It facilitates smooth data transfer between dissimilar systems, eliminates data silos, and boosts system effectiveness all around. Additionally, it offers a unified view of data from various systems.

1.1.2 Services

- **Enterprise Resource Planning (ERP) Services**

  Incture provides ERP consulting, implementation and support services to help organizations improve their business processes, increase operational efficiencies and streamline their supply chain.

- **Intelligent Automation Services**

  Incture provides intelligent automation services including Robotic Process Automation (RPA) and Artificial Intelligence (AI) to automate repetitive tasks, reduce errors and increase productivity. Digital Process

- **Automation Services**

  Incture helps companies automate their business processes end-to-end, from customer onboarding to order fulfillment, by leveraging technologies such as BPM, low code, and workflows.

- **Cloud Services**

  Incture provides cloud consulting, migration and managed services to help companies adopt and leverage cloud technologies such as AWS, Azure and Google Cloud Platform.

- **Mobile Application Development Services**

  Incture provides custom mobile device application development services to help organizations build mobile apps that engage customers, increase revenue, and improve employee productivity.

1.2 Existing System

In existing system task are assigned and there is no method to track the progress of the project .The existing system does not also provide any analytics to the user .The existing system creates some tasks and it is very difficult to track the status of the tasks .Mostly the status is updated via calls or emails .It is not a centralized system .No user have a way to view the progress of the task .There is no Dashboard provided ,the existing system makes the user to manually look up the data to see how much work is done and how much is yet to be completed .

Current system also does not allow the user to reserve any task so that the user can work on it without any other peoples intervention .Also in the current system ,the level of collaboration is very low . Since the system does not have any means to track the progress through Dashboards ,we need to pull data and put it in excel to visualize .

1.3 Proposed System

The proposed system is a very structured and organized way to manage the team and the task created for the project .Each user has their own task board and will only be able to view the tasks that are associated to them .The Proposed system provided a wide variety of features like

- Task goes through different stages depicting the progress .
- Specific tasks can be assigned to specific users.
- A proper team can be created by the manager with proper skillset .
- There is option to reserve a task ,so that a particular user can only work on it .
- There are Schedulers running in background which looks for tasks that are going beyond a timeline and changing them to be in proper place .
- User and Manager specific Dashboards are provided .

The are main but few features provided by the proposed system .The proposed system ensures better collaboration and better probability of meeting the deadline of projects .

1.4 Objective

The goal is to accomplish the following:

- Project Managers should be able to create tasks for the project they are involved.
- Team members should be able to pick tasks as per their availability.
- The project Manager should be able to track and view the status of all the tasks which is being worked on by the respective team members
- Team members should not be able to directly pick any task as per their wish ,the should request for the task that they need to work on.
- The system should provide a Dashboard that gives quick information that let the user to know the progress of the project through multiple metrics.
- There should be schedulers that work in background to dynamically pick the tasks and update its status .

Chapter 2

Literature Survey

A detailed investigation and interpretation of all the available literature on a subject is known as a literature review. Research questions are developed with the help of a literature review, and then solutions are sought by looking for and examining relevant material. It is a benefit of literature reviews that the outcomes of the study are constantly re-analyzed to produce fresh perspectives.A literature review is a concise synopsis and an explanation of all the academic books and journal articles that have been written about a particular topic since the beginning of time. In college, there are two different kinds of literature reviews you might be required to write: one is an independent project for a class, and the other is a written report.The second is a preface or introduction to a longer item, like a thesis or research report. The kind of review you are writing will affect its focus, point of view, and ability to articulate a concise hypothesis or main contention. The distinctions between these two categories can be learned by reading published literature reviews or the introductory chapters of pertinent theses and dissertations. Take into account how they tackle the topics and the organization of their arguments.

2.1 Purpose of the Literature Review

1. It makes research on a particular subject understandable for readers by choosing and summarising excellent articles or studies that are pertinent, meaningful, significant, and valid.

2. By asking them to summarise, assess, and contrast original research in that discipline, it provides nascent researchers in a new field with a great place to start.

3. It makes sure that researchers don't recycle already finished work.

4. It could offer suggestions for areas of focus or clues about the direction of future research.

5. The main conclusions are emphasised.

6. It notes any gaps, discrepancies, or contradictions in the literature.

7. It presents a helpful evaluation of the methods and strategies used by other studies.

2.2 Related Works

2.2.1 Hibernate

”Object-relational Mapping Using JPA, Hibernate and Spring Data JPA” paper talks about using special tools to help Java programs work better with databases. It also looks at different options for these tools. The writers talk about three commonly used computer programs for managing data: JPA, Hibernate, and Spring Data JPA.

This paper gives information about what different frameworks can do, what they are good at, and what they are not good at. The writers are comparing how well different frameworks work in different situations like simple data handling, complex data searching, and keeping data stored for later use. They talk about how tough it is to use these frameworks in computer networks and suggest ways to solve the problems.

The writers say that JPA, Hibernate, and Spring Data JPA are all good choices for managing data in Java apps, but which one to use depends on the needs and limitations of each project. This paper gives a detailed overview of the latest technology used for managing data in computer programs. It is helpful for people who create software and study this topic.[8]

”Design and Implementation of the Hibernate Persistence Layer Data Report System Based on J2EE”This paper talks about how to create a system for reporting data using Hibernate and J2EE. It also includes real-world examples and research. The writers talk about how good it is to use Hibernate for making a persistence layer. It can handle hard ways of connecting things together and has some helpful features like saving things and doing transactions.

This article talks about how a data report system is made. It has three parts: one for showing information (the presentation layer), one for figuring out what to do with the information (the business logic layer), and one for storing the information (the persistence layer). The third part uses a program called Hibernate. The writers explain how each part of the system is made and why it’s good to use certain computer tools like JSP, Servlets, and EJBs.

The writers believe that using Hibernate with J2EE technologies is a great way to make data report systems that are strong and adaptable. They say it’s really important to plan and build

things in a smart way so that they work well and are easy to take care of.

This paper tells developers how they can use Hibernate and J2EE to make data reports, and gives them an example to learn from. It adds to the information about using Hibernate for making big software in companies.[10]

This ”Finding and Evaluating the Performance Impact of Redundant Data Access for Applications that are Developed Using Object-Relational Mapping Frameworks” paper talks about how to make applications run faster when using object-relational mapping (ORM) frameworks, by reducing repetitive actions. This paper looks at how having extra copies of data can affect how well something works, and suggests ways to make it work better by getting rid of those extra copies.

This paper explains what the Hibernate tool does. It tests how well it works by doing some tasks that use extra data. The study found that using the same data over and over again can slow down how well an application works. However, there are ways to make it better by changing some settings and using different techniques to find the data faster.

In short, the paper has useful information for people who use ORM frameworks in their projects on how to solve problems and improve performance. [2]

This research paper ”Generation of POJOs and DAOs Classes from Metadata Database” shows a new idea for creating Java classes from a database. These classes are called POJOs and DAOs. The goal is to make it easier to work with the data in the database. The paper suggests a tool called Meta2Class that can make classes without manual effort. It works by studying information about how a database is set up.

This paper talks about the good things that happen when you use this approach. Some of those good things include finishing the work faster, making sure the code is the same everywhere, and making the work to take care of it easier. The writers show how to use a tool in a real-life situation by creating POJOs and DAOs for a database example and comparing it to code written by hand.

The paper offers a way to easily create basic code in Java programs that work with databases. The way described in this paper can help people who make big databases and need to create code quickly and well.[1]

”Exploration of a realization pattern of system based on Hibernate” ,this paper talks about Hibernate, which helps Java programs work with databases. It reviews information from other sources about how Hibernate works. The writers talk about using Hibernate to create big

business systems. They suggest a way to use Hibernate well and avoid problems.

This paper talks about all the good things Hibernate can do, like saving data without you even realizing it, helping make things run faster, and working well with other Java tools. The writers talk about problems with using Hibernate in big businesses, like it being slow, difficult to use, and needing good ways to get information from it.

The writers suggest a way to organize a system using different layers called DAO, entity manager, and service. This helps keep the system's important information safe. They explain each part and show how they work together to do a good job and to be able to do more work.

This article is important for people who design big computer systems. It suggests a helpful way to use a program called Hibernate in these systems. This will help developers and architects use Hibernate effectively and avoid its problems.[9]

"Model to Enable the Reuse of Metadata-Based Frameworks in Adaptive Object Model Architectures",this paper suggests a model that makes it easier to use metadata-based frameworks in adaptive object model architectures again. The writers say that the current models for changing things are hard to use again because they are very complicated. It takes a lot of work to make them work in different situations.

To fix the problem, a new model is suggested. It has three parts: a layer that works with any framework, a layer for a specific framework, and a layer that connects the two. The metadata layer has two parts: one that is for common features that all frameworks have, and one that is for features that only some frameworks have. The mapping layer makes it easy to use the same information in different frameworks.

The writers show that their way works by trying it out in a study about a learning program that can change to fit the student. The experts found out that the new model makes it easier to use metadata-based frameworks again and also reduces the work needed to change them for different situations. The article is important for people who work with adaptive object model structures because it discusses a difficult problem in putting them into action.[6]

2.2.2 Java

The article "Java in Real-Time Applications" talks about how Java is used in systems that need to respond quickly. It discusses what other people have written about this topic. The writers talk about the good and bad things about using Java in these systems. They also show how Java is used in real-life situations like in space, cars, and phones.

This paper talks about why Java is a good choice for real-time systems. Some of the reasons mentioned are that it can clean up unused code, can perform multiple tasks at the same time, and can work on different types of computers. The writers talk about the difficulties of using Java in systems that need to respond quickly, like when garbage is collected unexpectedly and memory should be used efficiently.

The writers say that you can use Java for real-time systems, but you have to think carefully about its drawbacks and plan the system very carefully. They say that it is important to use real-time Java extensions like the Real-Time Specification for Java (RTSJ), and make sure to test and confirm that the system is working correctly.

This paper is helpful for people who study and work with real-time systems and want to know how to use Java in their work. This also adds to the information we have about using Java for things that need to be done quickly and safely.[11]

The paper ”High Performance JAVA Programming” provides a comprehensive overview of techniques and best practices for achieving optimal performance in Java programming. The authors begin by discussing the importance of profiling and benchmarking in identifying performance bottlenecks, and then delve into a range of optimization strategies such as caching, multithreading, and parallel programming. The paper also covers topics like garbage collection, I/O optimization, and JIT compilation, as well as techniques for optimizing specific types of applications like web services and financial applications. Overall, the paper offers a valuable resource for Java developers seeking to improve the performance of their applications, and highlights the importance of considering performance optimization from the earliest stages of development.[15]

The research paper titled ”Java in Real-time Applications” delves into the utilization of the Java programming language in real-time systems. This document presents a comprehensive survey of real-time systems, including an in-depth analysis of the distinct difficulties that arise in the development of such systems, specifically in guaranteeing consistent and timely responses to various events.

The present study provides an analysis of the characteristics of Java that render it highly appropriate for real-time applications. Specifically, the investigation addresses the salient aspects of Java, including its garbage collection mechanism, thread management, and exception handling. This scholarly article further expounds on the different real-time Java specifications that have been formulated, namely the Real-Time Specification for Java (RTSJ) and the Safety-

Critical Java specification.

The work entitled ”Java in Real-time Applications” serves as a valuable reference for both developers and researchers with an inclination towards constructing real-time systems employing Java. This scholarly manuscript furnishes a comprehensive summary of the obstacles encountered in the construction of real-time systems and the manner in which Java can be leveraged to mitigate such difficulties. The discourse regarding the specifications of Java for real-time applications offers discernment into the various methodologies that may be employed whilst engineering real-time systems utilizing Java.[11]

This paper ”Multithreading in Java: Performance and Scalability on Multicore Systems” is about how well Java programs that work on many tasks at the same time work on computers with many processors. The authors study how fast and efficient these programs are on these types of computers. This paper talks about how using multiple threads can be really helpful in making software nowadays. But, it can be hard to make sure the software is working super well and is easy to use.

The writers did many tests to see how well Java programs that use multiple threads work and if they can handle bigger tasks. They discovered that using more than one thread at a time can make computers with many processing units work faster, but it’s important to create and put it together correctly to get these advantages.

This article talks about good ways to make computer programs with many threads work well. Some examples include not using locks, using groups of threads, and sharing work evenly.

This book is helpful for people who make computer programs using multiple parts at the same time in Java. The article talks about how to make computers with many processors work their best. It discusses problems and ways to fix them.[5]

2.2.3 Spring Boot

In this paper ” Monolithic vs. Microservice Architecture: A Performance and Scalability Evaluation ”, an evaluation is conducted to compare the performance and scalability of monolithic and microservice architecture in the context of a reference web application. The adoption of microservices-based architecture has become increasingly popular owing to its manifold advantages. It is noteworthy, however, that transitioning a monolithic architecture to microservices may not yield comparable benefits for small-scale enterprises with limited concurrent users and the capability of vertical scaling. microservices), each with two different

deployment options (on-premise vs. cloud). This allowed for a comprehensive evaluation and comparison of the different combinations and their respective performance and scalability characteristics. Data gathered from rigorous testing showed that the microservices architecture deployed in the cloud had the highest level of performance and scalability, making it the most suitable option for enterprise-level applications. The present study sheds light on the topic of microservices and their implementation by comparing two distinct technological approaches, namely Java and Node.js. The programming language C#.NET was utilized in this study, wherein controlled experiments were conducted across three distinct deployment environments including local, Azure Spring Cloud, and Azure App Service. The results of the study indicate that a monolithic architecture exhibits superior performance compared to a microservice-based architecture on a singular machine. Furthermore, the Java platform displays enhanced utilization of robust computing devices for computation-intensive services. Additionally, vertical scaling proves to be more economical than horizontal scaling on the Azure cloud. It is observed that escalating beyond a certain number of instances results in a decline in the application's performance. Moreover, the selection of implementation technology, namely Java or C.NET, does not significantly affect scalability performance.[7]

2.2.4 MySQL

The present study, entitled "Optimizing MySQL Database System on Information Systems Research, Publications, and Community Service," endeavors to optimize the functionality of MySQL database systems, specifically for deployment in information systems research, publications, and community service initiatives. This paper presents a comprehensive review of MySQL database systems and the inherent difficulties associated with achieving optimal performance.

In this scholarly work, the authors delve into the diverse methods that can be employed to enhance the performance of MySQL database systems. These techniques encompass configuring parameters, query optimization, and the implementation of indexing. Additionally, the present study furnishes an empirical investigation of the enhanced performance of a MySQL database system which was deployed to support an information system research undertaking.

The publication titled "Optimizing MySQL Database System on Information Systems Research, Publications and Community Service" is a valuable resource catering to the needs of researchers and developers who rely on MySQL database systems for their professional

pursuits. The present paper offers pragmatic directives pertaining to the optimization of MySQL database systems, aimed at enhancing the productivity and efficiency of scholarly endeavors, disseminations, and social outreach undertakings. This particular case study offers significant insights into the practical application of said techniques within a real-world context.[12]

This research paper ”Design and implementation of a MySQL database backup and recovery system” is about creating a strong system to save and restore data for MySQL databases. This paper talks about the difficulties of creating a system that can backup and restore MySQL databases without any problems.

The writers are talking about different ways to make a good system to keep a copy of your MySQL database safe. They talk about doing full and partial backups, being able to go back in time to get old information, and using more than one backup plan. The paper talks about how someone made a backup system for a real MySQL database.

This book called ”Design and Implementation of a MySQL Database Backup and Recovery System” is helpful for people who work with MySQL databases. This paper tells people how to make sure they don’t lose important information stored in a MySQL database. It explains how to make a backup system that is dependable and can help restore lost data. This is really important to make sure the data is always available and accurate. This study shows how to use techniques to make systems in the real world. It tells us about the problems and good things that come with making these systems.[13]

2.2.5 Rest API

This research paper ”Design Patterns and Extensibility of REST API for Networking Applications” talks about using design patterns to make REST APIs in networking applications better and more flexible. The paper talks about the difficulties of creating REST APIs for networking apps and how to solve those difficulties using design patterns.

The writers talk about different design patterns like Factory, Observer, and Decorator which can make REST APIs better for network apps. The article talks about a story of making a program using a special set of instructions. The program is used for connecting devices (like computers) to each other. The article also tells a story of how this program was made, using the instructions talked about earlier in the article.

The article ”Design Patterns and Extensibility of REST API for Networking Applications”

is helpful for people who create and plan REST APIs for networking. This paper tells you how to use design patterns to make REST APIs better. This is important to make applications run smoothly and adapt to changes easily. This study shows how to use design patterns in a real situation. It tells us about the advantages and disadvantages of using design patterns in this situation.[3]

The paper ”An Analysis of Public REST Web Service APIs” looks at how good the public REST APIs on the internet are. This article talks about how REST APIs work and the problems that come up when creating good APIs.

The writers studied some public software tools called REST APIs. They looked at what they can do, how well they work, and how easy they are to use. They rate the APIs by looking at things like how well the API information is explained, if the responses are always the same, and if there are ways to handle errors.

This article is helpful for people who design and work with REST APIs. This document explains what makes good APIs and explains the difficulties of creating them. The study of public REST APIs can help us judge how good other APIs are. We can also learn how to make good REST APIs from them.[4]

Chapter 3

Methodology

PROJECT MANAGEMENT SYSTEM is a management system where which people can work in projects with more collaboration .In this system project managers can involve the employees under them to work in a project .Using this system Project managers can create projects and add team members with specific capabilities .Project managers have also the ability to create tasks for the created project ,which can be either directly assigned to the team members or created without assigning to anyone .Depending upon how the task is created the status of the tasks changes .

The flow of the task are mostly changed by the team member .The task can have states like New,Assigned,Reserved,Pending ,cancelled and completed .A task can change its state depending upon various conditions .There are schedulers which can dynamically pick tasks and change its state based on different timelines of the tasks .Since this is a Project management system ,work should move on no matter the scenario .So tasks should be in correct states so that the person who is working on it can track without any issue .They should be able to identify the priority of the tasks based on the state it is at .

This is a simple and effective way to manage projects in a company .Managers will be easily able to track the progress and move accordingly .This system brings some new features like reservation of tasks and inbuilt dashboard .

The system is built with NextJS which is a framework of react .NextJS enables server side rendering ,so the loading of pages will be very fast .And as the backend we use Spring boot ,which is a framework of Java .Spring boot enables us to create APIs in java .Spring boot also has a well structured project model .This enables developers to work on project easier .As the database MySQL is used and to communicate between the spring boot and MySQL is Hibernate .Hibernate is also a framework which simplifies the communication between java application and database .

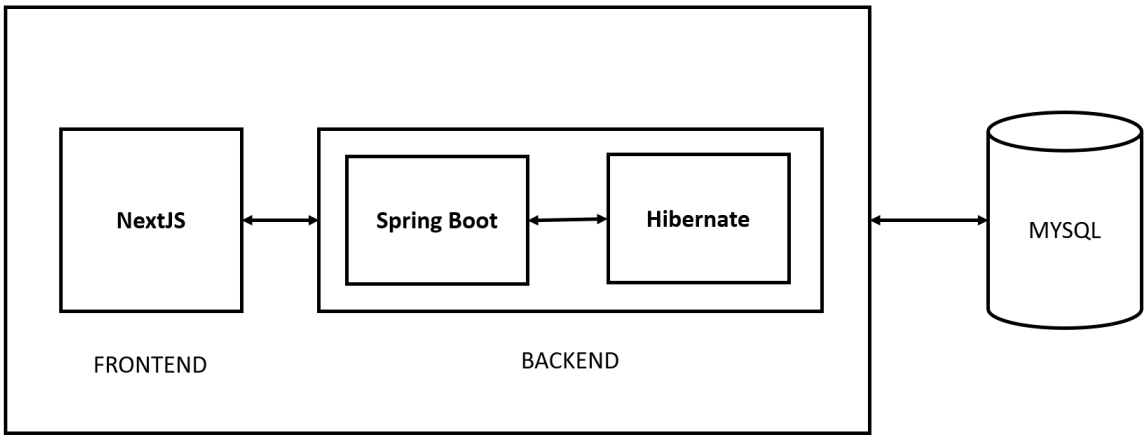

Figure 3.1: OVERALL SYSTEM

3.1 Module Description

3.1.1 Manager Module

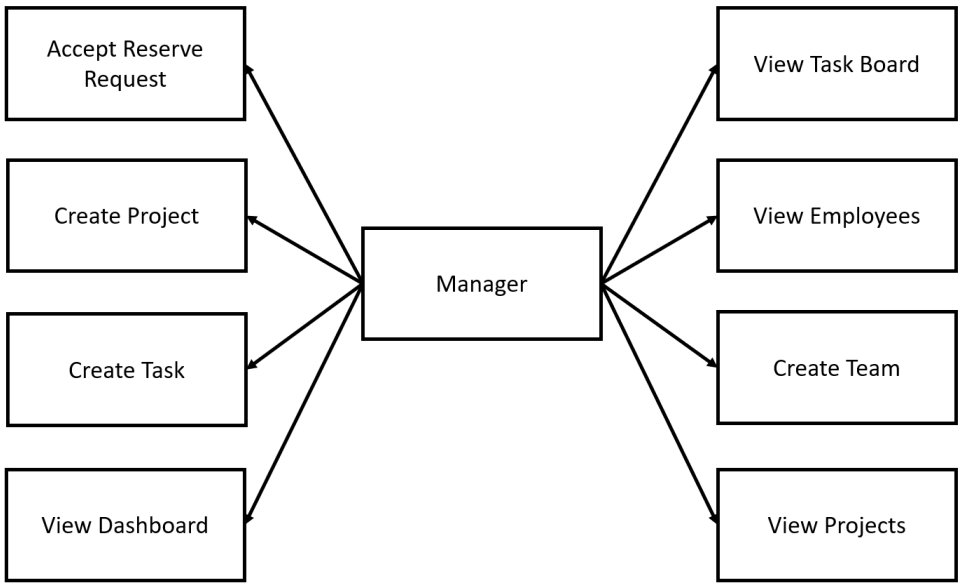

Figure 3.2: Functionalities of Manager

As a user who has logged in as Manager should be able to create projects and view the already created projects .When the project is created the manager should be able to see the employees under them .Each employee will be displayed with their post and the skill they have ,so that the manager will have an exact idea of the capability of the people who is in their team .After the project is created ,it will be displayed in tiles under project page .Each project will be

displayed with Title ,Description and created date .Each project also has two icons ,one icons will display all the tasks which are created under it and the next icons displays all the team members associated to that project .

After creating the project ,the manager also has the ability to create tasks under that project .When creating a task ,it can either be created by assigning to someone or created as new task so that any team member can assign it themselves .All the created tasks can be viewed in the page Taskboard .The Taskboard is divided into different section which as the stages of the tasks .The statuses of the tasks are NEW ,ASSIGNED ,RESERVED ,PENDING ,CANCELED AND COMPLETED . Tasks in each statuses will be placed in those particular tabs . The Manager has the freedom to complete and cancel a task ,depending upon the requirements and the situation .

There is a mechanism called reservation of task present in the system ,where which in order to work on a task the team member need to request to reserve the task for them .This particular request need to be approved by the manager .Manager will get a pending request count in the side bar if there are any request that are left to approve .

Another feature of this application is to view a dashboard that can display the analytics of the projects associated to that manager . Currently we have 3 metrics that are displayed in the dashboard .Project completion status is one metrics which works on specific project which is selected from a drop down .This metric shows how many tasks are completed and how many are remaining for the projects .Another metric is the Total Tasks in Each Status ,which shows tasks in each status for a project .This metric let the manager to know the overall status of the project .Last metric shows the pending tasks for all the project created by him .Pending tasks are pending work ,so it is very important to know how much work is pending for the projects .

3.1.2 User Module

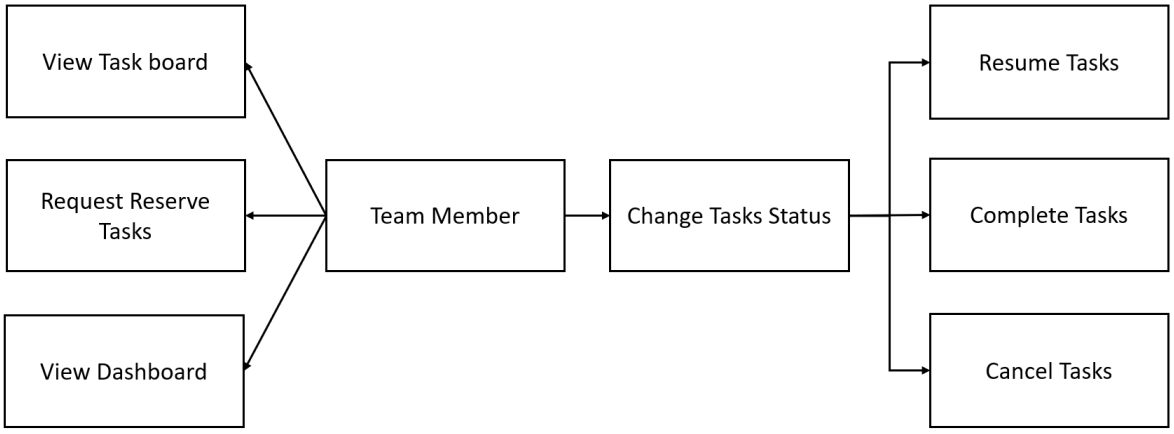

Figure 3.3: Functionalities of Team Member

When an user is logged in as a team member who is assigned to a project he has two pages to deal with .One of the main page is the Task boards where which he can take up tasks and work on it .The task board has tasks with multiple statuses .The NEW tab shows all the task which is created for the project .The user can request to reserve the task by clicking on the reserve task for each of the tasks . After clicking on the reserve task then the task changes the status to reserved and the move to reserved tab .After the request is approved by the manager it gets assigned to the user .

After the task gets assigned to the user ,he can start working on the task .After completing the work ,he can click on complete button for the corresponding task .User also has the option to cancel the task if the task becomes obsolete .

There are schedulers that runs daily which are able to pull the tasks from assigned to pending .If the tasks doesn't have any work done for specific time ,the schedulers will catch those tasks and put it in pending state.If a user needs to work on that task ,he can click on the resume task .If the task is resumes it get assigned to the user again .The whole task board will only display for the specfic users .The assigned task,pending task, reserved tasks ,completed tasks and the cancelled tasks will only be displayed for the logged in person .

The team member also has a dashboard with 4 specific metrics .First metric is Total tasks in each state ,which shows the user how many tasks are in each status .This will give the user a quick review of their work .Another metric is Completion of work ,which shows how much work is pending and how much is done till now in hours .Next metric shows a trend in the

number of tasks completed per day for the current week .This metrics allows the user to have a competing factor allowing them to complete more in the next day .Dashboard also shows a list of pending tasks under his name ,this allows him to have a quick view of his most priority work .

3.1.3 Admin Module

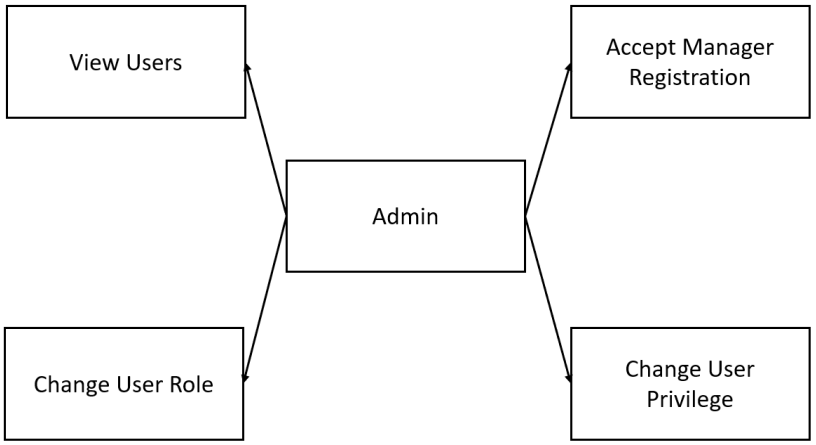

Figure 3.4: Functionalities of Admin

For an Admin the functionalities are mostly the management of the users .The admin will be able to view the all the users .There are different levels of access .Level-1 has the most access which consist of project creation ,task creation and to view the tasks ,Level-2 will not have access to create the project but will have access to create tasks for a project and Level-3 will only have the access to view the created tasks and work on them .

There are the levels of access we have in our system .There are also Roles which consist of Managers and Normal user or Team members .Admin have the right to change this upon request . As a manager they have Level-1 access so their registration is not directly approved .After registration of a manager the admin should approve the person so that he/she can login and user the system .Normal users are not able to create anything in the system ,they will only able to view the already created items ,so their registration does not need extra approval from the admin .

3.1.4 Task Life Cycle

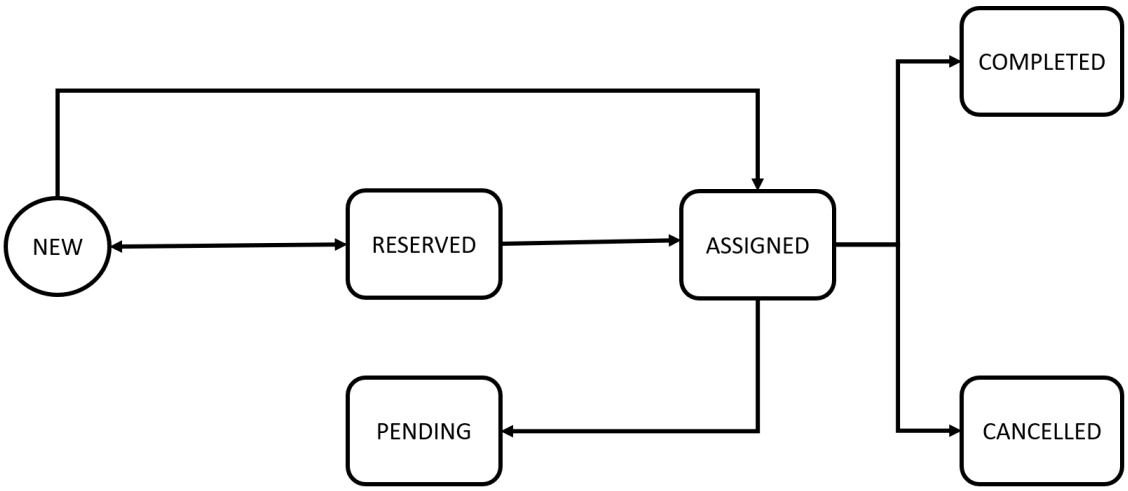

Figure 3.5: Life Cycle of Tasks

Tasks in our system will go through different stages .It starts with NEW, which is the state where the task is newly created .From there a user can reserve a task so that only he can work on it .Once the task is approved by the respective manager it will move to assigned state .A task can also move to assigned state if it is assigned at the task creation time itself .From there it can move to either cancelled or completed .If the task was a valid task it can be worked upon and moved to completed status or if the task was created by accident or that task is not valid ,it can be cancelled .

The above mentioned are the action done by the user ,but there are two task movements done by the system dynamically .When user request to reserve a task and the manager didn't approve the task for the next 5 days ,it will move the task back to new again so that the other user can pick it up .Another movement is if a task is in assigned state and no one has started working on it ,then that task will move to pending status under the assigned persons name .A pending task can be resumed if by clicking resume button for that task .

3.2 System Specifications

The application development architecture recognized for this project is specified in this section on the basis of requirements.

3.2.1 Software Specification

- Spring boot - for building microservices
- Next JS - Front end
- MySQL - Database
- Hibernate - for Database Communication
- Web Browser : Any web browser

3.2.2 Software Description

- **Spring Boot**

  Spring Boot is a Java-oriented framework meticulously created to facilitate the seamless development and deployment of Spring-based applications on a large scale without requiring elaborate configuration. Spring Boot is anchored on the widely-used Spring framework and offers several capabilities that streamline the process of developing applications. These features encompass self-configuring abilities, integrated web servers, and a diversity of beginner dependencies that can be seamlessly integrated into a project.

  The auto-configuration capabilities of Spring Boot constitute a prominent characteristic, whereby the application can be effortlessly configured by developers with minimal adjustment. Spring Boot has the capability of automatically configuring numerous constituents of an application, contingent on the dependencies encompassed in the project. This curtails the necessity for manual configuration and streamlines the process of development.

- **Next JS**

  Next.js is a well-regarded open-source framework that operates on the React platform, facilitating the development of server-rendered React applications by programmers. The present system offers a range of functionalities and resources that facilitate the construction of highly efficient, adaptable, and search engine-optimized software. The Next.js framework presents numerous advantages compared to conventional React applications, such as the automatic partitioning of code, rendering on the server-side, and effortless deployment alternatives.

Next.js possesses a noteworthy characteristic in its provision of support for server-side rendering, culminating in swifter page loading times and improvements in search engine optimization. Through the utilization of server-side rendering, the Next.js framework has the capacity to produce HTML content for a given webpage on the server before transmitting it to the client's browser, thus freeing the process of page rendering from dependence upon client-side JavaScript. This enhancement results in a reduction in time-to-first-byte (TTFB) and consequently, leads to expedited loading of the webpages.

- **MySQL**

  MySQL is a prevalent open-source Relational Database Management System (RDBMS) that enjoys widespread usage in various aspects of software development, including web applications. The MySQL platform was initially created by the Swedish firm MySQL AB in 1995, and has subsequently been procured by Oracle Corporation. MySQL stands out as one of the most widely embraced database management systems in contemporary use, owing to its considerable user base and extensive array of auxiliary tools and applications.

  A pivotal characteristic of MySQL is its scalability. The database management system, MySQL, has the capability of managing substantial quantities of information and can effectively function in applications that experience an extensive flow of traffic with minimal performance degradation. Moreover, it offers a wide range of customization options, enabling developers to tailor the code according to their individual requirements and enhance its capabilities to address specific demands.

  MySQL offers a diverse range of security measures pertaining to data, comprising of provisions for SSL encryption, access regulation, and password hashing. This attribute renders it a favored option for use cases that necessitate robust data protection.

- **Hibernate**

  Hibernate is a freely available software framework for Java-based programming which engages in Object-Relational Mapping (ORM). Its objective is to streamline the mapping procedures involved in correlating a domain model operating on object-oriented principles with a relational database system. The framework was developed with the primary objective to address the issue of intricate database access and mapping in Java-based applications. Subsequently, it has emerged as one of the most extensively adopted frameworks for Object-Relational Mapping (ORM) within the Java ecosystem.

One of the principal advantages offered by Hibernate is its ability to provide abstraction of the low-level database access, which, in turn, affords the developers the opportunity to work alongside a more elevated object-oriented API. Hibernate serves as a framework for effectively mapping Java classes to relational database tables, while simultaneously offering a versatile Application Programming Interface (API) aimed at proficiently handling and manipulating pertinent data. The aforementioned feature facilitates the creation of applications that necessitate access to databases.

3.3 System Design

The system design phase plays a vital role in connecting the problem area with the existing system by tackling the implementation process. Its aim is to address the question of ”how to execute?” This phase involves transforming the SRS documentation into an efficient implementation outline, which typically outlines the functioning of the system. pieces, making it easier to handle and complete successfully. Various interdependent undertakings collaborate towards accomplishing the overall objective of designing a system. Smartly paraphrased: Crafting a well-built design paves the way for generating streamlined code and diminishing implementation size as per the requirements of the project and application. Developing the system design encompasses two primary levels - logical design and physical design. The logical design involves creating a conceptual framework that depicts how a system's inputs, outputs, and data are processed to fulfill user requirements. This includes specifying the sources of input, destinations of output, where data is stored, and how it flows through various processes. Effective development of a corporate database relies heavily on sound logical planning. Insufficient logical planning may necessitate expensive alterations in the future when it comes to gathering, storing, and safeguarding data. Developing a well-structured initial plan facilitates the database process. Contribution to successfully carrying out a project through its development and assessment. During the phase of logical system design, the system analyst's key task is to thoroughly outline the user requirements, including the information flow, data sources required for the system while also directing the flow into and out of the system. The system analyst delves into the users' requirements and provides a detailed overview of how data is accessed and transmitted within the system as well as what data sources are needed when creating a logical design for the system. Data flow diagrams and models of entity-relationship

diagrams are utilized. Moreover, the designated input/output media, database layout, and backup protocols are set. The schedule for implementing the system has been arranged.

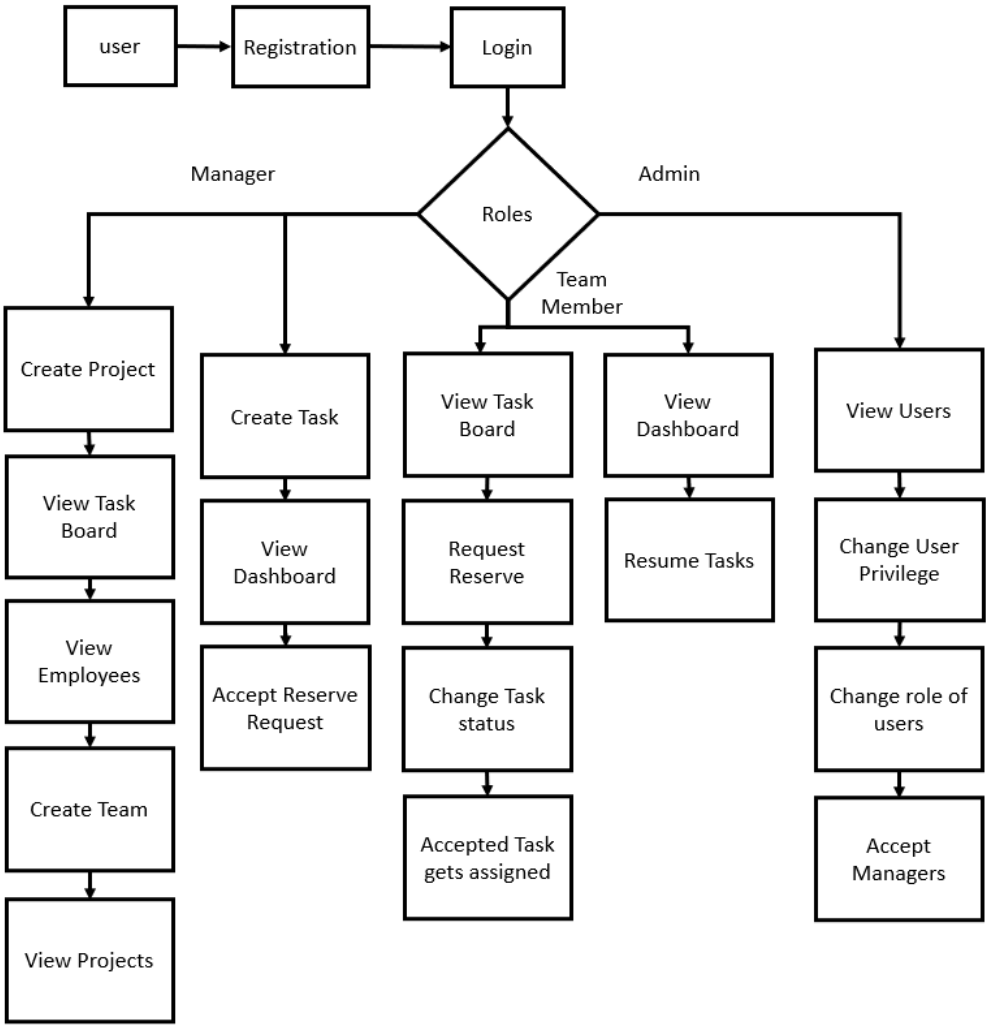

Figure 3.6: System Design

The Project Management System is a software app for multiple users with different access levels. It's for Managers, Team Members, and Admin, each with unique tasks and permissions. The Manager can create projects and assign team members. Tasks have various states such as new, reserved, assigned, pending, completed, and canceled. Team members can access and move assigned tasks through different states, such as reserving a task and having it approved by the manager to move to the assigned state. Pending tasks wait for team members to take action. The app has a Dashboard for progress updates. The Admin user can monitor activity, view logs, manage accounts, set access levels, and remove inactive users. The Project Management System aims to enhance teamwork and productivity by streamlining project and task management.

Chapter 4

RESULT AND DISCUSSION

Project Management System that provides a centralized platform for managing and collaborating on projects and tasks. The system is designed to cater to the needs of three primary users: Managers, Team Members, and Admin. Each of these users has access to different functionalities to work with, such as viewing and managing tasks, managing users and access levels, and viewing scheduler logs.

The Manager has the most access to the system and can create projects with titles, descriptions, and corresponding team members. The Manager can then create tasks for the team members to work on, and the Team Members can move the tasks through different statuses such as new, reserved, assigned, pending, complete or cancel.

Additionally, the system provides a Dashboard to both Managers and Team Members, which allows them to analyze their progress in their work. For Managers, it shows how much the project is completed, how many tasks are pending in each project, and other various metrics.

Overall, the Project Management System facilitates collaboration, enhances efficiency, and provides valuable insights to help users manage projects and tasks effectively.

4.1 Testing Methods

Testing guarantees that the framework is error-free based on criteria that are expected by the client or by the organization. A framework may have high-end or low-end execution based on the environment in which it works

4.1.1 Unit Testing

For unit testing JUnit framework is used .Test cases are written for each API so that the response are validated and assertions are made based on the output .APIs for Data insertions such as task creation ,project creation ,reserve request are tested based on if the data is properly getting inserted into the database .APIs for Data updations like status change of tasks ,manager

registration updation ,assigning tasks to team are tested by retrieving data from database after updation and comparing them both . Mockito is also used for unit testing .Using mockito dummy data is created and using that dummy data validations are done with test cases since the database calls are very expensive .

4.1.2 Functionality Testing

Functionality testing is a way of testing by verifying the actual functions of the application is working as per the requirement .Here a simple scenario which can be considered for functionality testing is creation of projects .The user should be able to login as a manager then the user should see the Projects page .When the user is navigating through the page they should see a create project button .When clicking on the button a new pop up should appear that displaying a form which creates the project .After entering the essential details and clicking on the submit button ,the project should be created and viewed on the projects page .This is a series of steps to ensure the functional aspects of the web application .This type of testing ensures mostly the functionality not the code base .

4.1.3 User Acceptance Testing

The User Acceptance Testing (UAT) phase holds considerable importance in the development of the Project Management System. The conduction of User Acceptance Testing (UAT) holds a paramount significance in the identification of potential errors or faults and ensuring that the functionalities of the system comply with the users' anticipated outcomes. UAT testing moslty ensures the developed functionality aligns with the requirements .That is the main objective of the UAT ,to ensure the desired functionalities are working . During the User Acceptance Testing (UAT) phase, end-users engage in the simulation of real-life scenarios aimed at assessing the functionalities of the system under consideration. Subsequently, the users provide constructive feedback to the development team to enable them to make improvements to the system. The aforementioned feedback is subsequently utilized to effectuate any essential enhancements to the system. The process of User Acceptance Testing (UAT) serves to mitigate the possibility of user discontentment and guarantees the system is sufficiently prepared for implementation.

4.1.4 Integration testing

While unit testing tests the bits and parts of the project ,integration testing test after combining the modules together .Each modules might work well independently but that does not ensure that its should also work if being combined with other modules .Consider the modules for changing the task status and the schedulers working in background .The user can change the status of the task through the UI which should update the DB .But also the Schedulers will change the task status based on certain criteria ,this will also update the data in the database and these two should work together withtout any issue .The integration of new APIs can also result in breaking of existing functionality ,Integration testing also covers that .

4.2 Test Cases

Table 4.2: Test Cases

Slno	**Condition to be Tested**	**Expected Result**	**Observed Outcome**	**Status**
1	Verifying Login Functionality with valid username and password	The login is successful and the user should be navigated to the homepage.	The login is successful and the user should is navigated to the homepage.	Pass
2	Verifying Login Functionality with invalid username and password	The login should be unsuccessful and the user should stay in Login page.	The login is unsuccessful and the user stays in Login page.	Pass
3	Verify project creation by providing project title ,description ,assigned to and team and click on create project	Project should be created and displayed in Project page.	Project is created and displayed in Project page.	Pass

4	Verify project creation without providing project title ,description ,assigned to and team and click on create project	Project should not be created and stays in Project creation page.	Project is not created and stays in Project creation page.	Pass
5	Verifying Task creation by providing all values .	Entering in all fields for task creation like ,title ,hours,assigned to and description and clicking on create task should create task and display in taskboard .	Entering in all fields for task creation like ,title ,hours,assigned to and description and clicking on create task creates task and display in taskboard .	Pass
6	Verifying Task creation by not providing all values .	Task should not be created if all the mandatory fileds are not filled.	Task is not created and stays in task creation page.	pass
7	Verifying Assigning task to team via reserve request .	After accepting the reserve request the task should get assigned to the user .	The Task gets assigned to the requesting user and appears in assigned tab .	pass
8	Verifying Task creation by not providing all values .	Task should not be created if all the mandatory fields are not filled.	Task is not created and stays in task creation page.	pass
9	Verifying Managers cannot login directly after registration .	Managers should only be able to login after Admin approval .	Managers is only able to login after Admin approval .	pass

4.3 Output Screens and Results

1. Login Page

   User can log in by giving username and password.

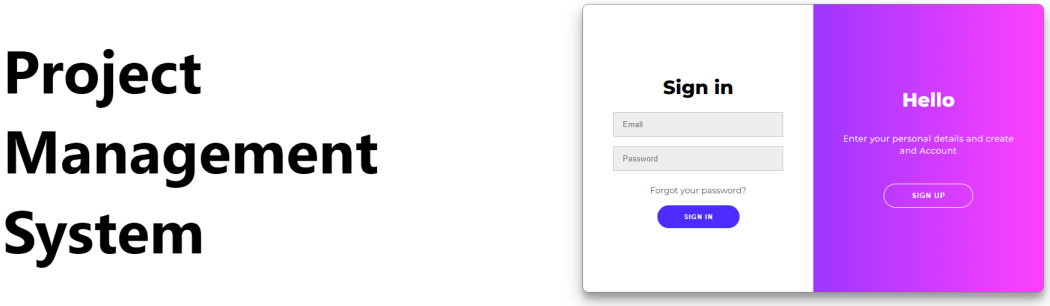

Figure 4.1: Login Page

2. Registration Page

   User can enter in details to register an account in system .

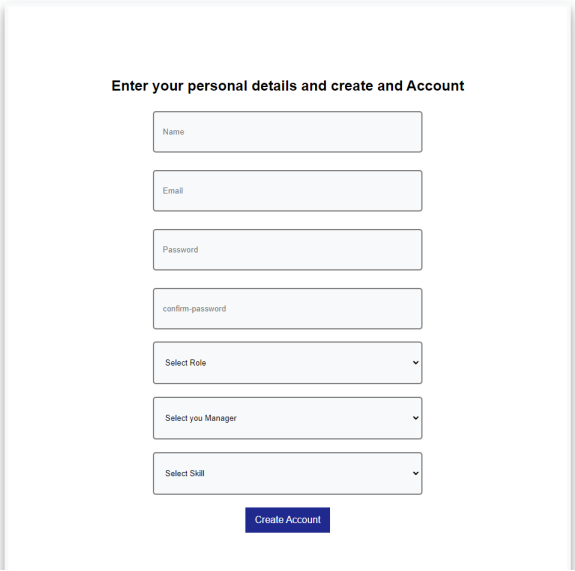

Figure 4.2: Registration Page

3. Manager Dashboard

   Manager will be able to view different metrics in dashboard form

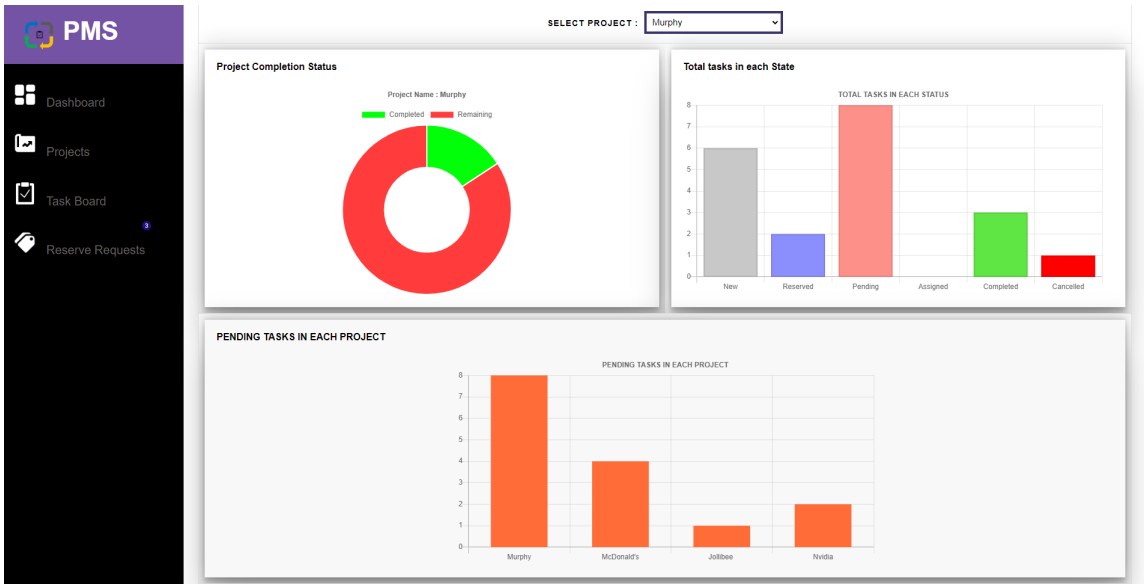

Figure 4.3: Manager Dashboard Page

4. User Dashboard Page

   User has a different set of metrics to view in Dashboard

Figure 4.4: User Dashboard Page

5. Project Page

   Displays all the Projects

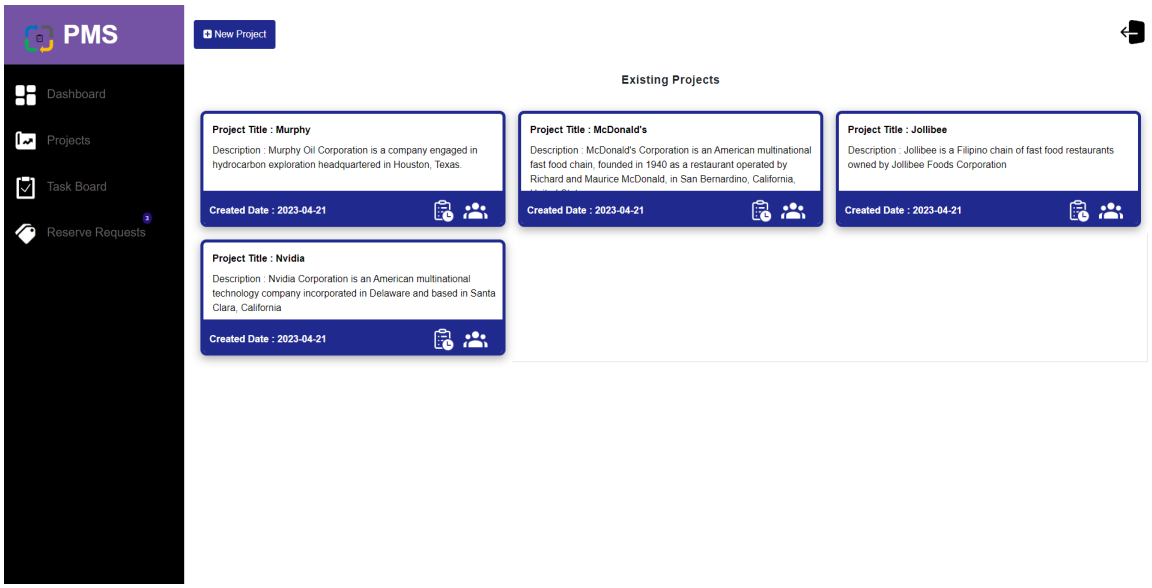

Figure 4.5: Project Page

6. Create Project Page

   User can enter in details and select team members and create project

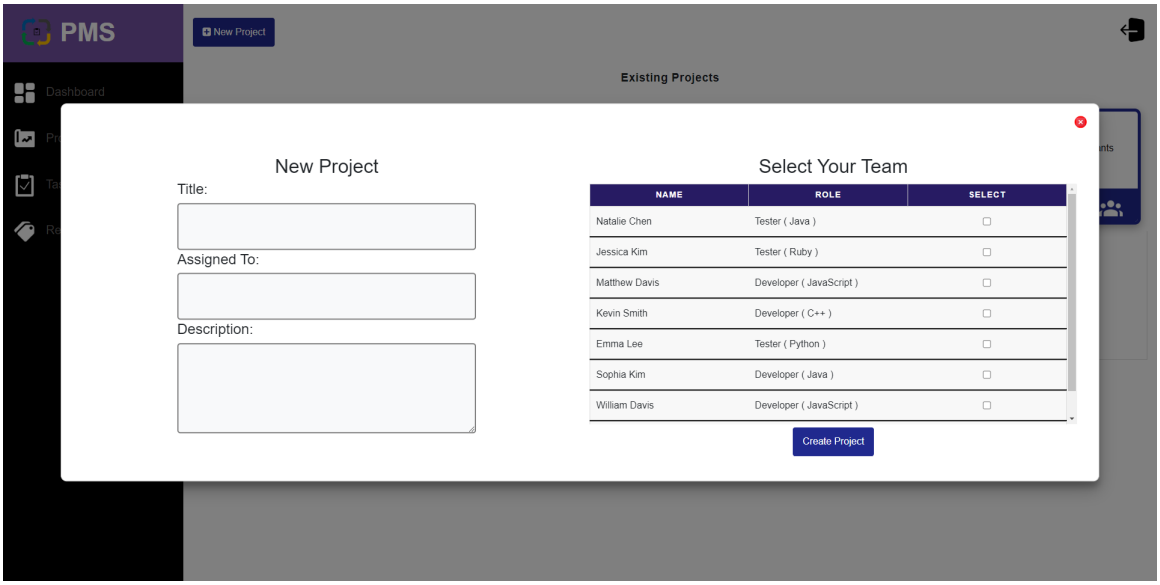

Figure 4.6: Create Project Page

7. View Tasks for Project

   User can view tasks created under the projects

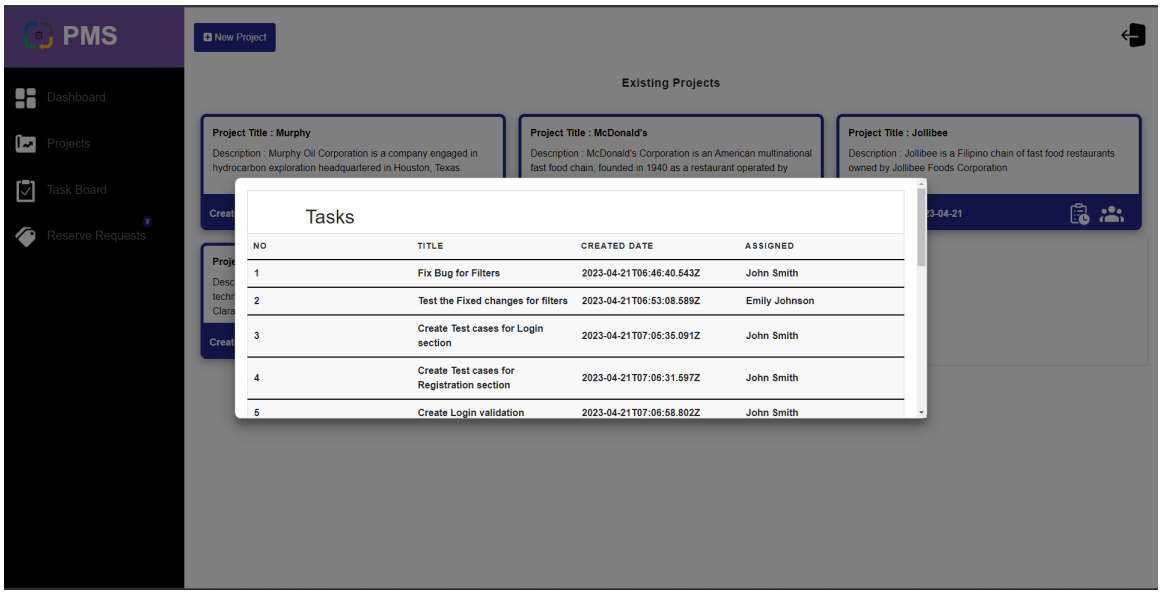

Figure 4.7: View Tasks

8. View Team

   User can view team created under the projects

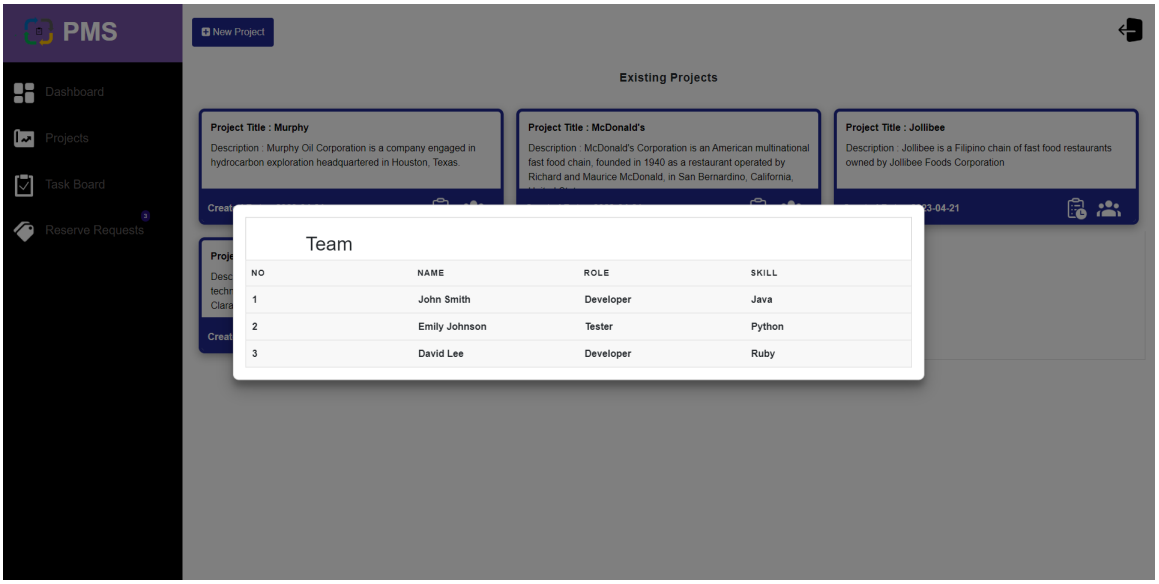

Figure 4.7: View Team

9. Taskboard

All the Task created are displayed in different tabs .

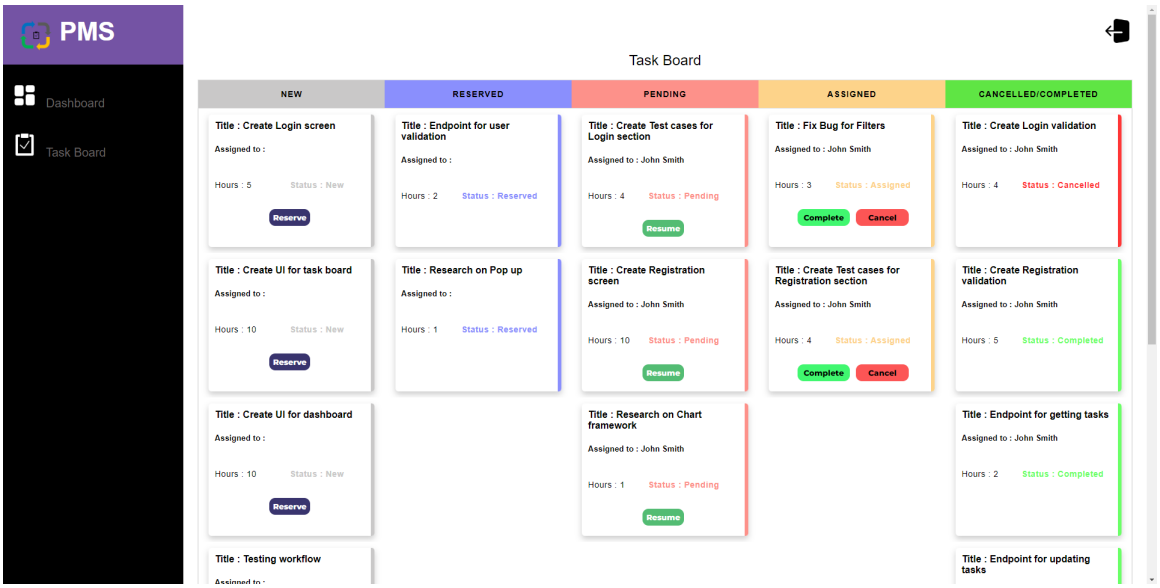

Figure 4.8: Taskboard

10. Create Tasks

Task details can be entered and created .

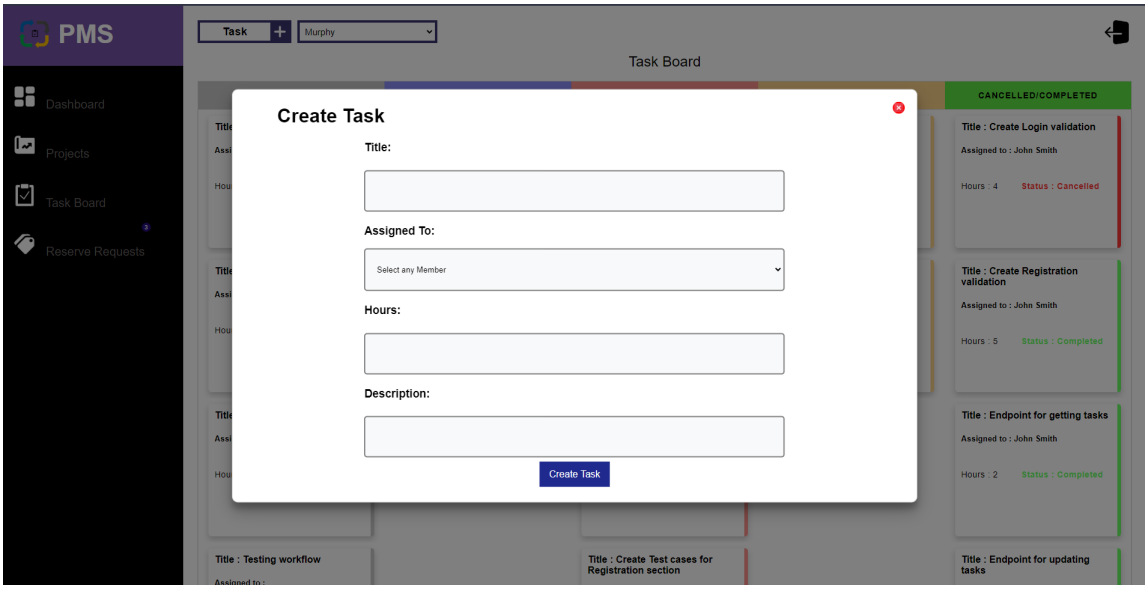

Figure 4.9: Create Task

11. Admin View Users

Admin can view the users .

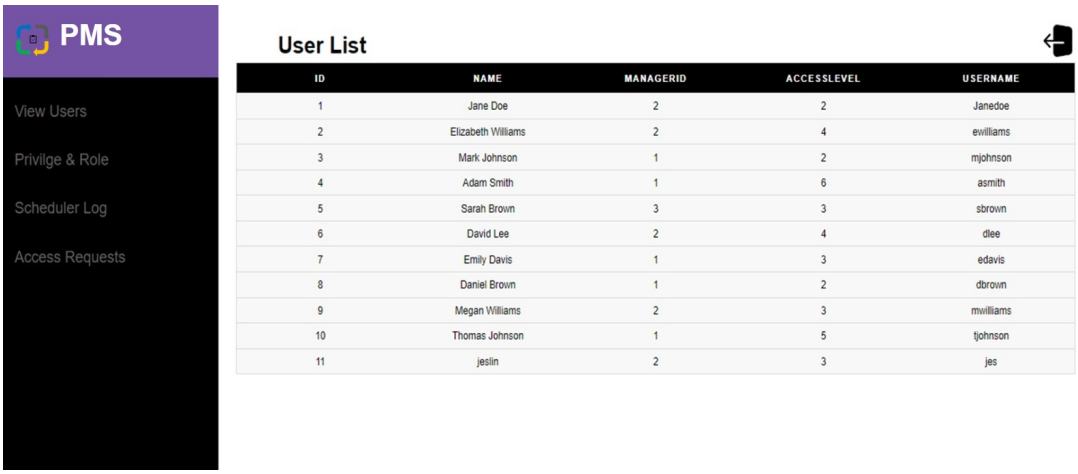

Figure 4.10: Admin View Users

12. Role and Privilege

Admin can change Role and Privilege .

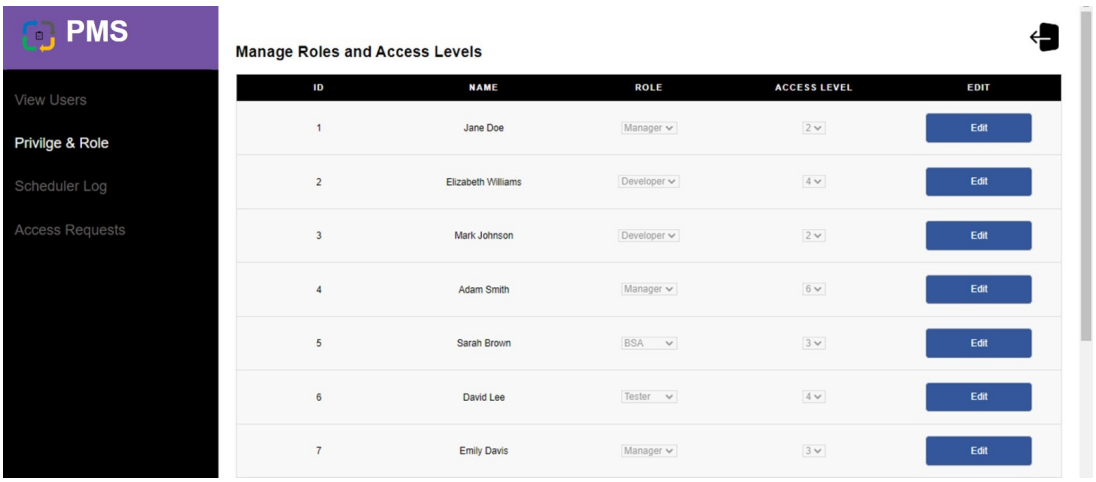

Figure 4.11: Role and Privilege

13. Accept Manager

Admin can accept the manager registration .

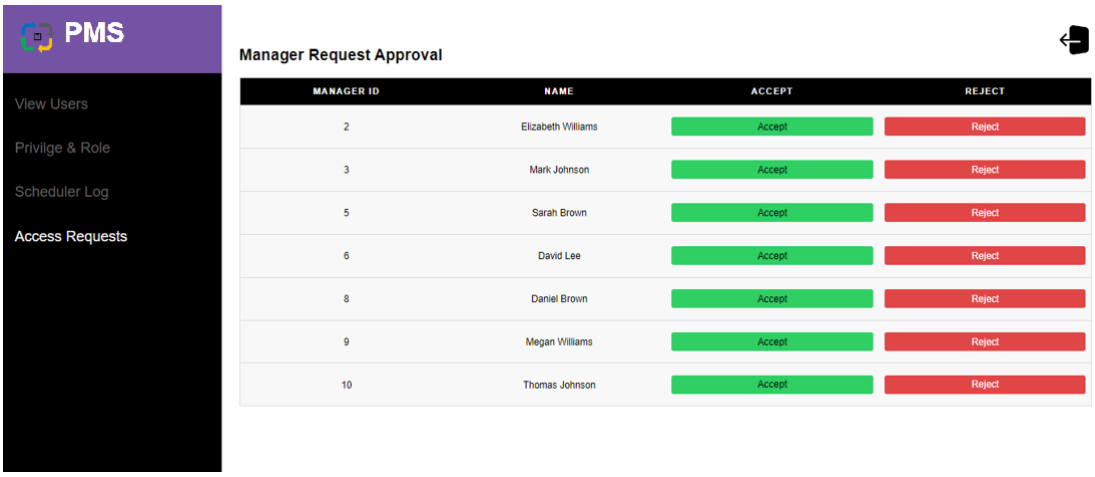

Figure 4.12: Accept Manager

14. Scheduler Log

Admin can View the Logs for the schedulers.

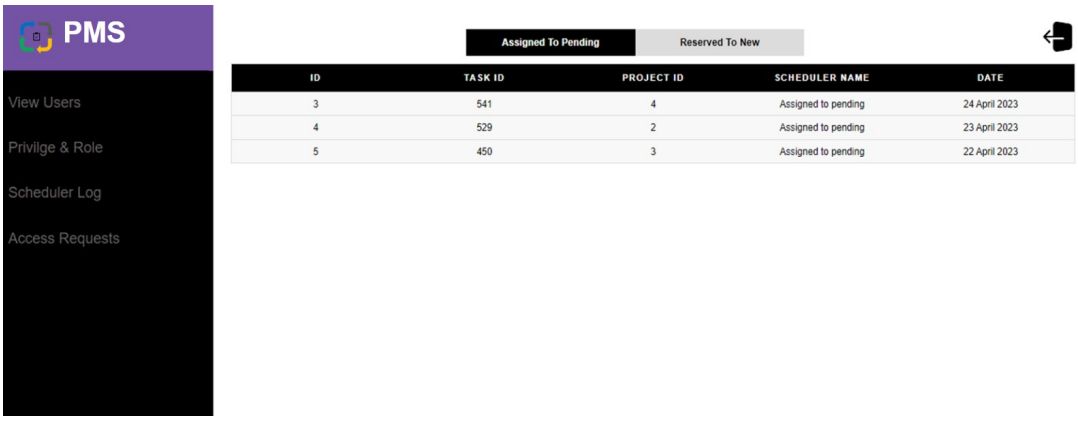

Figure 4.13: Scheduler Log

Chapter 5

CONCLUSION

The Project Management System has become an indispensable instrument for organizations in order to proficiently administer and collaborate on diverse projects and tasks. ”The system offers a user-friendly interface and a range of advanced functionalities to cater to the requirements of managers, team members, and administrators, thereby simplifying project management processes, promoting collaboration, and facilitating effective goal attainment. Furthermore, the system's capability to allocate tasks to team members, advance tasks through diverse statuses, and administer access levels to users simplifies the task delegation process for Managers and facilitates their ability to monitor task progress.Moreover, the utilization of the Project Management System fosters an environment of responsibility by facilitating Managers and Team Members to monitor their delegated assignments and associated due dates, consequently mitigating the likelihood of overlooking significant project aspects.

5.1 Future Enhancement

Since the Project is built in Spring boot new modules and services can be added very easily .The future enhancements that can be done is to add Comments to each tasks .Comments can be added as information of the task ,new updates to the task or the reason for the task being in a particular stage .Another feature that can be added is to have history of every action for a workitem . And also each action done by the user should provide an email communication to the respective person to which the task is assigned to .

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Appendix

Screenshots

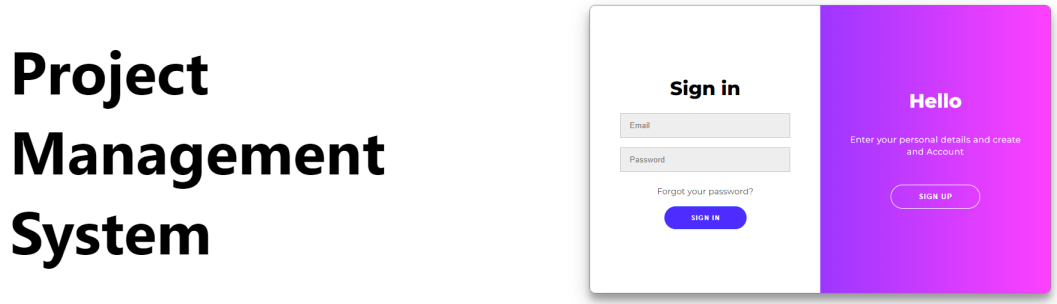


Figure A.1: Login Page

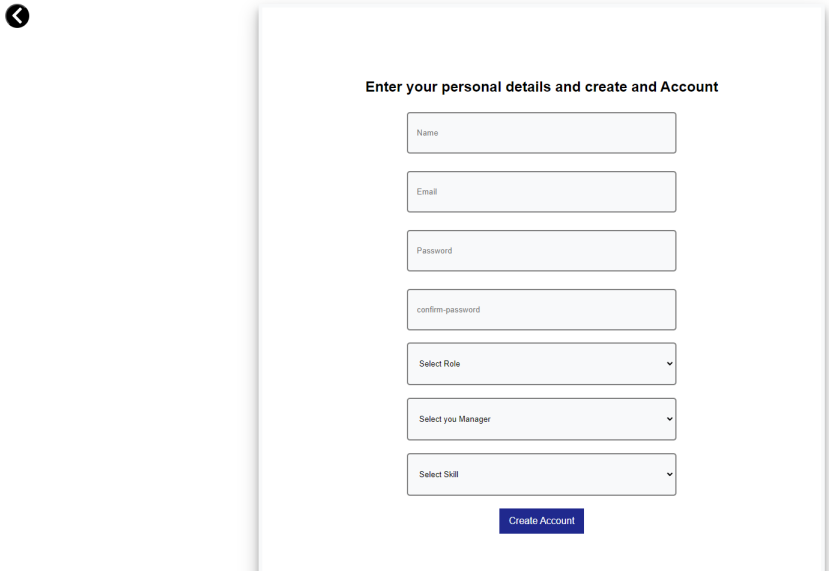


Figure A.2: Registration Page

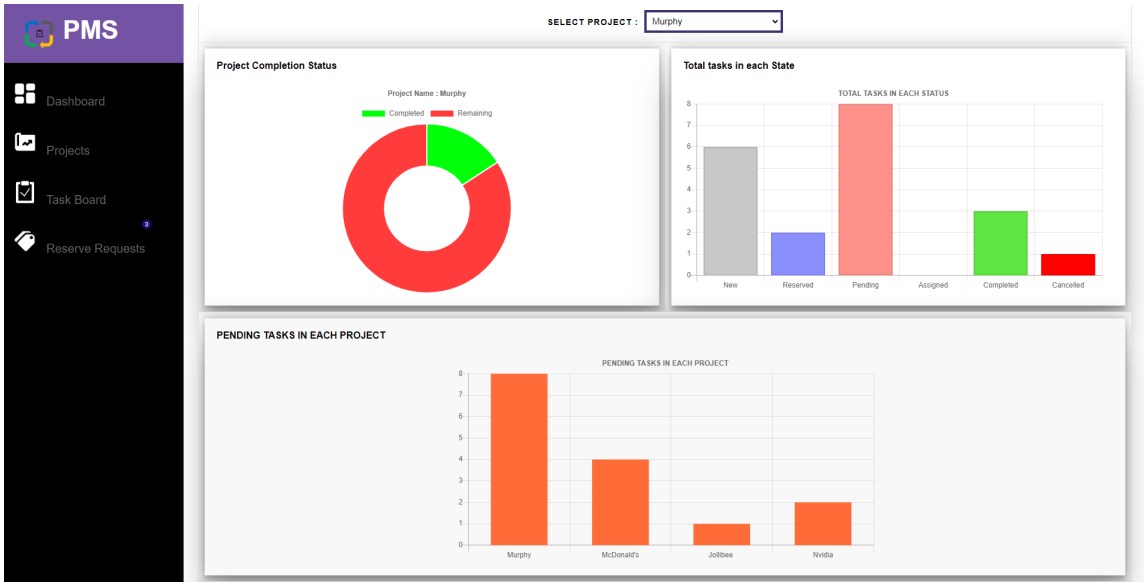


Figure A.3: Manager Dashboard Page

Figure A.4: User Dashboard Page

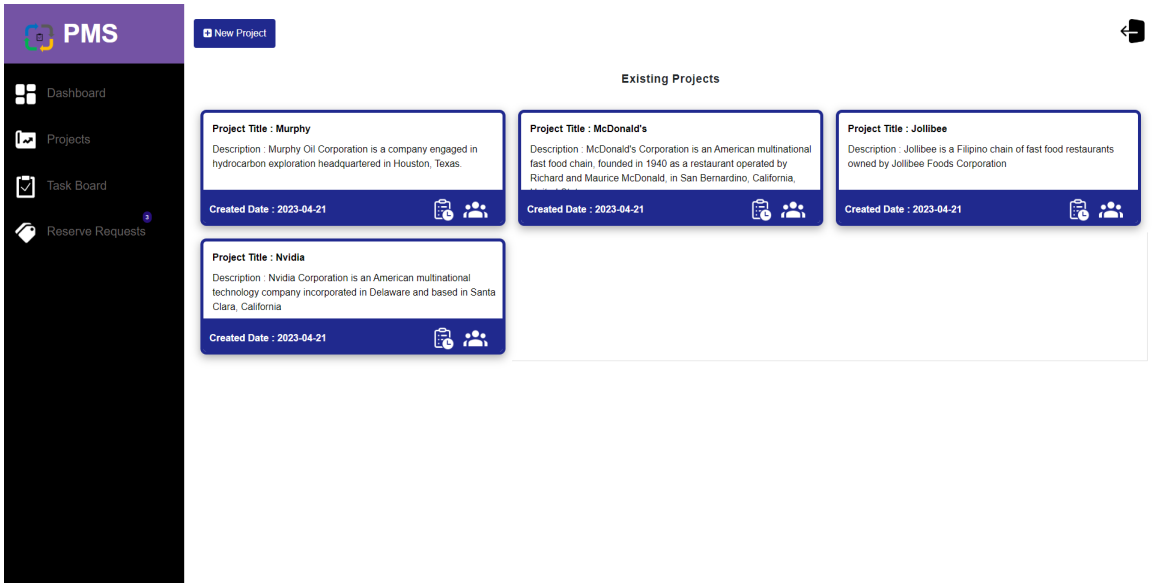


Figure A.5: Project Page

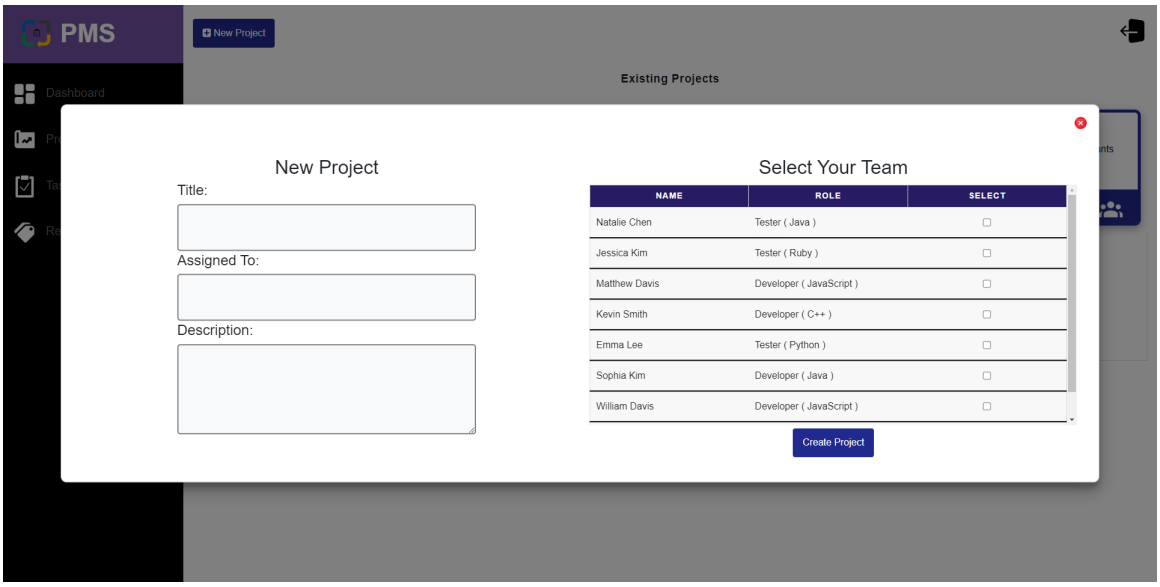


Figure A.6: Create Project Page

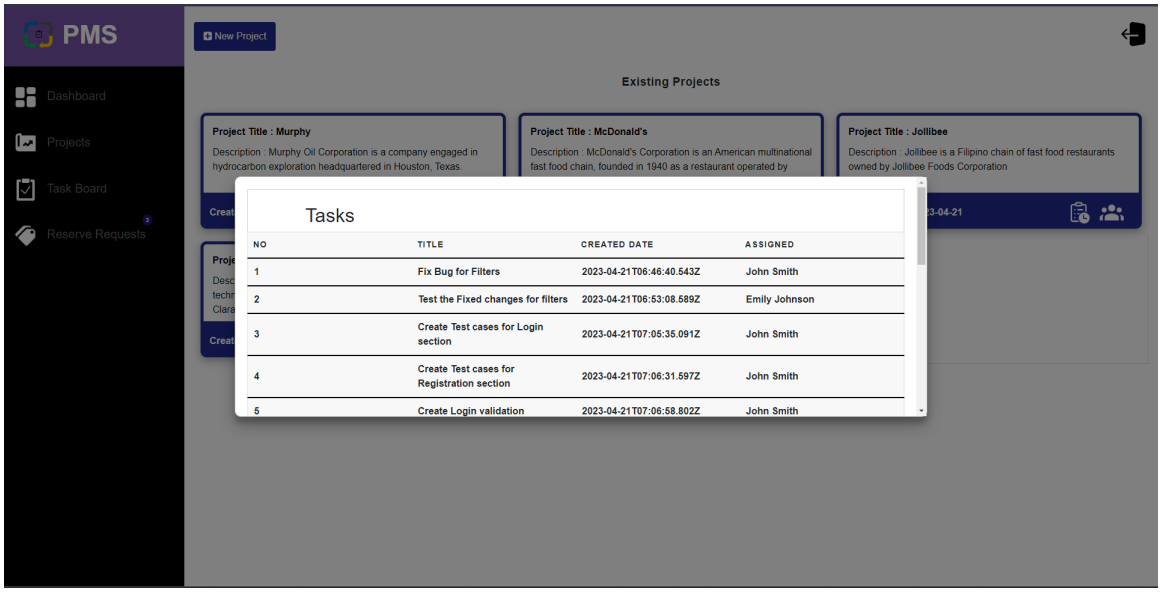


Figure A.7: View Tasks

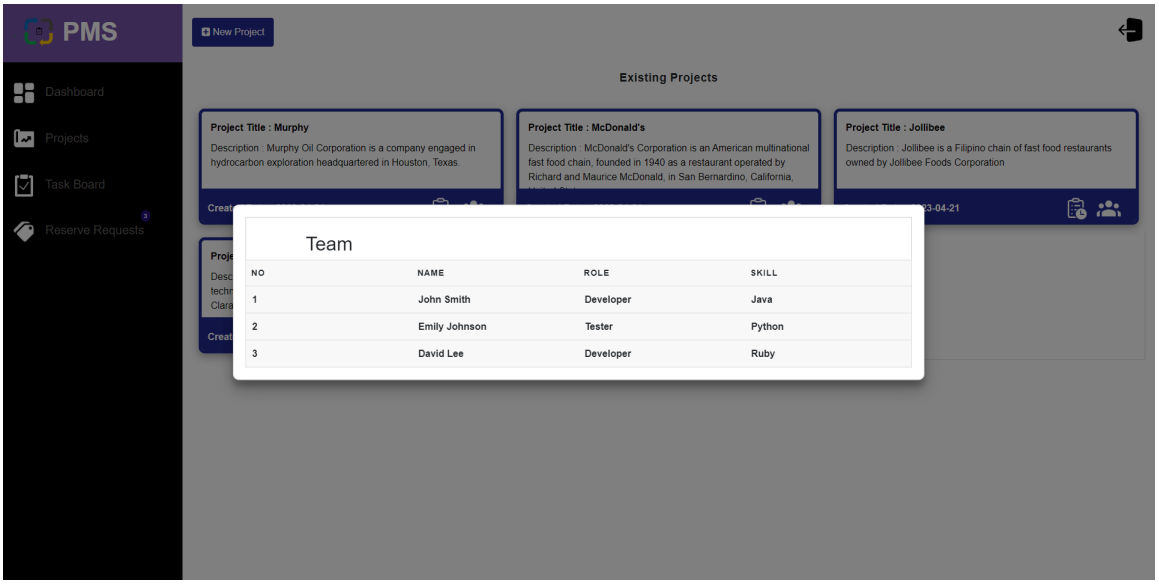


Figure A.8: View Team

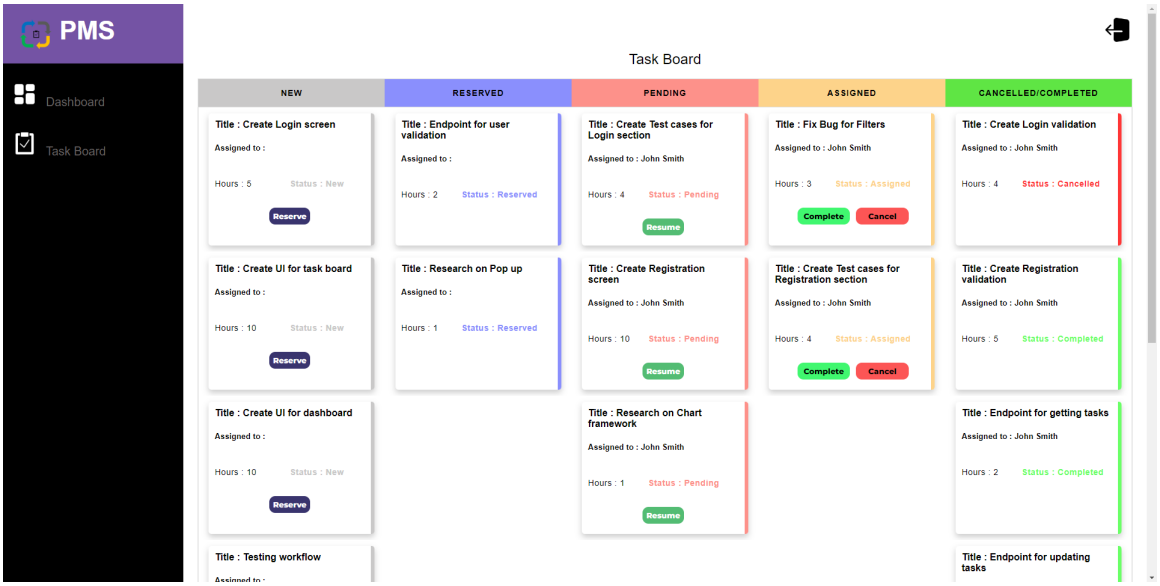


Figure A.9: Taskboard

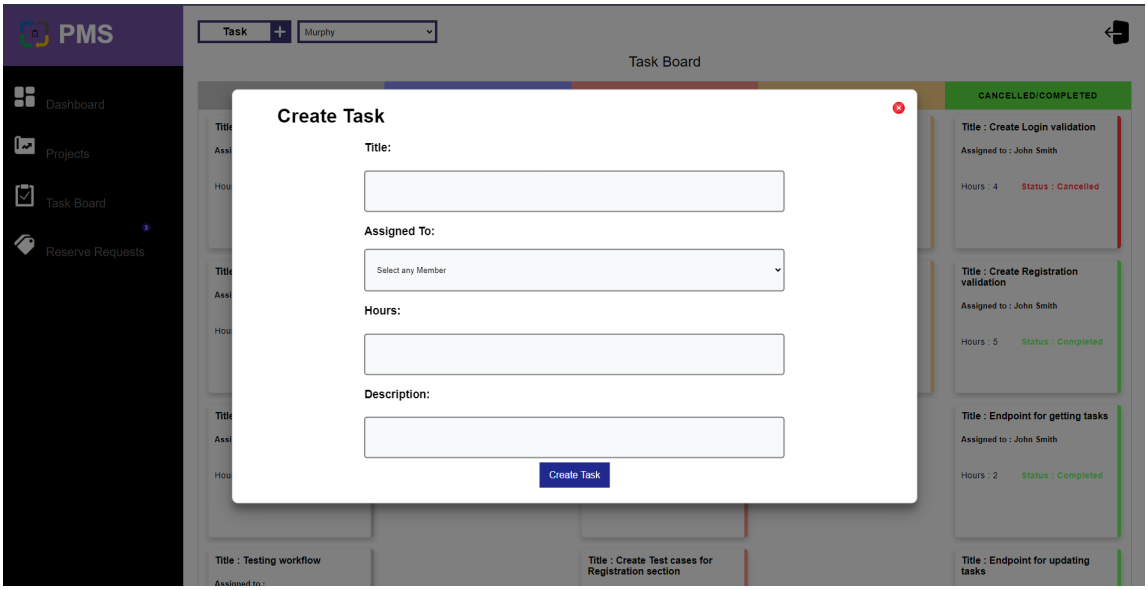
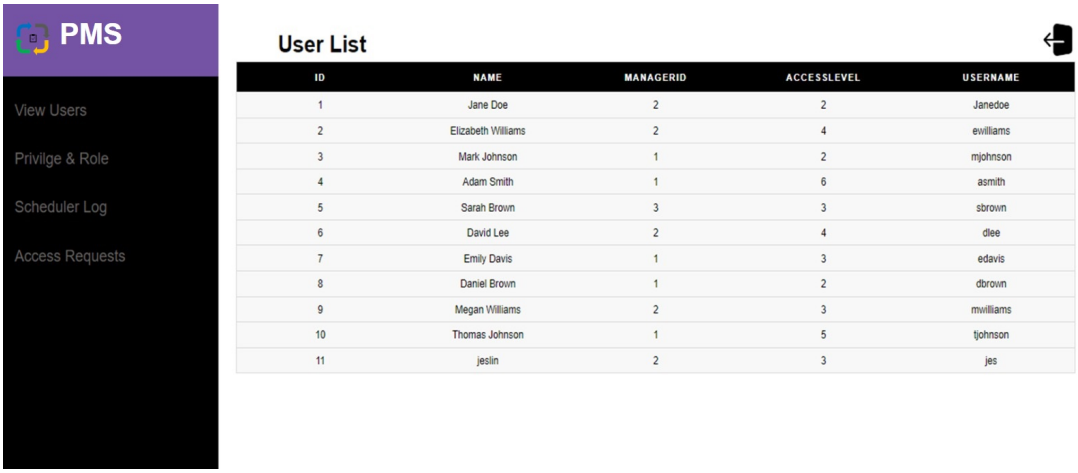
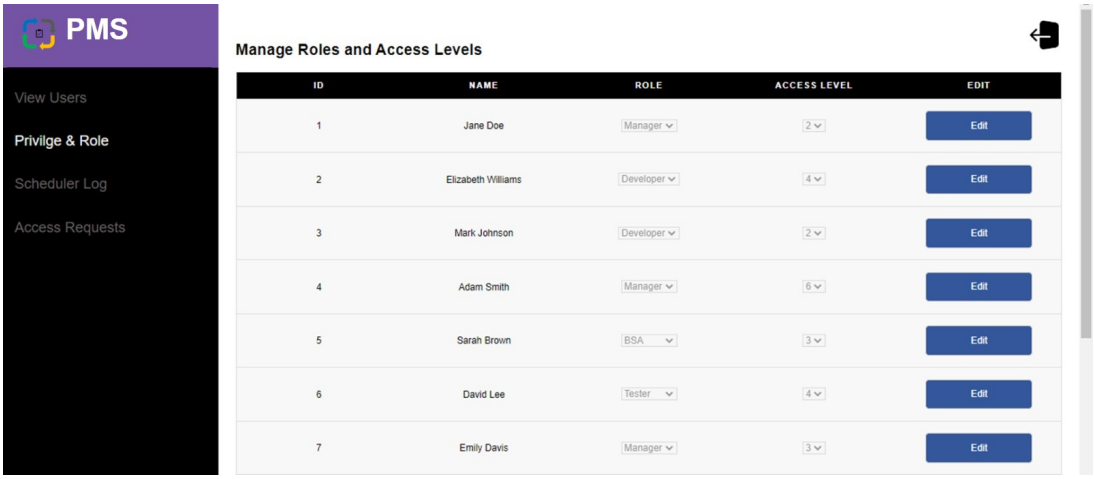


Figure A.10: Create Task



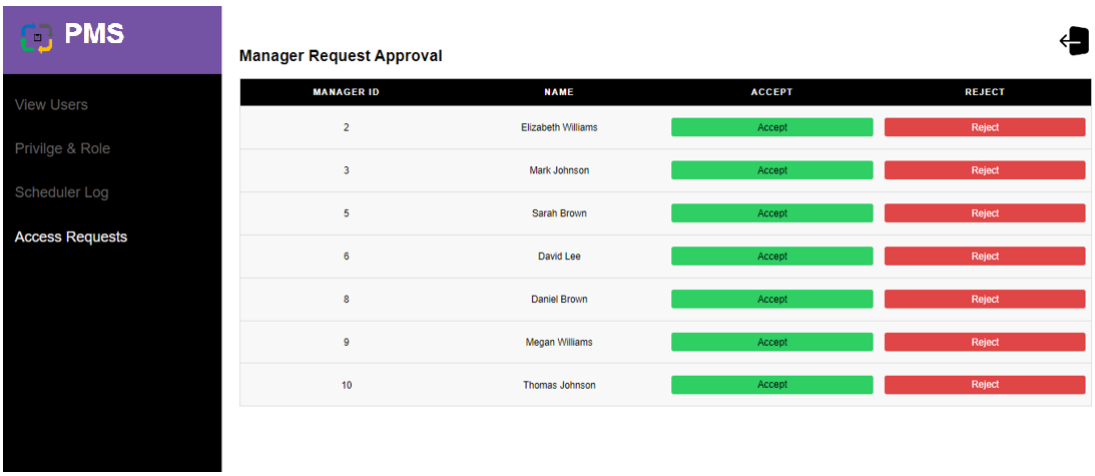
ID	NAME	MANAGERID	ACCESSLEVEL	USERNAME
1	Jane Doe	2	2	Janedoe
2	Elizabeth Williams	2	4	ewilliams
3	Mark Johnson	1	2	mjohnson
4	Adam Smith	1	6	asmith
5	Sarah Brown	3	3	sbrown
6	David Lee	2	4	dlee
7	Emily Davis	1	3	edavis
8	Daniel Brown	1	2	dbrown
9	Megan Williams	2	3	mwilliams
10	Thomas Johnson	1	5	tjohnson
11	jeslin	2	3	jes

Figure A.11: Admin View Users



ID	NAME	ROLE	ACCESS LEVEL	EDIT
1	Jane Doe	Manager	2	Edit
2	Elizabeth Williams	Developer	4	Edit
3	Mark Johnson	Developer	2	Edit
4	Adam Smith	Manager	6	Edit
5	Sarah Brown	BSA	3	Edit
6	David Lee	Tester	4	Edit
7	Emily Davis	Manager	3	Edit

Figure A.12: Role and Privilege



MANAGER ID	NAME	ACCEPT	REJECT
2	Elizabeth Williams	Accept	Reject
3	Mark Johnson	Accept	Reject
5	Sarah Brown	Accept	Reject
6	David Lee	Accept	Reject
8	Daniel Brown	Accept	Reject
9	Megan Williams	Accept	Reject
10	Thomas Johnson	Accept	Reject

Figure A.13: Accept Manager

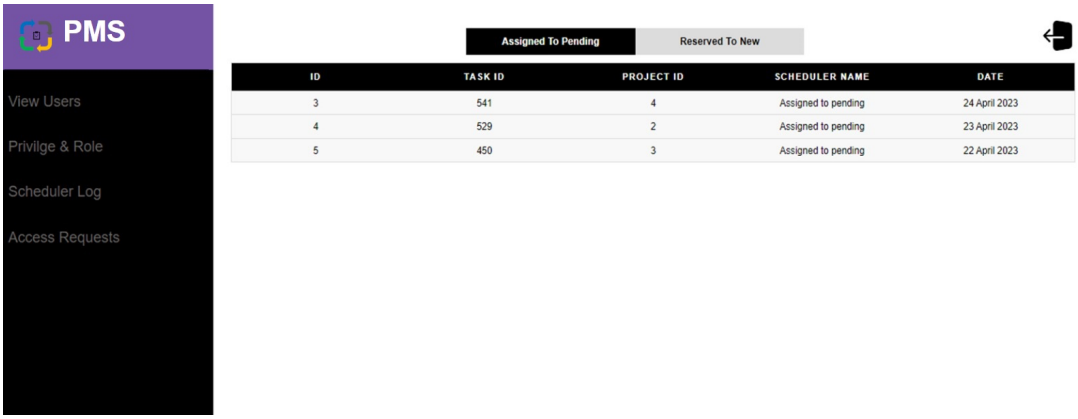


Figure A.14: Scheduler Log