DYNAMIC TASK LIFECYCLE MANAGEMENT SYSTEM

A PROJECT REPORT

Submitted by

JESLIN JOHNSON (TKM21MCA-2023)

to

The APJ Abdul Kalam Technological University

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

MASTER OF COMPUTER APPLICATION

Thangal Kunju Musaliar College of Engineering
Kerala

DEPARTMENT OF COMPUTER APPLICATION

MAY 2023

DECLARATION

I undersigned hereby declare that the project report on **DYNAMIC TASK LIFECYCLE 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.

Kollam

16-05-2023

JESLIN JOHNSON

DEPARTMENT OF COMPUTER APPLICATION

TKM COLLEGE OF ENGINEERING

KOLLAM

2021 - 23

CERTIFICATE

This is to certify that the report entitled **DYNAMIC TASK LIFECYCLE MANAGEMENT SYSTEM** submitted by **JESLIN JOHNSON** (TKM21MCA-2023) 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 her 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,

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

During her internship, she has been trained in 'Java' competency. She is currently working on external client-related projects.

She 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

ACKNOWLEDGEMENT

First and foremost, I thank GOD almighty and my parents for the success of this project. I owe sincere gratitude and heart full thanks to everyone who shared their precious time and knowledge for the successful completion of my project.

I am extremely grateful to **Dr.Fousia M Shamsudeen**, Head of the Department, Department of Computer Application, for providing me with best facilities.

I would like to thank my Co-ordinator, Advisor and Project guide **Prof.Natheera Beevi M**, Department of Computer Application, who motivated me throughout the project.

I would like to thank my external coordinator **Mrs. Anuradha Vidyarthi** ,Incture technologies, who guided me throughout my work.

I profusely thank all other faculty members in the department and all other members of TKM College of Engineering, for their guidance and inspirations throughout my course of study.

I owe my thanks to my friends and all others who have directly or indirectly helped me in the successful completion of this project.

JESLIN JOHNSON

ABSTRACT

DYNAMIC TASK LIFECYCLE MANAGEMENT SYSTEM, is a web tool used by businesses to manage their projects. It offers a simple user interface that makes tracking and monitoring the development of the projects simple. It gives the user the ability to make Tasks for the project they've created and allocate them to the appropriate team members. Typically, project managers create the tasks, and the team members work on them.

The supervisors and team members can monitor the status of the tasks and projects to which they have been assigned.Both users receive a unique set of metrics that are presented in a visual way for rapid access to their job progress.

The jobs in this programme go through a variety of stages, including New, Reserved, Pending, Assigned, Completed, and Cancelled.These task statuses make it simpler to get a broad idea of where the project is in terms of development.

This website offers a straightforward and dynamic way to manage projects, tasks, and the team of people working on them.This programme, which provides an analytical picture for the team members' development, allows for a self-evaluation as well.

Contents

List of Figures

List of Tables

Chapter 1

Introduction

DYNAMIC TASK LIFECYCLE MANAGEMENT SYSTEM allows people to manage and work together on Projects and Tasks.The system primarily comprises three types of users: managers, team members, and administrators.There are many functionalities available to each of those consumers. Task management and viewing capabilities are offered to Managers and Team members. The administrator controls user access levels, user logs, and scheduler logs.

The Manager in particular has the most access to the system. The workflow of the programme begins with the manager's creation of projects. A project is created by the manager with a title, a description, and the appropriate team members. The manager can assign tasks to the team members after the project has been created.

They have the ability to move tasks through various statuses as a Team member. The task will be in a new state when it is created, and it will shift to the reserved state when the user requests it. When the Manager approves the reserve request, the requester is given that specific job. The task's state changes to Assigned after it is assigned. The Team member can then choose whether to finish the mission or abandon it. A job might also be in the pending stage, which signifies that it is waiting for a team member in particular.

Additionally, this application gives Managers and Team Members a Dashboard so they can track their success in their work.It displays for a manager how much of the project is finished, how many tasks are still outstanding for each project, and other various indicators.

1.1 Company Profile

Incture Technologies provides services like helping businesses automate their processes, giving advice on using SAP software, integrating digital systems, and creating new applications. This company offers new and advanced technology tools like the Cherrywork program. This program helps businesses make and use computer programs and processes faster.

1.1.1 Products

- **Cherrywork Studio**
  Cherrywork Studio is a tool that helps developers make high-quality applications and workflows easily. It's a low-code platform. It has things you can use again and again, ready-made designs, and an easy way to put them together quickly. Developers can design and change apps easily without needing to write a lot of code. It also has tests that check if the program is good before it's used.

- **Cherrywork Engage**
  Cherrywork Engage is a tool that helps businesses get to know their customers better and build strong relationships with them. It provides tools to make customer experiences easier by automating their journeys, tracking their interactions, and getting their feedback. This allows businesses to talk to their customers in different ways, like using social media, chat, or email. When companies ask customers questions, it helps them understand their customers better.

- **Cherrywork Insights**
  Cherrywork Insights helps companies understand how they are working and how to improve using data. It gives businesses helpful information right away to help them make good decisions. It allows businesses to use facts and data to keep track of and enhance their day-to-day operations. Furthermore, it provides tools that help companies predict future trends and plan for the future.

- **Cherrywork Connect** Cherrywork Connect helps businesses combine their own apps and systems. SAP, Salesforce, and Microsoft Dynamics have interfaces that are ready to use. It helps different systems to share information easily, gets rid of separate information storage areas, and makes the whole system work better. Furthermore, it provides a way to see all information from different sources in one place.

1.1.2 Services

- **Enterprise Resource Planning (ERP) Services**
  Incture helps companies make their work better by giving advice, doing work for them, and helping them keep it going. They want to make everything easier and faster for the business.

- **Intelligent Automation Services**
  Incture helps make work faster and easier by using robots and smart computer programs called automation. This helps get rid of mistakes and lets people get more done. Digital process refers to using electronic devices and computer programs to accomplish tasks and solve problems.

- **Automation Services**
  Incture helps companies use technology to make their work easier. They can do things like take on new customers and complete orders faster by using automation tools like BPM, low code, and workflows.

- **Cloud Services**
  Incture helps businesses use cloud technology like AWS, Azure and Google Cloud Platform. They offer advice, support and management services for moving to the cloud.

- **Mobile Application Development Services**
  Incture helps businesses make mobile apps that make customers happy, earn more money, and help workers do their job better.

1.2 Existing System

The current system assigns tasks but doesn't let you see how far along they are. It also doesn't give you any helpful data. It's hard to know what tasks have been completed and what still needs to be done. People usually update progress using phone calls or emails. It's not easy to see everything in one place. There's no dashboard to show progress. You have to search through the information yourself to figure out what's been done and what still needs doing.

The current system doesn't let you save a task for yourself and work on it without interruptions from others. Also, there isn't much teamwork happening in the current system. The system cannot show progress through graphs, so we have to manually get information and put it in excel to see it visually.

1.3 Proposed System

The system will help the team stay organized and manage their tasks for the project. Each person will only see the tasks assigned to them. It offers many useful tools to help the team work better together.The Proposed system provided a wide variety of features like

- The task goes through different stages to show how it's going.
- Certain jobs can be given to certain people.
- The manager can create a good team by choosing people with the right skills. .
- You can choose to save a task so that only one person can do it.
- There are programs running in the background that make sure tasks are done on time. If a task is going to be late, they move it to a better time.
- We offer separate pages for users and managers called dashboards.

The new system has a few important features. It helps people work better together and makes it more likely that projects will be finished on time.

1.4 Objective

The goal is to accomplish the following:

- Organize all tasks on a single platform
- Creating and sharing task lists
- Assigning work to individuals

- Identifying and labeling dependent tasks
- Estimating task duration

Chapter 2

Literature Survey

A literature review is when you look at a lot of different writing on a subject and try to understand it all. A literature review helps to make research questions. Then, important information is found and examined to find solutions. A literature review is when someone looks at all the academic books and articles that have been written about one topic. It's helpful because the person doing the review can find new ideas by looking at the old information in different ways. In college, you might have to do two kinds of literature reviews: one by yourself for a class and another that's turned in as a report. A prologue or introduction comes at the beginning of a long piece of writing, like an essay or report. The way you write your review, including what you focus on and believe, depends on the type of review you are doing. You can learn about the differences between literature reviews and theses/dissertations by reading published examples. Think about what topics they talk about and how they share their ideas.

2.1 Purpose of the Literature Review

1. By choosing and summarizing important and accurate research papers, it makes it easier for people to understand about a particular topic.

2. It's a great starting place for people who are new to a topic. They need to summarize, evaluate, and compare the research that has already been done in that area.

3. It makes sure that researchers don't use work that has already been done before.

   might give suggestions for topics to research or clues about what to look into next.

4. The most important things discovered are shown clearly.

5. If there is any difference or confusion in written works, we point it out.

   looked at how other studies were done to see if we could learn anything useful.

2.2 Related Works

2.2.1 Hibernate

”Object-relational Mapping Using JPA, Hibernate and Spring Data JPA” paper discusses the use of specialised tools to improve the database compatibility of Java programmes. It also examines various configurations for these instruments. JPA, Hibernate, and Spring Data JPA are three of the most widely used computer programmes for managing data that are discussed by the authors.

This essay describes the capabilities of several frameworks, their strengths, and their weaknesses. The authors are analysing how well various frameworks perform in various circumstances, such as basic data management, intricate data searching, and archiving data for later use. They discuss how challenging it is to use these frameworks in computer networks and offer solutions to the issues.

According to the authors, JPA, Hibernate, and Spring Data The best JPA to employ for managing data in Java apps will depend on the requirements and constraints of each project. In-depth information about the most recent technologies for managing data in computer programmes is provided in this paper. It is beneficial for anyone researching and developing software in this area.[8]

”Design and Implementation of the Hibernate Persistence Layer Data Report System Based on J2EE” paper discusses about the creation of a data reporting system utilising J2EE and Hibernate is discussed in this paper. Research and examples from the real world are also included. The authors discuss how effective Hibernate is for creating a persistence layer. It has certain beneficial functions, such as saving objects and performing transactions, and it can handle difficult ways of putting things together.

This article describes the creation of a data report system. It is divided into three sections: the presentation layer, the business logic layer, and the persistence layer. The presentation layer displays information, the business logic layer determines what to do with it, and the persistence layer stores the information. Hibernate is a programme that is used in the third section. The authors describe the construction of each component of the system as well as the advantages of using JSP, Servlets, and EJBs.

The authors contend that combining Hibernate with J2EE technologies is an excellent method to create robust and flexible data report systems. They claim that wise planning and construction are crucial for things to function efficiently and be simple to maintain.

This document provides developers with instructions on how to create data reports using J2EE and Hibernate, along with a working example. It expands on the knowledge of Hibernate's use in large-scale enterprise software development.[10]

"Finding and Evaluating the Performance Impact of Redundant Data Access for Applications that are Developed Using Object-Relational Mapping Frameworks" paper discuss that, we learn how to make computer programs go faster when using a way of storing data called object-relational mapping. We can do this by not doing the same thing over and over again. This paper talks about how having many copies of data can make things not work well. It gives ideas to make it work better by removing these extra copies.

This paper tells you what the Hibernate tool does. The test checks if it works well by using more information to do some jobs. The research showed that when we use the same information repeatedly, it can make an app work slower. But we can improve it by adjusting settings and using faster methods to find the data.

Basically, the paper gives helpful tips for people who use ORM frameworks in their projects to fix problems and make things run better.[2]

"Generation of POJOs and DAOs Classes from Metadata Database" paper suggests a different way to make Java classes using a database. These are classes named POJOs and DAOs. The aim is to simplify the process of using the information in the database. The paper talks about a tool called Meta2Class that can create classes automatically. It works by learning how a database is organized.

This article is about the benefits of using this method. Some benefits are completing tasks quickly, ensuring consistency in the code, and simplifying maintenance. The writers explain how to use a tool in a real-world situation by making POJOs and DAOs for an example database, and comparing it to manually written code.

This article shows an easy way to make simple computer programs in Java that can work with databases. This paper explains a helpful way for people who work with large databases to quickly and effectively create computer code.[1]

"Exploration of a realization pattern of system based on Hibernate" paper is about something called Hibernate. It helps Java programs work with databases. It looks at information from different places to understand how Hibernate works. The writers are discussing how to use Hibernate to make large company computer systems. They have a helpful idea on how to use Hibernate effectively so you don't encounter any issues.

This paper explains how Hibernate can help with saving data automatically, making things faster and working well with other Java tools. The writers discuss issues with using Hibernate in large companies, such as it being slow, hard to utilize, and requiring effective methods to access information from it.

The writers propose a method of organizing a system by using different layers such as DAO, entity manager, and service. This makes sure that the important information of the system is secure. They talk about each piece and demonstrate how they collaborate to perform well and get more tasks done.

This article is useful for people who make complicated computer systems. It gives a good way to use a software named Hibernate in these computer systems. This will help people who make software and design buildings use Hibernate in a good way and not have any issues with it.[9]

"Model to Enable the Reuse of Metadata-Based Frameworks in Adaptive Object Model Architectures" paper proposes a new way to use metadata-based tools in making changes to object models. The authors believe that it's difficult to use the current methods for making changes because they're too complicated. Making them work in various situations requires a significant amount of effort.

They suggest making a new thing to solve the problem. This thing has three parts: one that can work with any system, one for a certain system, and one that links them together. The metadata layer has two parts - one for things that all frameworks have and one for things that only some frameworks have. The mapping layer helps to use the same information in different ways.

The writers proved that their method works by testing it in a study on a learning program that can adapt to fit each student's needs. The smart people discovered that the new design helps you use frameworks based on data descriptions more easily and needs less work to adjust them for different situations. This article is helpful for people who use adaptive object model structures. It talks about a tough problem with putting them into use.[6]

2.2.2 Java

”Java in real-time applications” article discusses the use of Java in systems that must react quickly. It discusses the writings on this subject by others. The authors discuss the advantages and disadvantages of adopting Java in these systems. They also demonstrate how Java is utilised in practical contexts, such as in phones, cars, and space.

This essay explains the advantages of Java for real-time applications. It can conduct numerous jobs at once, clean up unused code, and operate on various types of computers, to name a few of the benefits. The authors discuss the challenges of utilising Java in systems that must react fast, such as when garbage is suddenly collected and memory needs to be used effectively.

According to the authors, Java can be used for real-time systems, but you must carefully consider its shortcomings and carefully plan the system. They advise using real-time Java extensions such as the Real-Time Specification for Java (RTSJ) and testing and confirming that the system is operating as intended.

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]

”High Performance JAVA Programming” paper explains how to make Java programs work really well. It includes lots of tips and tricks to make programs faster. The writers talk about how to find and fix things that slow down computer programs. They explain ways to make programs run faster, like saving information and doing many things at once. The article talks about how to improve the performance of computer programs, including ways to manage waste, make input/output faster, and compile software more efficiently. It also gives advice on how to make certain kinds of programs, such as those for financial institutions and websites, run better. This paper is helpful for people who use Java to make their computer programs run better. It shows that it’s important to think about performance improvement right from the start of making the program.[15]

The paper ”Java in real-time applications” talks about using Java language in systems that need to react quickly. This paper talks about real-time systems, and it explores the challenges of making sure these systems are reliable and quick to respond when something happens.

This study looks at why Java is good for apps that need to work quickly. The investigation is looking at important parts of Java like how it gets rid of unnecessary things, how it handles multiple jobs happening at the same time, and how it deals with things going wrong. This article talks more about two different types of real-time Java rules called the Real-Time Specification for Java (RTSJ) and the Safety-Critical Java specification.

The book ”Java in Real-time Applications” is helpful for people who want to build quick computer systems using Java. It can be useful for developers and researchers. This document explains the difficulties that come with making real-time systems and how the programming language Java can help with those challenges. The discussion about using Java for real-time programs helps us understand different ways to create real-time systems with Java.[11]

”Multithreading in Java: Performance and Scalability on Multicore System” paper talks about how good Java programs are at doing many things at once on computers with lots of processors. The writers check how quickly and well these software work on these computers. This article explains how using more than one thread can be very useful in developing software these days. However, it can be difficult to ensure that the program is functioning very well and is user-friendly.

The writers tested Java programs with many threads to see if they could handle big tasks. They found out that using several threads at once can speed up computers with lots of processing power, but it’s crucial to assemble them properly to get these benefits.

This article tells us how to make computer programs with multiple parts work better. Here are some ways to improve work efficiency: avoid locking, use groups of threads, and share work equally among team members.

This book can help people who use many different parts in Java to create computer programs at the same time. The article is about making computers with many brain pieces work really well. It talks about issues and how to solve them.[5]

2.2.3 Spring Boot

”Monolithic vs. Microservice Architecture: A Performance and Scalability Evaluation

This study compares the way two types of computer systems work for a website to see which one is better. Many people are now choosing to use microservices-based architecture because it has many benefits. Switching from one big system to many little systems might not be very helpful for small businesses that don’t have a lot of people using it at the same time and can just grow bigger by adding more power to their servers. Microservices are small pieces of software that work together to create a larger application. There are two ways to deploy these microservices: on-premise or in the cloud. This text is already very simple, it just says ”cloud”. This made it possible to thoroughly test and compare the different combinations and see how well they worked and could handle more work in the future. Information collected from thorough testing proved that the microservices design used in the cloud was the best choice for large-scale applications because it was very effective and could grow easily. This research explores how microservices are used and compares two different ways of doing it: Java and Node.js. We used a computer language called C.NET for this study. We did some tests in three different places: on the computer itself, on Azure Spring Cloud, and on Azure App Service. The study results show that a system with a single design works better than one made up of smaller parts on just one computer. Moreover, Java works well on powerful computers when doing tasks that require a lot of computing power. In simple words, making our computer bigger (vertical scaling) costs less money than adding more computers (horizontal scaling) on Azure cloud. When there are too many examples, the app doesn’t work as well. It doesn’t matter if we use Java or C.NET because it won’t make a big difference in how well it can handle a lot of users.[7]

2.2.4 MySQL

The study”Optimizing MySQL database system on information systems research, publications and community service” tries to make MySQL database systems work better so they can be used in research, publishing, and community projects related to information. This article talks about all the things that can go wrong with MySQL databases and how to make them run better.

This article talks about ways to make MySQL databases work better. These methods include adjusting settings, making searches faster, and organizing data more efficiently. This study looked at how well a computer system called MySQL worked for a research project. They tested it to see if it was better than other systems.

The book ”Optimizing MySQL Database System on Information Systems Research, Publications and Community Service” is helpful for people who use MySQL databases in their work, like researchers and developers. This paper gives helpful tips for making MySQL databases work better. It can help people who want to do academic work, share information and be more social. This study shows how techniques can be used in real-life situations.[12]

”Design and implementation of a MySQL database backup and recovery system” paper talks about making a good way to save and bring back information for MySQL computers. This article explains how hard it is to make a system that can save and recover MySQL databases without issues.

The authors are discussing ways to keep a backup of your MySQL database safe and secure. They are discussing different types of backups such as full and partial backups. They also mentioned the ability to access old information by going back in time. They suggested using multiple backup plans for extra safety. The essay explains how a person created a safety plan for a real MySQL database.

This book named ”Making and Using a Backup and Recovery System for MySQL Database” helps those who use MySQL databases. This paper explains how people can keep their important information safe in a MySQL database. This tells you how to create a good backup system that can recover lost information. It’s really important to make sure that the information can always be found and is correct. This research explains how to use methods to create useful things in the real world. This tells us about the upsides and downsides of creating these systems.[13]

2.2.5 Rest API

”Design Patterns and Extensibility of REST API for Networking Applications” paper explains how to use design patterns to improve and make networking applications more flexible by making REST APIs. This paper discusses the problems in making REST APIs for networking apps, and how to fix them by applying design patterns.

The writers discuss ways to improve REST APIs for network apps using design patterns such as Factory, Observer, and Decorator. The article is about creating a computer program using specific steps. This program helps devices, such as computers, connect to each other. The article explains how the program was created, following the instructions mentioned earlier.

The article ”Design Patterns and Extensibility of REST API for Networking Applications” is useful for those who make and set up REST APIs for networking. This article explains how to improve REST APIs using design patterns. It is necessary to ensure that applications can work well and adjust easily to any modifications. This research explains how to apply certain design techniques in a practical scenario. This text explains the good and bad things about using design patterns in this situation.[3]

”An Analysis of Public REST Web Service APIs” paper examines how effective the publicly available REST APIs on the internet are. This article explains how REST APIs function and the difficulties that arise when developing effective APIs.

The authors learned about a few computer programs that are available to everyone, called REST APIs. They checked what they can do, how good they work, and how simple they are to use. They evaluate the APIs based on how easy it is to understand the information, whether the responses are consistent, and if mistakes can be managed.

This article is useful for folks who create and use REST APIs. This paper talks about how to make good APIs and why it is hard to make them. Studying public REST APIs can help us determine the quality of other APIs. We can learn how to make good APIs from them too.[4]

Chapter 3

Methodology

DYNAMIC TASK LIFECYCLE MANAGEMENT SYSTEM is a project management system that allows for greater collaboration among team members.Under this system, project managers can assign their subordinates to work on a project.With the use of this system, project managers can add team members with particular skills to projects.Assigning tasks to team members directly or creating them without doing so is an option available to project managers when creating tasks for a project.The state of the tasks changes depending on how they are created.

Most changes to the task's flow are made by team members.The task may be in the following states: New, Assigned, Reserved, Pending, Cancelled, and Completed.Depending on a variety of factors, a task's state can vary.There are schedulers that can dynamically select tasks and modify their states in accordance with various job timeframes.Since this is a project management system, work ought to continue regardless of the circumstances.Therefore, tasks should be in the proper states to allow the person working on them to track without any problems.Based on the state the work is in, they should be able to determine its priority.

This is an easy and efficient method of managing projects within an organisation.Managers will be able to monitor the development with ease and take appropriate action.This system adds various novel features, such as built-in dashboards and task reservations.

The system is created using NextJS, a react framework.Because NextJS supports server side rendering, pages load incredibly quickly.Additionally, we use Spring Boot, a Java framework, as the backend.Java APIs can be created using spring boot.Additionally, Spring Boot features a well-organized project format.This makes it simpler for developers to work on projects.As MySQL is the database used, Hibernate is used to communicate between MySQL and spring boot.Another framework that makes communication between Java applications and databases simpler is called Hibernate.

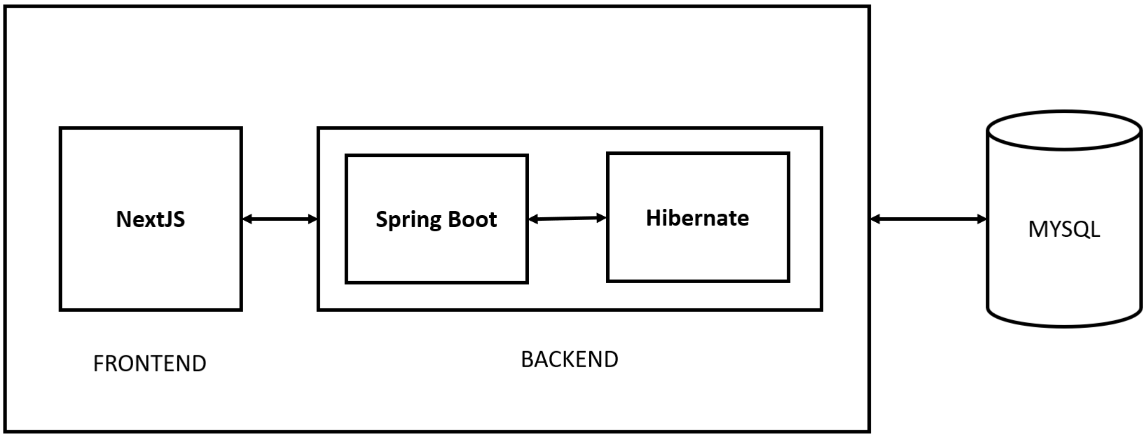

Figure 3.1: Overall System

3.1 Module Description

3.1.1 Manager Module

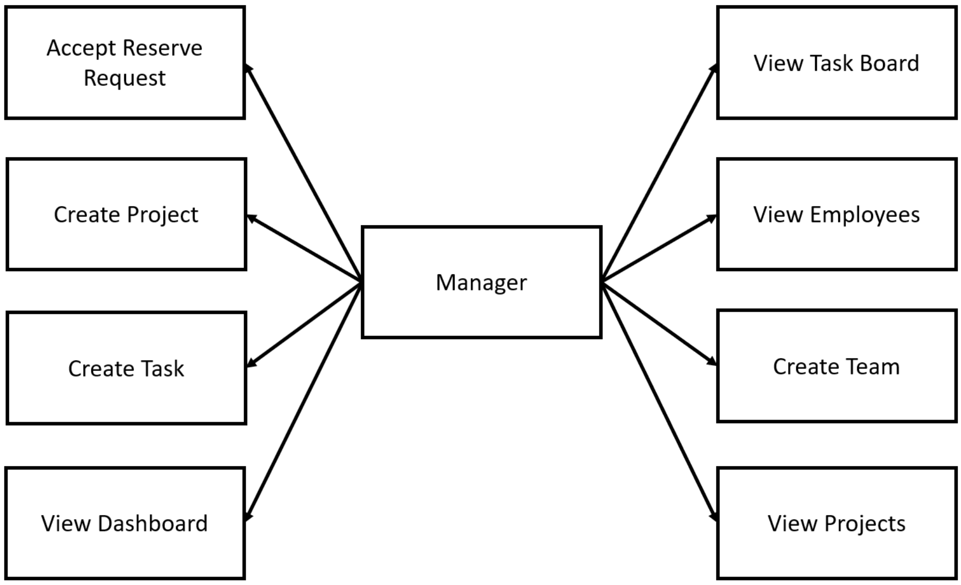

Figure 3.2: Functionalities of Manager

Creating new projects and viewing those that have already been started should be possible for a user who has logged in as the manager.The management should be able to see the workers who report to them when the project is created.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 .The project will be shown in tiles under the project page once it has been built.Each project's title, description, and creation date will be visible.Each project also includes two icons; the first shows all of the tasks created under it, while the second shows all of the team members connected to that project.

The manager can create tasks that will be included in the project after creating it.You have two options when establishing a task: assign it to someone or create it as a new task that any team member can take on themself.The page Taskboard allows you to view every generated task.The Taskboard is separated into various sections that correspond to the stages of the work.The tasks have the following statuses: NEW, ASSIGNED,RESERVED, PENDING, CANCELLED, AND COMPLETED. Tasks in each status are added to those specific tabs. Depending on the circumstances and the requirements, the Manager is free to finish or abandon a work.

The system has a feature called task reservation that requires a team member to ask for the task to be reserved for them in order to work on it.The management must give his or her approval to this specific request.If there are still requests that need to be approved, the manager will see a count of such requests in the side bar.

Viewing a dashboard that can provide the analytics of the projects connected to that manager is another feature of this application. Three metrics are currently visible in the dashboard.One metric that applies to a particular project that is chosen from a drop-down list is project completion status.This measure displays the number of tasks that have been accomplished and those that are still outstanding for the projects.The Total Tasks in Each Status statistic is another one that displays the total number of tasks in each status for a project.This measure provided the manager with information about the project's overall status.The final statistic displays all of his completed projects' outstanding duties.Pending tasks are considered pending work, so it is crucial to understand how much.

3.1.2 User Module

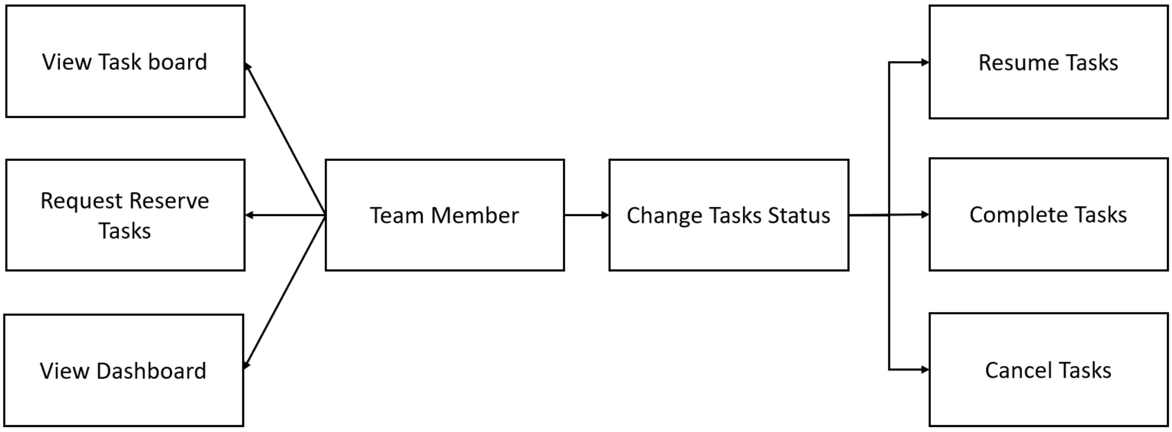

Figure 3.3: Functionalities of Team Member

A user has two pages to manage when logged in as a team member who is assigned to a project.The task boards are one of the key pages where he can accept and work on jobs.Multiple task statuses are present on the task board.The NEW tab displays each and every task that has been generated for the project.By using the reserve task button next to each task, the user can ask to have the task reserved. As soon as the reserve task is clicked, the work's state is changed to reserved and it is moved to the reserved tab.The request is allocated to the user once the management has given it approval.

The user can begin working on the task after it has been assigned to him.He can click the complete button for the related assignment once the work has been finished.If the task becomes obsolete, the user also has the choice to cancel it.

There are daily schedulers that can pull jobs from assigned to pending status.The schedulers will capture those jobs and put them in a pending status if they don't have any work completed for a specified period of time.The resume task button can be used if a user needs to continue working on that task.If the task is continued, the user is once more allocated to it.Only those particular users will see the entire task board.Only the logged-in user will see the given job, pending task, reserved task, finished task, and cancelled task lists.

Additionally, the team member has a dashboard with 4 particular KPIs.The first statistic, Total tasks in each state, informs the user of the number of tasks in each status.The user will receive a brief evaluation of their work as a result.Another indicator is work completion, which displays how much work is still unfinished and how much has already been completed in hours.The next measure displays a pattern in the number of jobs finished each day during the last week.This statistic gives the user a competitive advantage, enabling them to accomplish more the next day.Dashboard also displays a list of open tasks next to the user's name, giving him rapid access to the work that is most important to him.

3.1.3 Admin Module

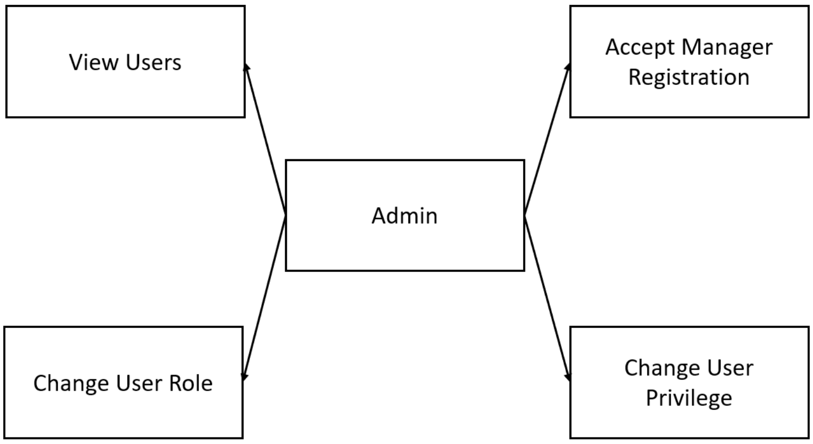

Figure 3.4: Functionalities of Admin

The majority of an administrator's functions include managing users.The administrator will be able to see every user.There are various access levels.Level-1 has the most access, allowing for the creation of projects, tasks, and tasks to be viewed. Levels 2 and 3 only allow for the creation of tasks for projects, while Level-4 only allows for the creation of tasks to be viewed and worked on.

We have different tiers of access in our system.Additionally, there are roles that include managers and regular users or team members.On request, admin have the authority to alter this. They have Level-1 access because they are a manager, so their registration is not immediately authorised.A manager must be approved by the administrator after registering before they can log in and utilise the system.Normal users can only examine the items that have already been created in the system, therefore their registration does not require additional admin approval.

3.1.4 Task Life Cycle

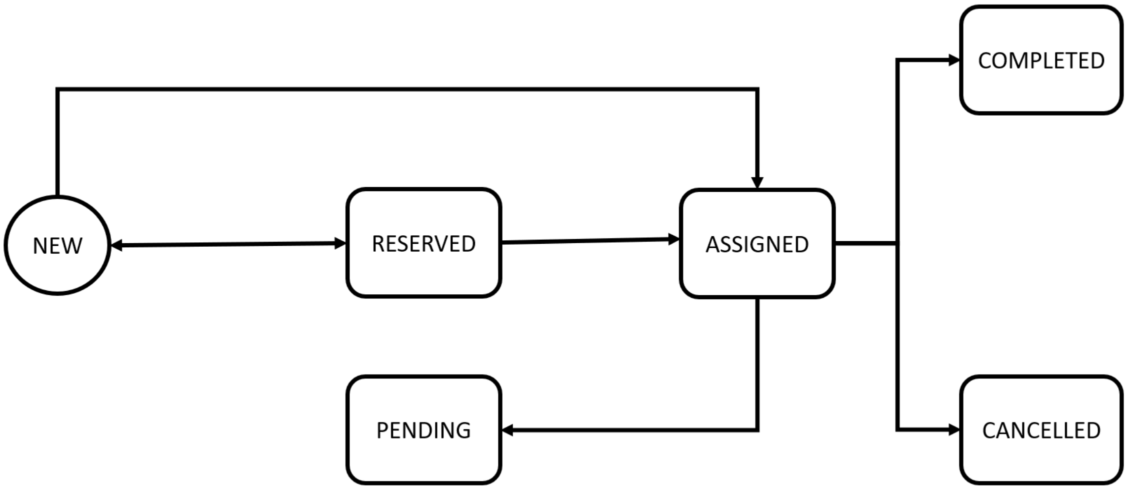

Figure 3.5: Life Cycle of Tasks

In our system, tasks will go through various phases.The task is in the NEW state in the beginning, which represents its most recent creation.A user can reserve a task from there so that only he or she can work on it.The task will go to the designated status as soon as the appropriate management approves it.If a task is assigned at the time of task creation, it can also migrate to the assigned state.From there, it might go to completed or cancelled.If the job was created accidentally or was not valid, it can be cancelled. If the task was valid, it can be worked on and moved to the finished status.

The aforementioned actions are those taken by the user, however the system also moves two tasks dynamically.It will switch the task back to new so that another user can pick it up when a user requests to reserve a task but the manager doesn't approve it for the following five days.A task may also migrate to the pending status under the assigned person's name if no one has begun working on it while it is in the assigned state.By selecting the task's resume button, a pending task can be finished.

3.2 System Specifications

On the basis of the requirements, the application development architecture recognised for this project is described in this section.

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**

  A Java-oriented framework called Spring Boot was carefully developed to make it easier to design and deploy Spring-based applications on a wide scale without the need for complex configuration. With its foundation in the popular Spring framework, Spring Boot provides a number of features that speed up the process of creating applications. These capabilities include the ability to self-configure, built-in web servers, and a variety of beginning dependencies that may be easily incorporated into a project.

  One standout feature of Spring Boot is its auto-configuration capabilities, which allow developers to quickly and easily build an application with little modification. Depending on the dependencies included in the project, Spring Boot has the ability to configure several application components automatically. This reduces the need for manual setting and speeds up the development process.

- **Next JS**

  Developers can create server-rendered React applications with the help of Next.js, a reputable open-source framework that runs on the React platform. The current system provides a variety of tools and functions that make it easier to create software that is extremely effective, versatile, and search engine friendly. When compared to traditional React apps, the Next.js framework offers a number of benefits, including automated code division, server-side rendering, and simple deployment options.

The server-side rendering capability that Next.js offers is a remarkable feature that leads to faster page load times and enhanced search engine optimisation. The Next.js framework's ability to use server-side rendering frees the process of page rendering from dependence on client-side JavaScript by generating HTML content for a specific webpage on the server before sending it to the client's browser. With this improvement, the time to first byte (TTFB) is decreased, hastening the loading of the webpages.

- **MySQL**

  The popular open-source Relational Database Management System (RDBMS) MySQL is used extensively in many areas of software development, including the creation of web applications. The Swedish company MySQL AB first developed the MySQL platform in 1995, and Oracle Corporation later acquired it. Due to its sizable user base and vast range of ancillary tools and applications, MySQL stands out as one of the most extensively embraced database management systems in current usage.

  The scalability of MySQL is a crucial feature. The MySQL database management system has the capacity to manage huge amounts of data and can operate well in applications that encounter a high volume of traffic with little performance loss. Additionally, it provides a broad range of customization possibilities, allowing programmers to modify the code to suit their own needs and increase its capacity to meet particular requirements.

  MySQL provides a wide variety of data security mechanisms, including options for SSL encryption, access control, and password hashing. This characteristic makes it a preferred choice for use scenarios that demand strong data protection.

- **Hibernate**

  A free Object-Relational Mapping (ORM) software framework for Java-based programming is called Hibernate. Its goal is to accelerate the mapping processes necessary to connect an object-oriented domain model with a relational database system. The framework's main goal in development was to deal with the problem of complex database access and mapping in Java-based applications. As a result, it has become one of the Java ecosystem's most widely used frameworks for Object-Relational Mapping (ORM).

  One of Hibernate's main benefits is its capacity to abstract away the low-level database access, which gives programmers the chance to collaborate using a more advanced object-oriented API. Hibernate offers a flexible Application Programming Interface (API) focused for expertly handling and manipulating relevant data, serving as a framework for efficiently mapping Java classes to relational database tables. The aforementioned capability makes it easier to create applications that require database access.

3.3 System Design

By addressing the implementation process, the system design phase is crucial in bridging the problem area with the current system. Its purpose is to answer the query, ”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.

The overarching goal of system design is accomplished by the cooperation of numerous interconnected projects. According to the needs of the project and application, creating a well-built design paves the way for producing streamlined code and reducing implementation size. The logical design and physical design are the two main tiers of developing the system design. The logical design process entails developing a conceptual framework that shows how inputs, outputs, and data are processed by a system to meet user needs. This comprises describing the data's origins, points of origin, storage location, and path through multiple procedures.

A company's database's ability to be developed effectively depends greatly on logical planning. The collection, storing, and protection of data may require costly adjustments in the future due to inadequate logical planning. The database process is facilitated by developing an initial plan that is well-structured.

the development and evaluation of a project's contribution to its success. The primary responsibility of the system analyst during the logical system design phase is to clearly define the user needs, including the information flow, data sources needed for the system, as well as controlling the flow into and out of the system. When developing a logical design for the system, the system analyst digs deep into the user needs and offers a thorough description of how data is accessed, sent, and stored within the system as well as what data sources are required. Both models of entity-relationship diagrams and data flow diagrams are used. Additionally, the chosen input/output medium, database design, and backup procedures are established. The system's implementation timeline has been planned.

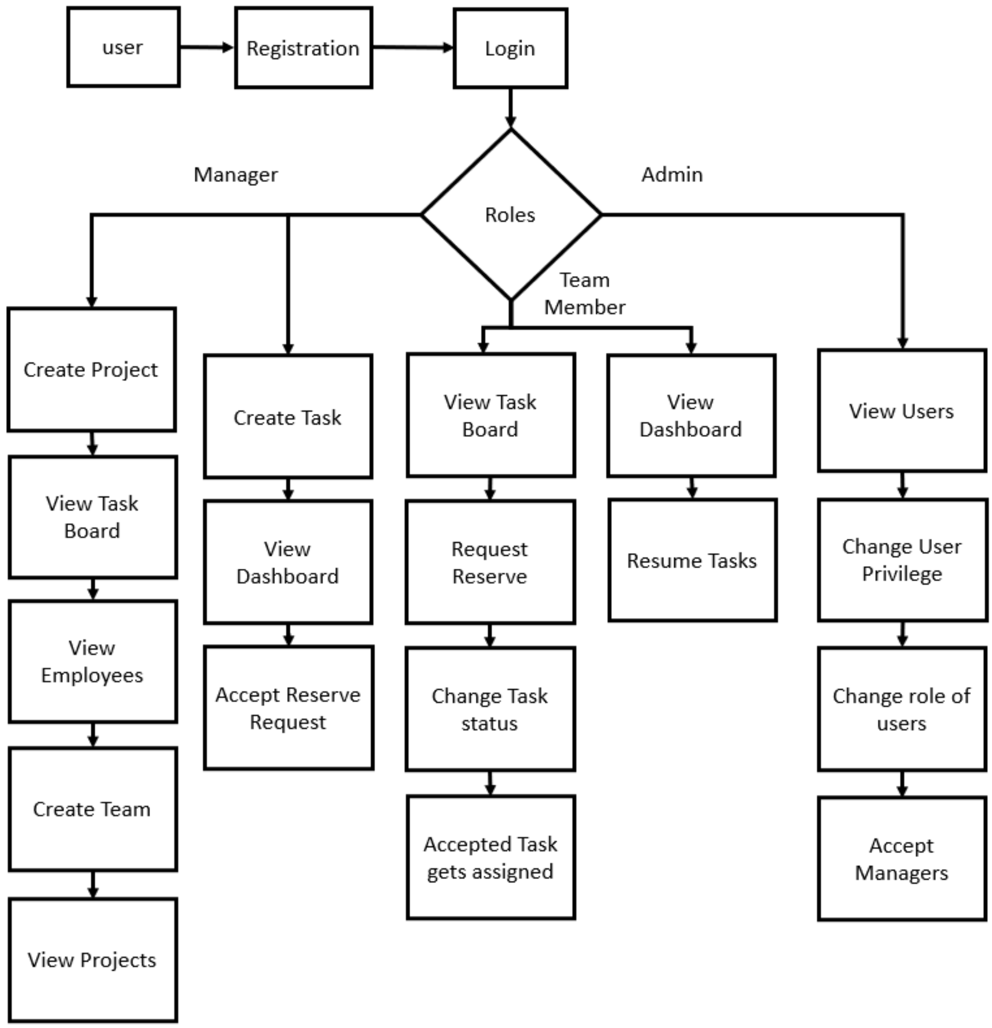

Figure 3.6: System Design

Dynamic Task Lifecycle Management System is a software programme with several access levels for multiple users. It has specific duties and rights for Managers, Team Members, and Admin. Projects can be created, and team members can be assigned. The states of a task can be new, reserved, assigned, pending, finished, or cancelled. Team members have access to and can transfer assigned tasks between states. For example, a task may be reserved and moved to the assigned state after receiving management approval.

Team members have tasks that need to be completed. A Dashboard in the app displays progress reports. The Admin user can manage accounts, adjust access levels, read logs, keep track of activities, and delete inactive users. The Project Management System streamlines project and task management in an effort to improve collaboration and productivity.

Chapter 4

RESULT AND DISCUSSION

Dynamic Task Lifecycle Management gives users a centralised platform for organising and working together on assignments and projects. Three core users—Managers, Team Members, and Admin—are catered for by the system. These users each have access to a variety of capabilities, including viewing and managing tasks, controlling users and access levels, and reading scheduler logs.

The Manager can create projects with names, descriptions, and corresponding team members and has the most access to the system. After that, the Manager can produce tasks for the team members to do, and the team members can change the tasks' statuses to new, reserved, assigned, pending, complete, or cancel.

The solution also gives Managers and Team Members access to a Dashboard where they can track their progress on various tasks. It displays numerous data for managers, such as how much of the project is finished and how many tasks are still outstanding for each project.

Overall, the project management system promotes collaboration, boosts productivity, and offers insightful information to assist users in effectively managing projects and tasks.

4.1 Testing Methods

Testing proves that the system is without mistakes according to standards requested by the customer or company. Some frameworks work better in some environments than others.

4.1.1 Validation Testing

Validation testing means checking if a new computer program works correctly for people. People who make things check to see if they work well in different situations. Validation testing is used to make sure that the system works the way it's supposed to. This includes testing it with lots of data and making sure it doesn't take too long to load. They also check that the system can handle lots of tasks at once without any problems. This includes testing the background scheduler to make sure it works correctly.

4.1.2 Unit Testing

The JUnit framework is used for unit testing.For each API, test cases are created in order to validate the answer and make assertions depending on the result.The accurate insertion of data into the database is tested using APIs for data insertions such task, project, and reservation requests.By getting data from the database after an update and comparing it to the original, APIs for data updates including task status changes, manager registration updates, and task assignment to teams are tested. Unit testing also makes use of Mockito.Since database requests are quite expensive, dummy data is created using mockito, and test cases are then used to validate the dummy data.

4.1.3 Integration testing

Unit testing checks individual parts of a project, while integration testing checks how those parts work together. Even if parts work well by themselves, they may not work well together. For example, if there are modules for changing task status and for schedulers, they both need to work properly together. Changing the status of a task through the UI should update the database, and the schedulers should also change the status based on certain criteria. Adding new APIs can also cause problems, so integration testing checks for that too.

4.1.4 User Acceptance Testing

The User Acceptance Testing (UAT) part is very important when making a Project Management System. This means testing a system to see if it works the way it should, and if it's ready to be used by people. User Acceptance Testing (UAT) is really important for finding problems in a system and making sure it works the way users want it to work.

In User Acceptance Testing (UAT), the people who will use the system in real life try out different situations to see if the system works properly. Afterwards, the people who use the system give helpful comments to the team building it so they can make it better. The mentioned feedback is used to make important improvements to the system. User Acceptance Testing (UAT) helps make sure that users will be happy with the system and that it's ready to be used.

The success of the Project Management System depends on how well the User Acceptance Testing process is done. This system will be easy for people to use, work well and meet the needs of the people who will use it. When you use a good User Acceptance Testing (UAT) process, it makes sure that the system can handle changes and updates in the future and keeps meeting the needs of the people who use it. This makes it possible to handle more things at once and helps the system work better.

User Acceptance Testing (UAT) is really important when we make Project Management Systems. It helps us make sure everything works the way users want it to. This process helps to identify any potential problems and make sure the system matches what the users expect. It also checks if the system is ready to be put into use.

4.1.5 Functionality Testing

Functionality testing checks if an application's features work as they should. For example, we can check if a user can create a new project. First, the user needs to log in as a manager and see the Projects page. Then, they should be able to click on a create project button and fill out a form that will create a new project. After submitting the form, the new project should appear on the Projects page. This kind of testing focuses on checking if the application's features work, not on the code itself.

4.2 Test Cases

Table 4.2: Test Cases

Slno	Condition to be Tested	Expected Result	Observed Outcome	Status
1	Verifying the login process with a legitimate username and password	The user should be directed to the homepage if the login is successful.	After successfully logging in, the user should be directed 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	By entering the project title, description, allocated to, and team, you may confirm that the project has been created.	Create a project and display it on the project page.	The generated project is visible on the project page.	Pass
4	Verify the formation of the project without entering the title, description, allocated to, or team members, then click the Create Project button	The project creation page should not be visited while creating a project.	The project creation page remains empty and the project is not created.	Pass
5	Verifying different stages	When all fields for task creation, including title, hours, assigned to, and description, are filled out and the create task button is clicked, the task should be created and appear on the 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 the task's creation by withholding some of the values.	If all of the required fields are not filled out, the task should not be generated.	The task creation page is empty and the task is not created.	pass

7	Verifying task delegation via reserve request.	After the reservation request has been approved, the user should be given the assignment.	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

   By entering their username and password, users can log in.

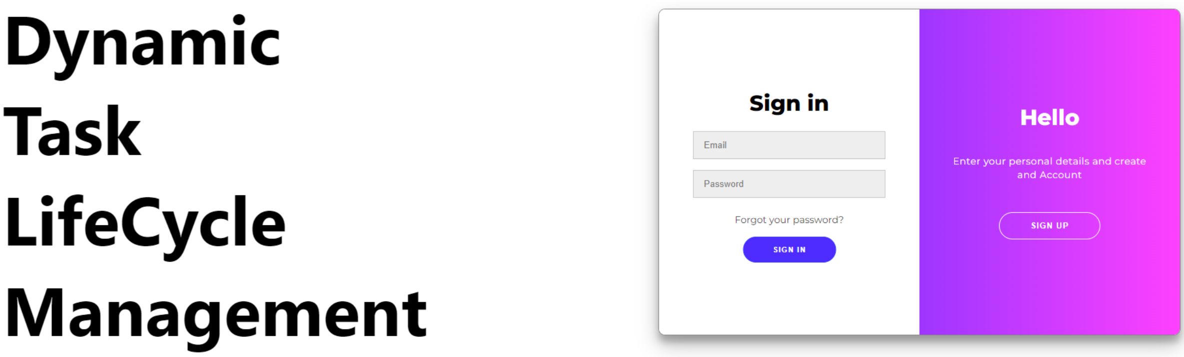

Figure 4.1: Login Page

2. Registration Page

   Users can enter information to create accounts in the system..

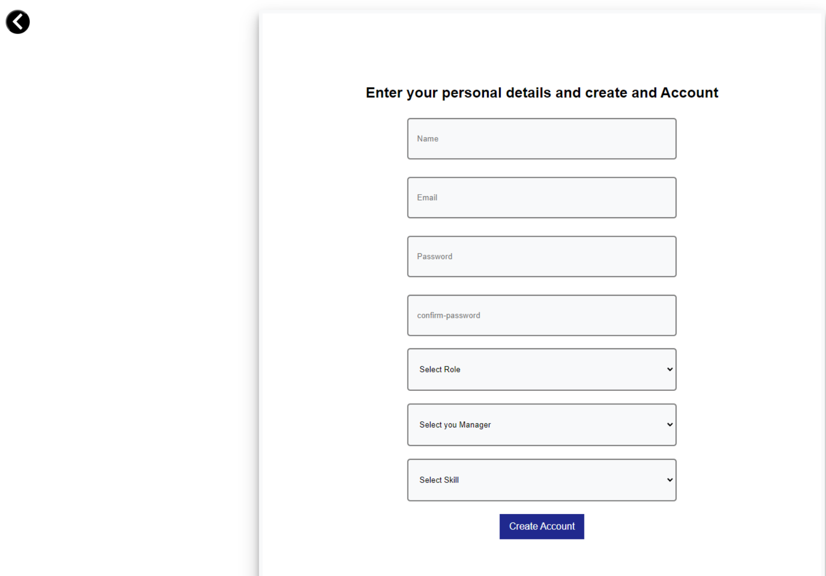

Figure 4.2: Registration Page

3. Manager Dashboard

The manager can monitor various metrics in dashboard format.

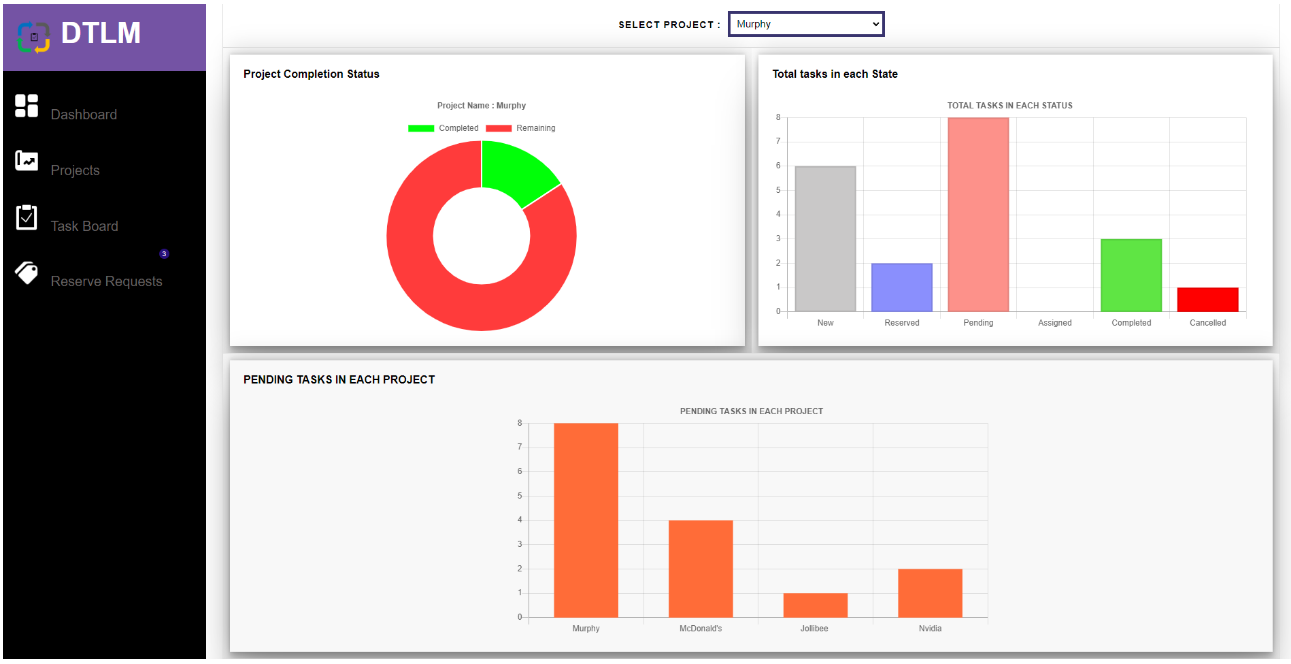

Figure 4.3: Manager Dashboard Page

4. User Dashboard Page

user's Dashboard has a separate set of stats to view.

Figure 4.4: User Dashboard Page

5. Project Page

Projects all are displayed

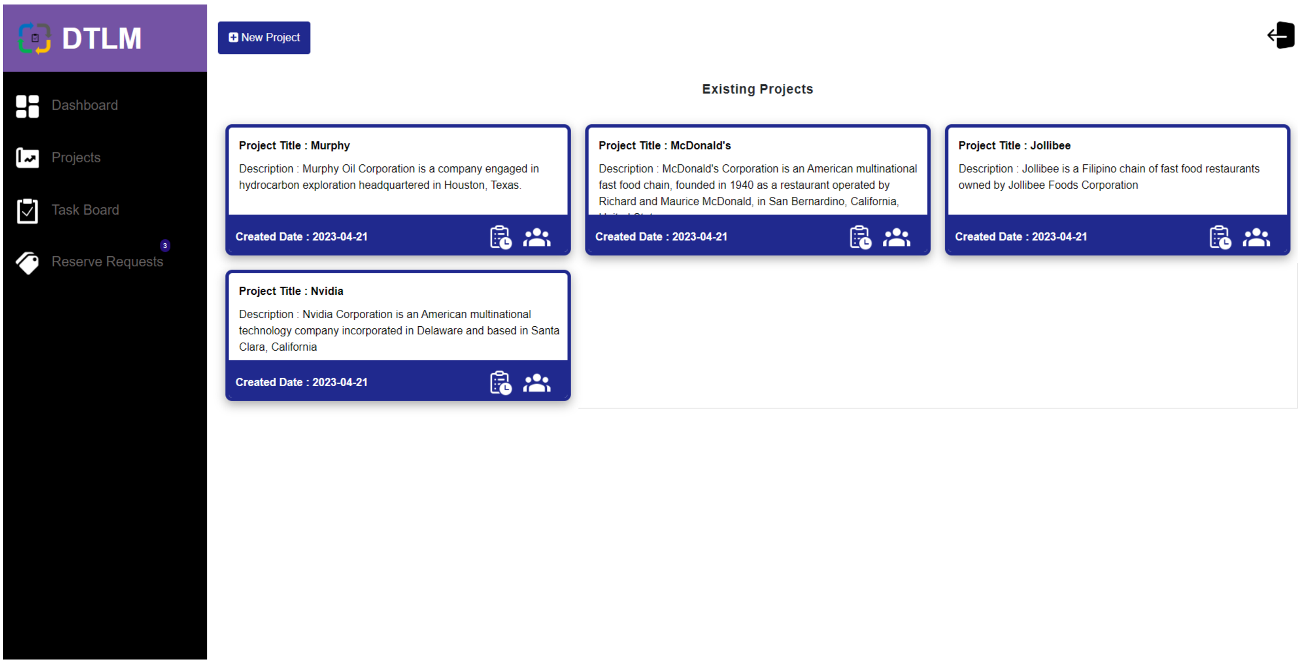

Figure 4.5: Project Page

6. Create Project Page

The user can enter information, choose team members, and create projects.

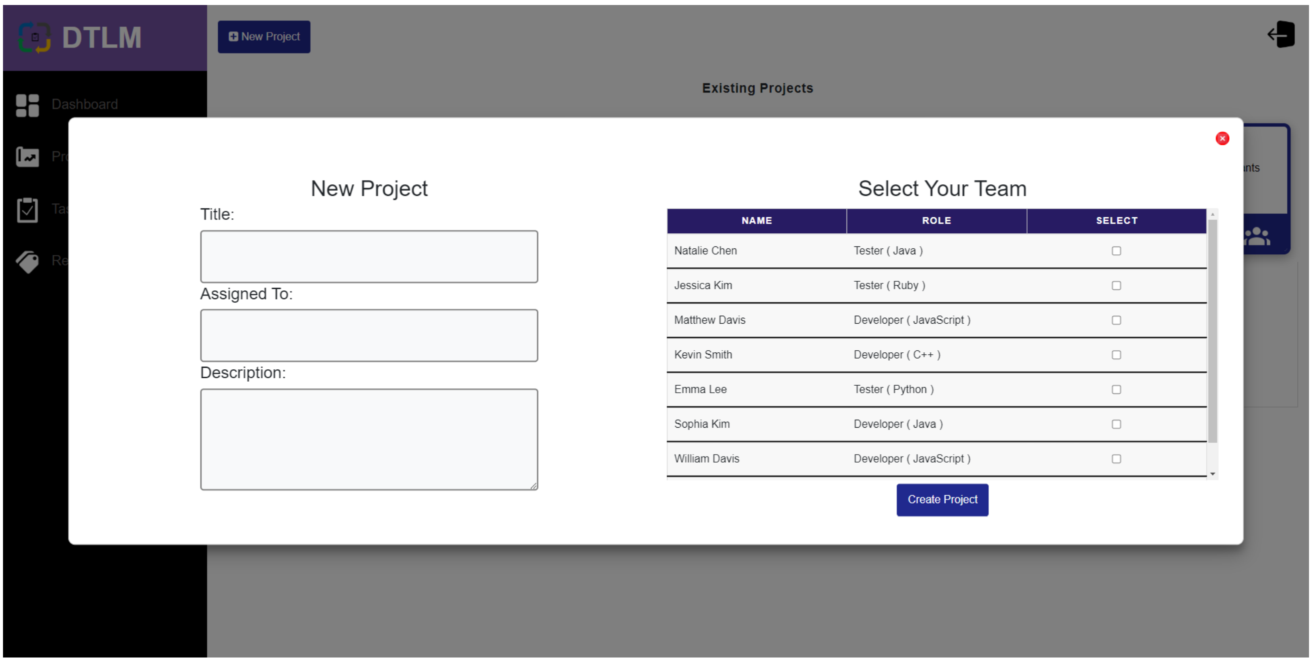

Figure 4.6: Create Project Page

7. View Tasks for Project

   User can view tasks created under the projects

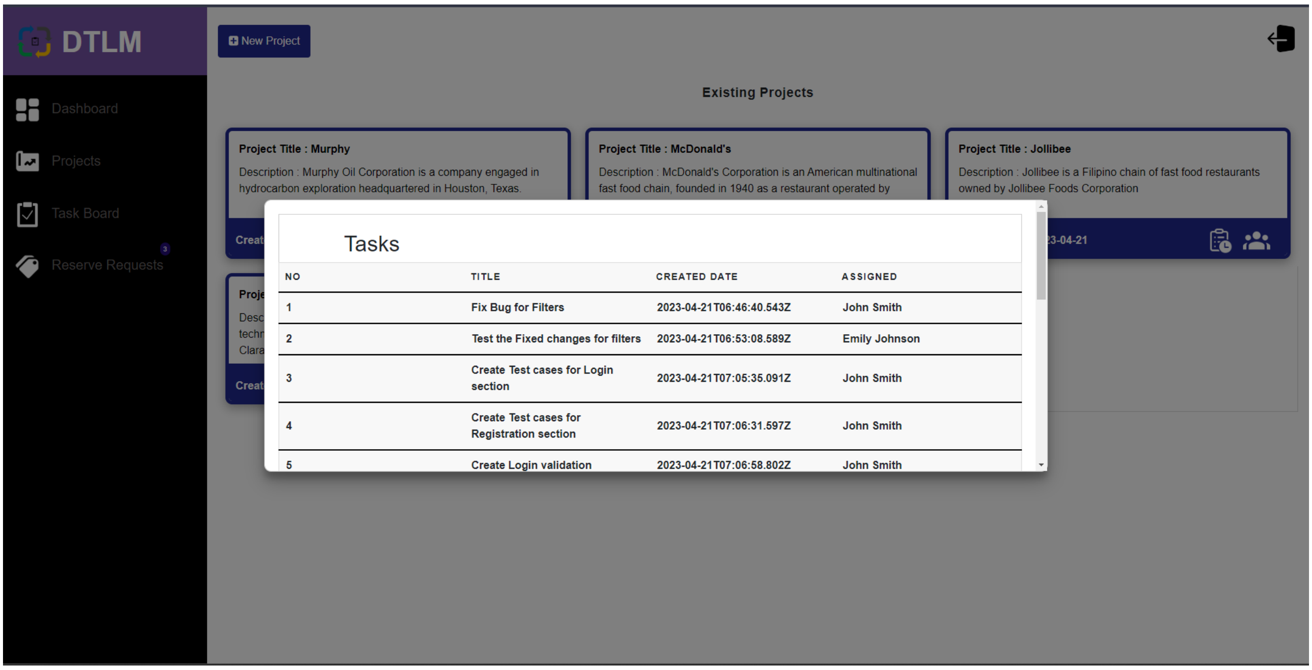

Figure 4.7: View Tasks

8. View Team

   User can view team created under the projects

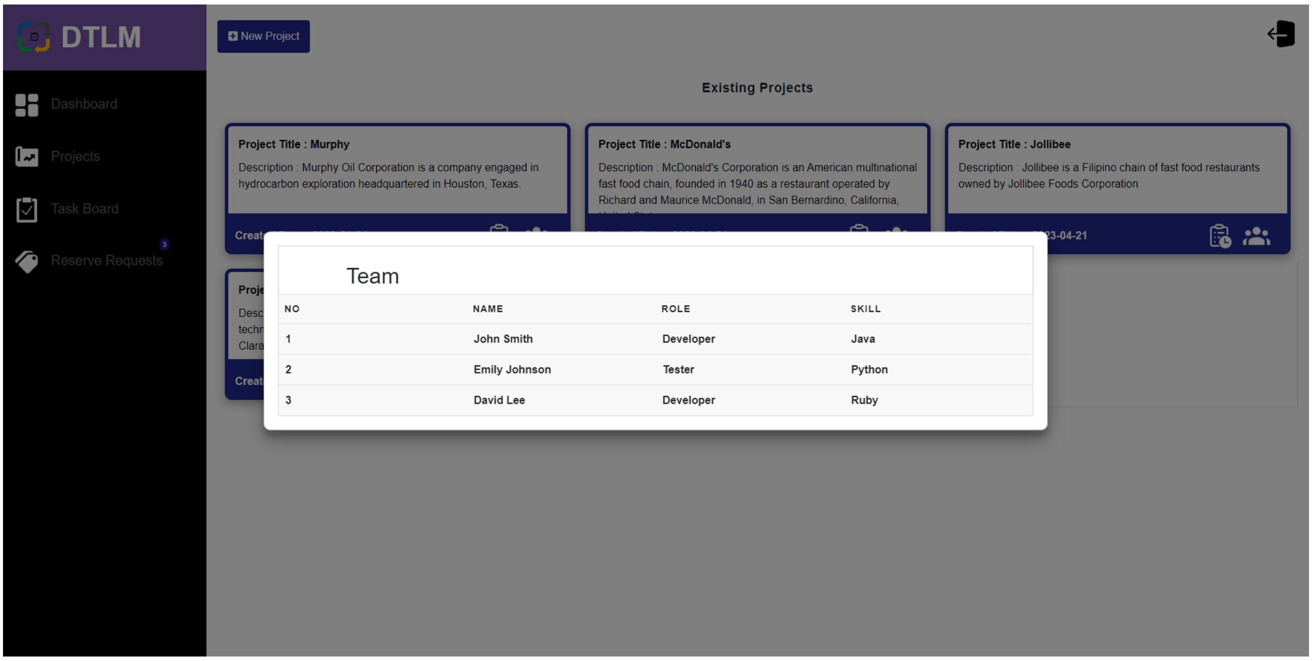

Figure 4.8: View Team

9. Taskboard

Each Task that is generated is presented in a separate tab.

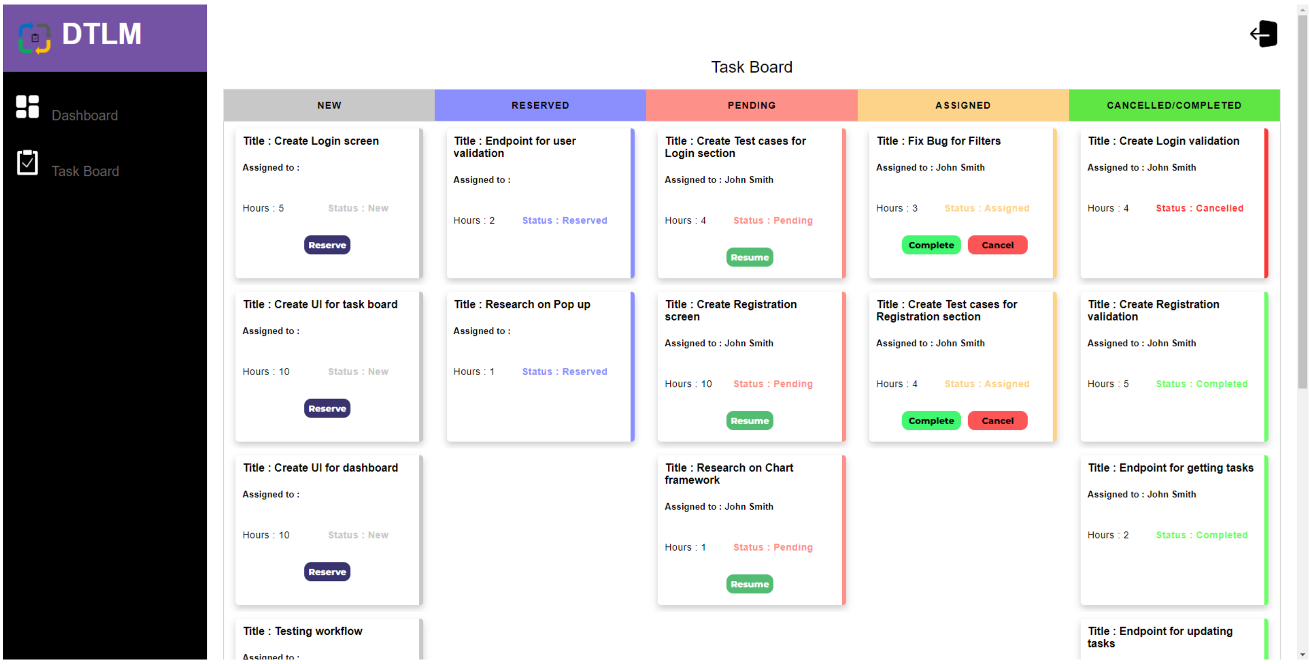

Figure 4.9: Taskboard

10. Create Tasks

You can write down and make up all the information about the work.

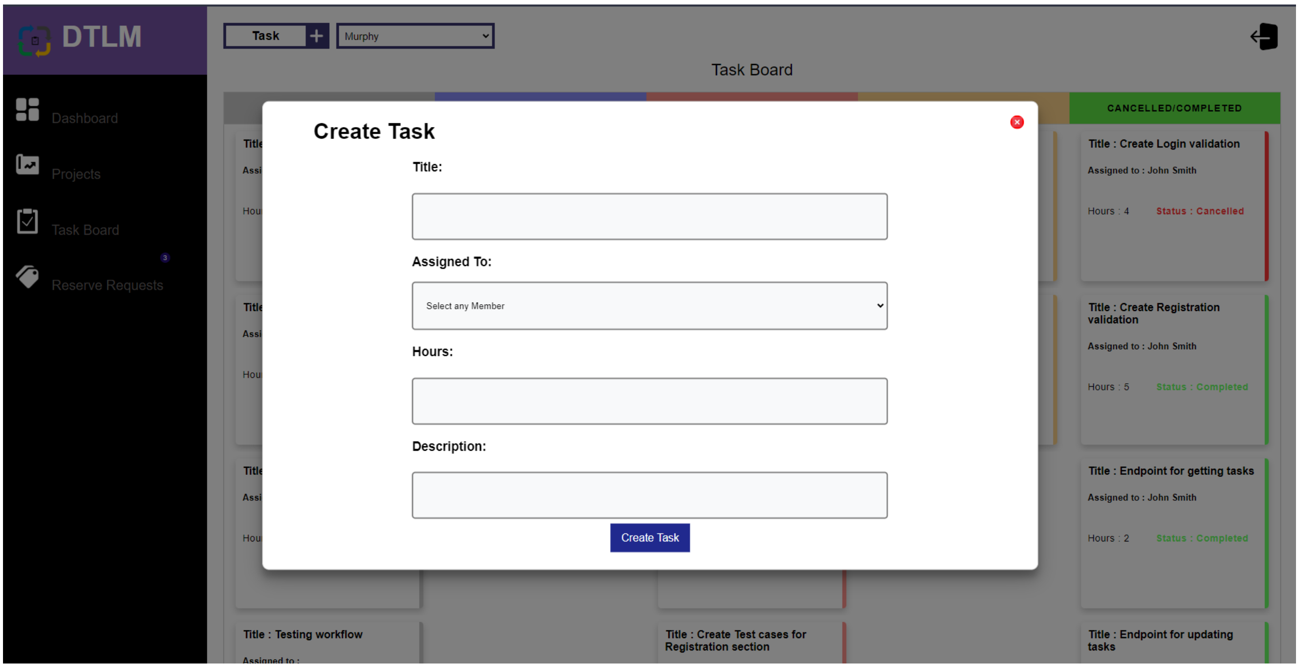

Figure 4.10: Create Task

11. Admin View Users

    Admin can view the users .

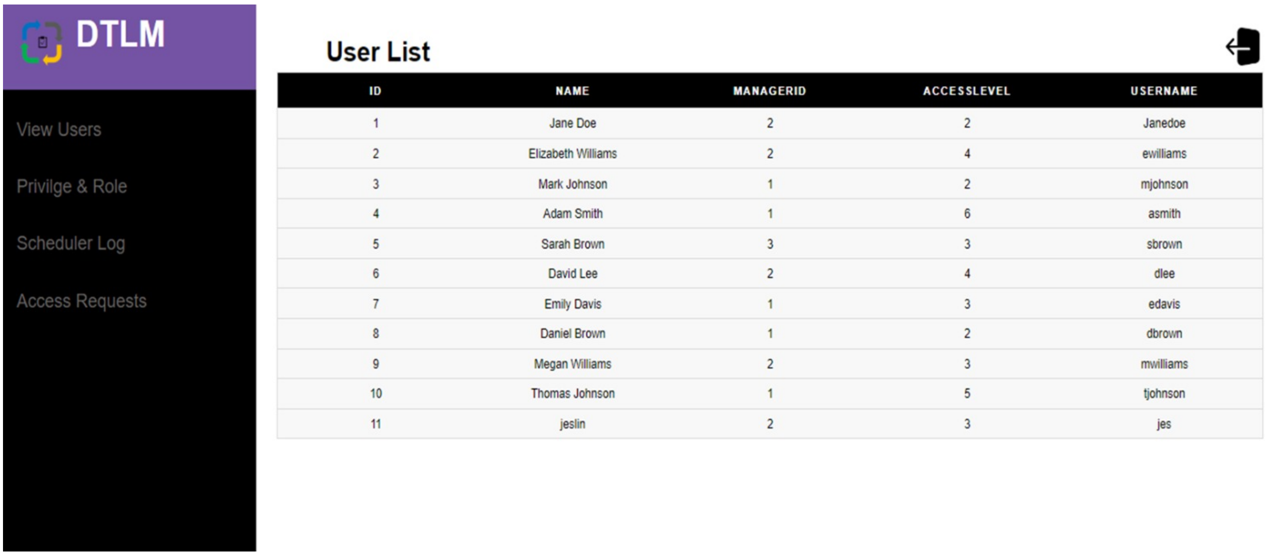

Figure 4.11: Admin View Users

12. Role and Privilege

    Admin can change Role and Privilege .

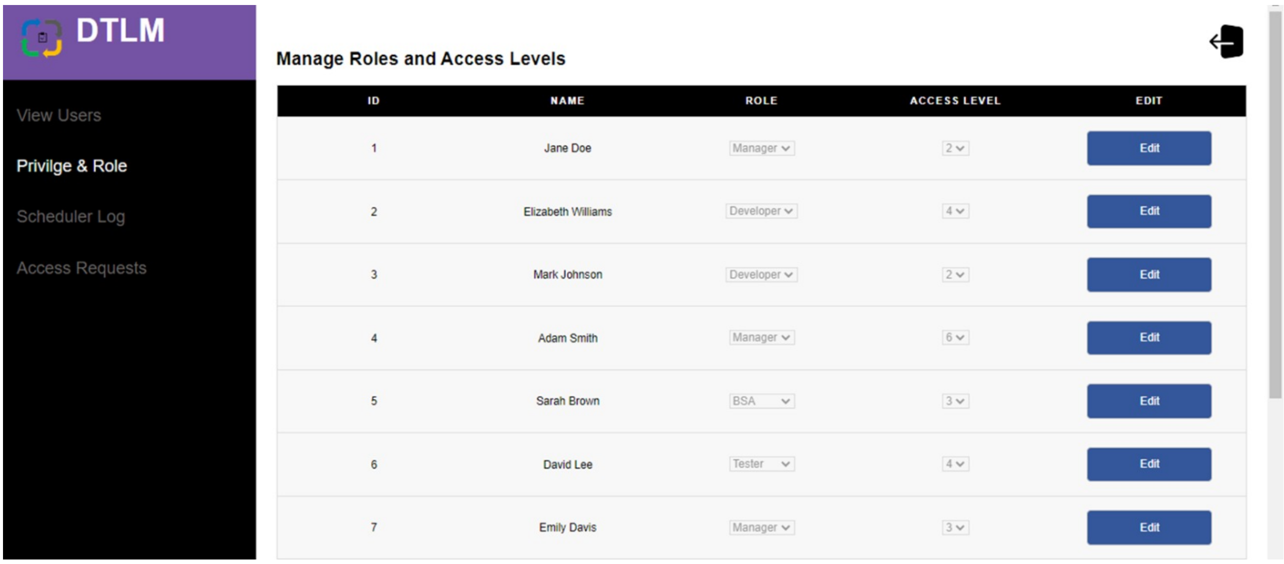

Figure 4.12: Role and Privilege

13. Accept Manager

Admin can accept the manager registration .

Figure 4.13: Accept Manager

14. Scheduler Log

Admin can View the Logs for the schedulers.

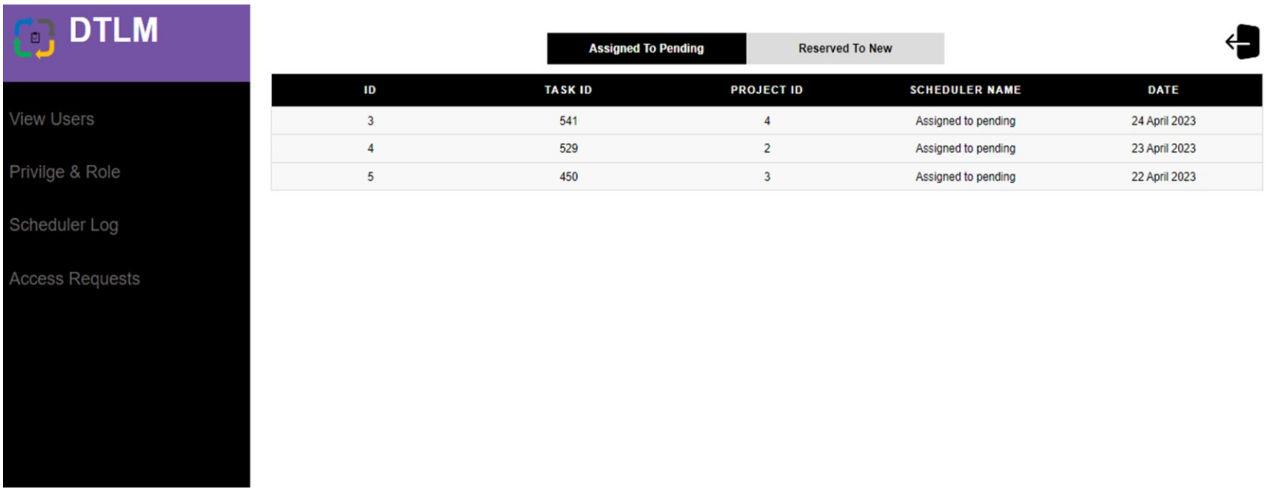

Figure 4.14: Scheduler Log

Chapter 5

CONCLUSION

The project is a smart ticketing system that accepts abnormalities as events from several OEMs' self-diagnosable critical systems, which then creates tickets and assigns a support engineer based on availability, technology, and expertise with a SLA of under a minute.

This fixes the problems with the current mechanism for booking customer care tickets. An first assessment of the system's necessity was made. A thorough study that is easy to use and user pleasant was developed to fulfil the needs of the users. This particular system has been created so that even a user with little experience can readily utilise it.

5.1 Future Enhancement

The system's design makes it possible to install new modules with ease. The reconstruction will provide the system additional adaptability. The system has been designed to be as adaptive and user-friendly as possible, keeping in mind the most recent capabilities of this technology. At this time, the system complies with every SRS criteria.

References

[1] J. Rojas, O. Fragoso, R. Santaolaya and J. Soto, ”Generation of POJOs and DAOs Classes from Metadata Database” *IEEE Latin America Transactions, vol. 18, no. 09, pp. 1547-1554, September 2020, doi: 10.1109/TLA.2020.9381796.*

[2] T. -H. Chen, W. Shang, Z. M. Jiang, A. E. Hassan, M. Nasser and P. Flora, ”Finding and Evaluating the Performance Impact of Redundant Data Access for Applications that are Developed Using Object-Relational Mapping Frameworks” *IEEE Transactions on Software Engineering, vol. 42, no. 12, pp. 1148-1161, 1 Dec. 2016, doi: 10.1109/TSE.2016.2553039.*

[3] L. Li, W. Chou, W. Zhou and M. Luo, ”Design Patterns and Extensibility of REST API for Networking Applications” *IEEE Transactions on Network and Service Management, vol. 13, no. 1, pp. 154-167, March 2016, doi: 10.1109/TNSM.2016.2516946.*

[4] A. Neumann, N. Laranjeiro and J. Bernardino, ”An Analysis of Public REST Web Service APIs” *IEEE Transactions on Services Computing, vol. 14, no. 4, pp. 957-970, 1 July-Aug. 2021, doi: 10.1109/TSC.2018.2847344.*

[5] K. -Y. Chen, J. M. Chang and T. -W. Hou, ”Multithreading in Java: Performance and Scalability on Multicore Systems” *IEEE Transactions on Computers, vol. 60, no. 11, pp. 1521-1534, Nov. 2011, doi: 10.1109/TC.2010.232.*

[6] E. Guerra, A. De Oliveira Dias, L. G. D. O. Véras, A. Aguiar, J. Choma and T. S. Da Silva, ”A Model to Enable the Reuse of Metadata-Based Frameworks in Adaptive Object Model Architectures” *IEEE Access, vol. 9, pp. 85124-85143, 2021, doi: 10.1109/ACCESS.2021.3087795.*

[7] G. Blinowski, A. Ojdowska and A. Przybyłek, ”Monolithic vs. Microservice Architecture: A Performance and Scalability Evaluation” *IEEE Access, vol. 10, pp. 20357-20374, 2022, doi: 10.1109/ACCESS.2022.3152803.*

[8] C. Tudose and C. Odubăşteanu, ”Object-relational Mapping Using JPA, Hibernate and Spring Data JPA” *2021 23rd International Conference on Control Systems*

and Computer Science (CSCS), Bucharest, Romania, 2021, pp. 424-431, doi: 10.1109/CSCS52396.2021.00076.

[9] Wu Peng, ”Exploration of a realization pattern of system based on Hibernate” *2010 International Conference On Computer Design and Applications, Qinhuangdao, China, 2010, pp. V5-108-V5-110, doi: 10.1109/ICCDA.2010.5540871.*

[10] M. Xue and C. Zhu, ”Design and Implementation of the Hibernate Persistence Layer Data Report System Based on J2EE” *2009 Pacific-Asia Conference on Circuits, Communications and Systems, Chengdu, China, 2009, pp. 232-235, doi: 10.1109/PACCS.2009.56.*

[11] E. Bertolissi and C. Preece, ”Java in real-time applications” *IEEE Transactions on Nuclear Science, vol. 45, no. 4, pp. 1965-1972, Aug. 1998, doi: 10.1109/23.710972.*

[12] K. I. Satoto, R. R. Isnanto, R. Kridalukmana and K. T. Martono, ”Optimizing MySQL database system on information systems research, publications and community service” *2016 3rd International Conference on Information Technology, Computer, and Electrical Engineering (ICITACEE), Semarang, Indonesia, 2016, pp. 1-5, doi: 10.1109/ICITACEE.2016.7892476.*

[13] Yu Ping, Hu Hong-Wei and Zhou Nan, ”Design and implementation of a MySQL database backup and recovery system” *Proceeding of the 11th World Congress on Intelligent Control and Automation, Shenyang, China, 2014, pp. 5410-5415, doi: 10.1109/WCICA.2014.7053638.*

[14] Soni, Ravi Soni, Namrata. (2021). Spring Boot with React and AWS, Learn to Deploy a Full Stack Spring Boot React Application to AWS. *10.1007/978-1-4842-7392-0.*

[15] V. K. Myalapalli and S. Geloth, ”High performance JAVA programming” *2015 International Conference on Pervasive Computing (ICPC), Pune, India, 2015, pp. 1-6, doi: 10.1109/PERVASIVE.2015.7087004.*

APPENDIX

Screenshots

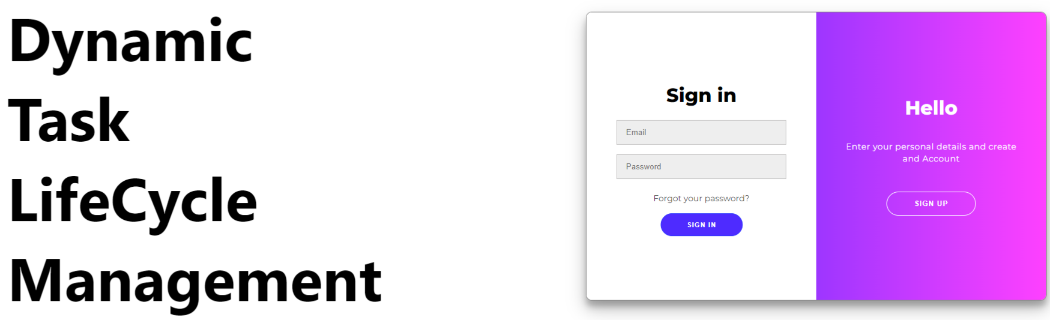

Figure A.1: Login Page

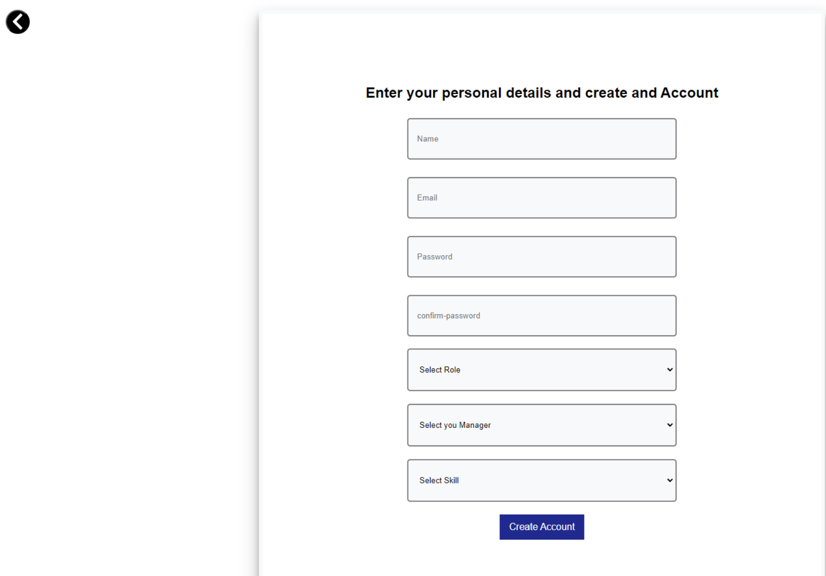

Figure A.2: Registration Page

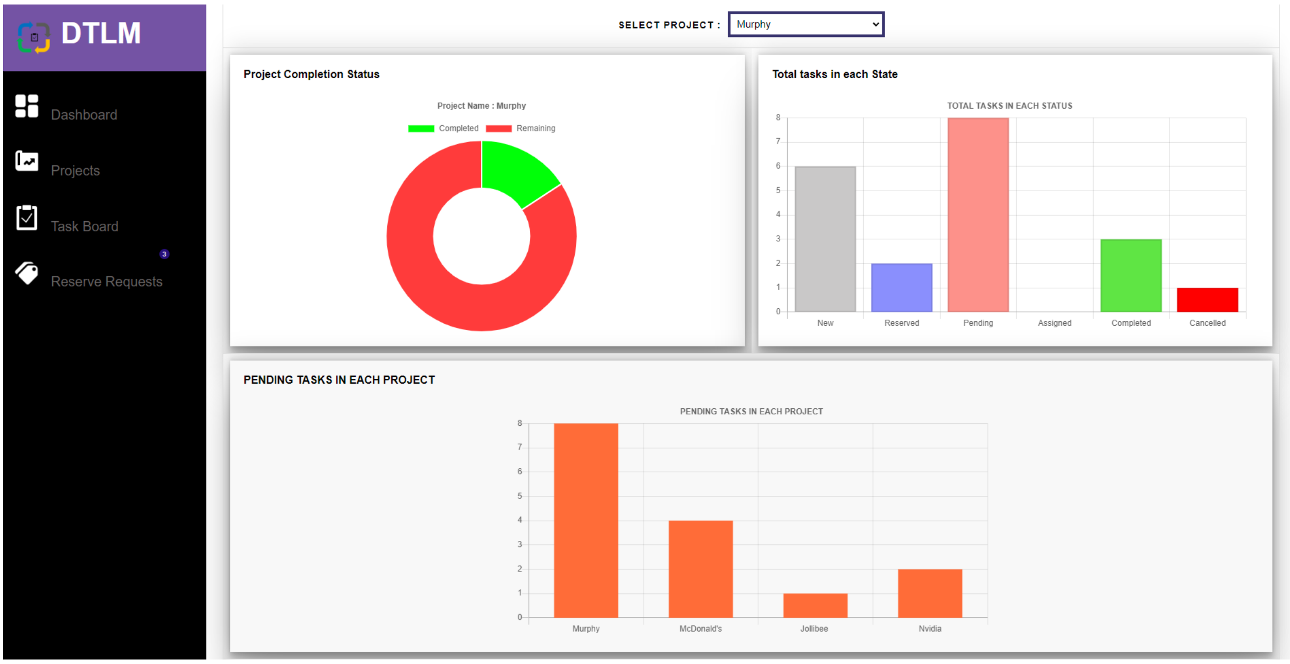

Figure A.3: Manager Dashboard Page

Figure A.4: User Dashboard Page

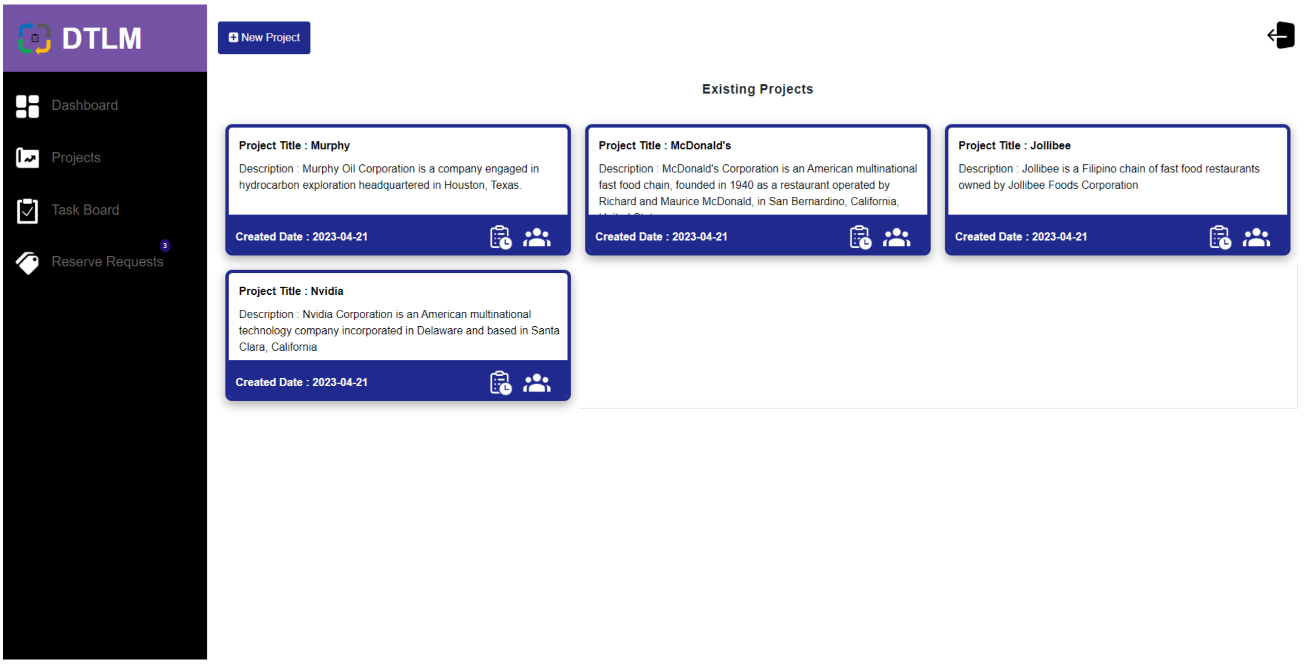

Figure A.5: Project Page

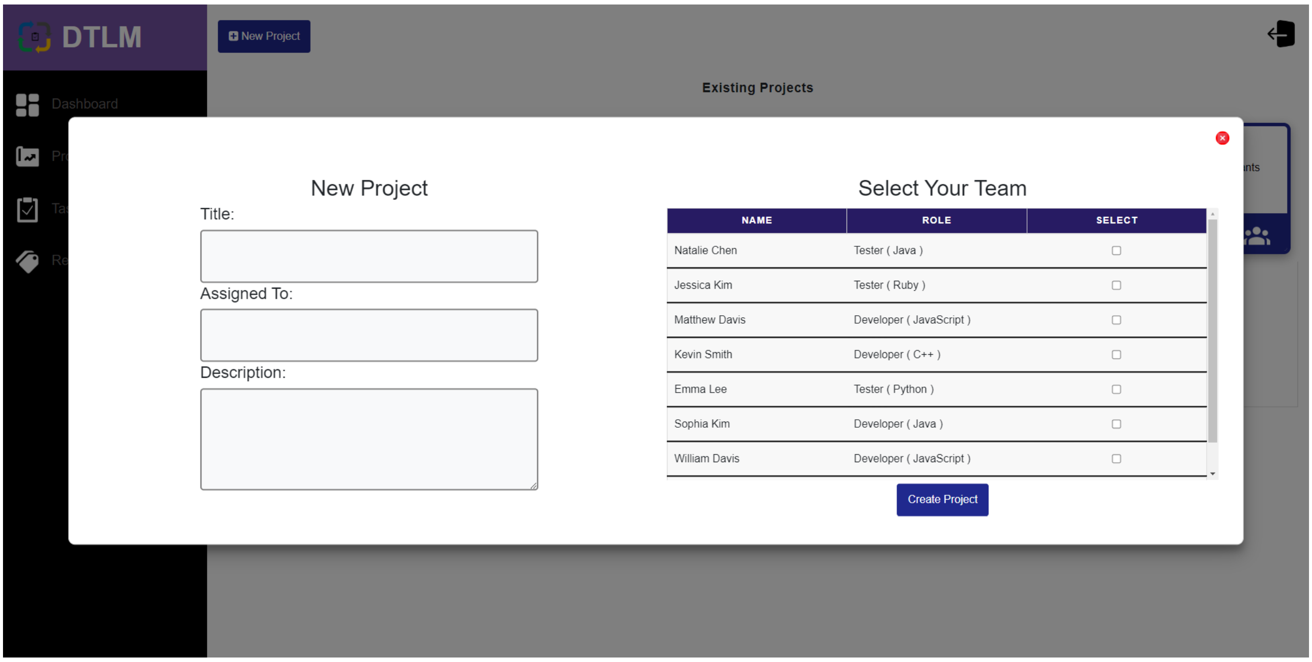

Figure A.6: Create Project Page

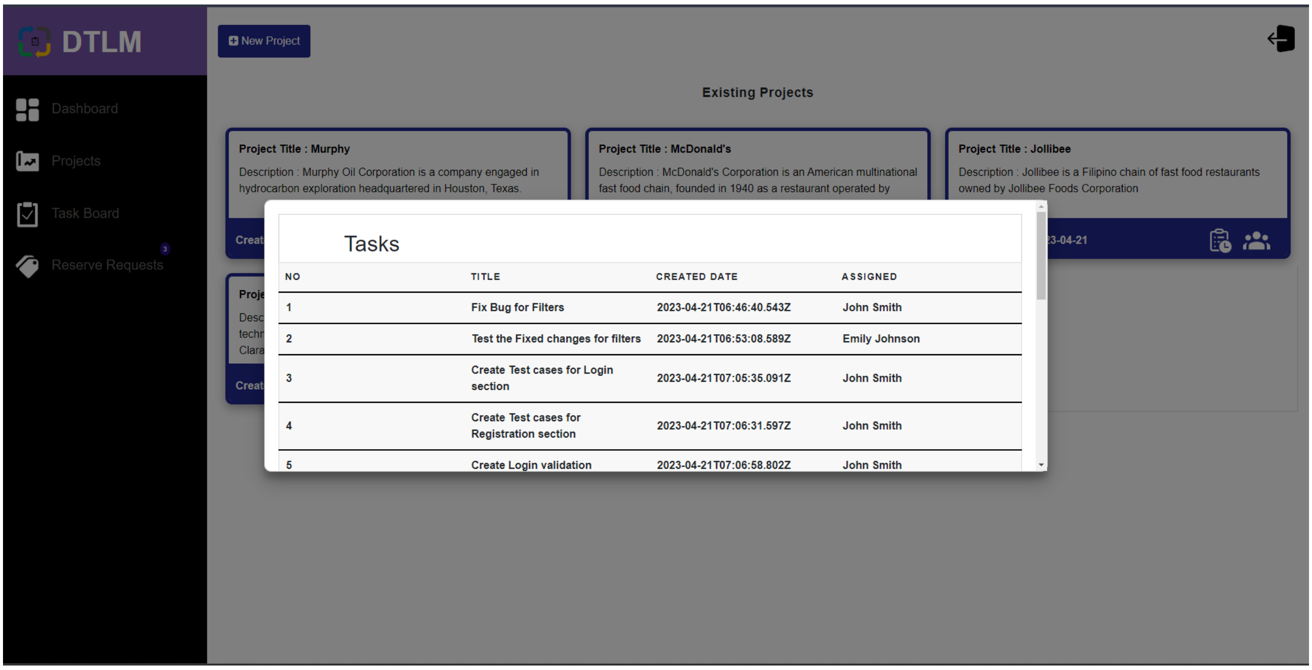

Figure A.7: View Tasks

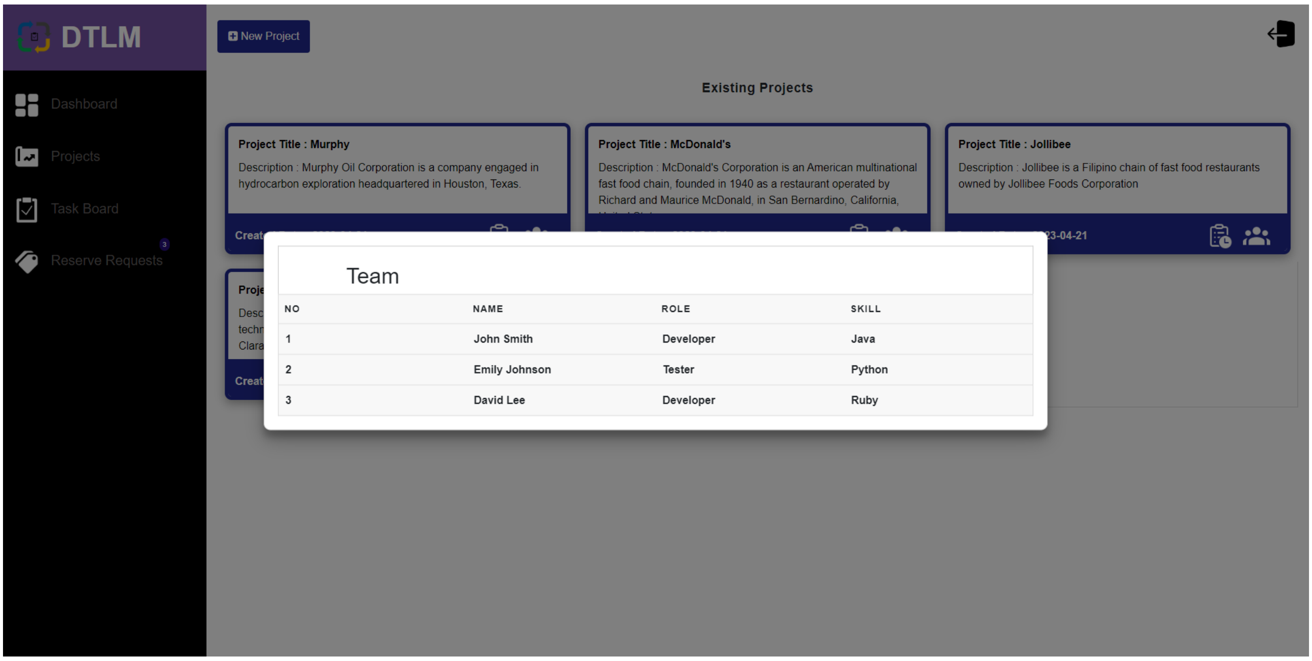

Figure A.8: View Team

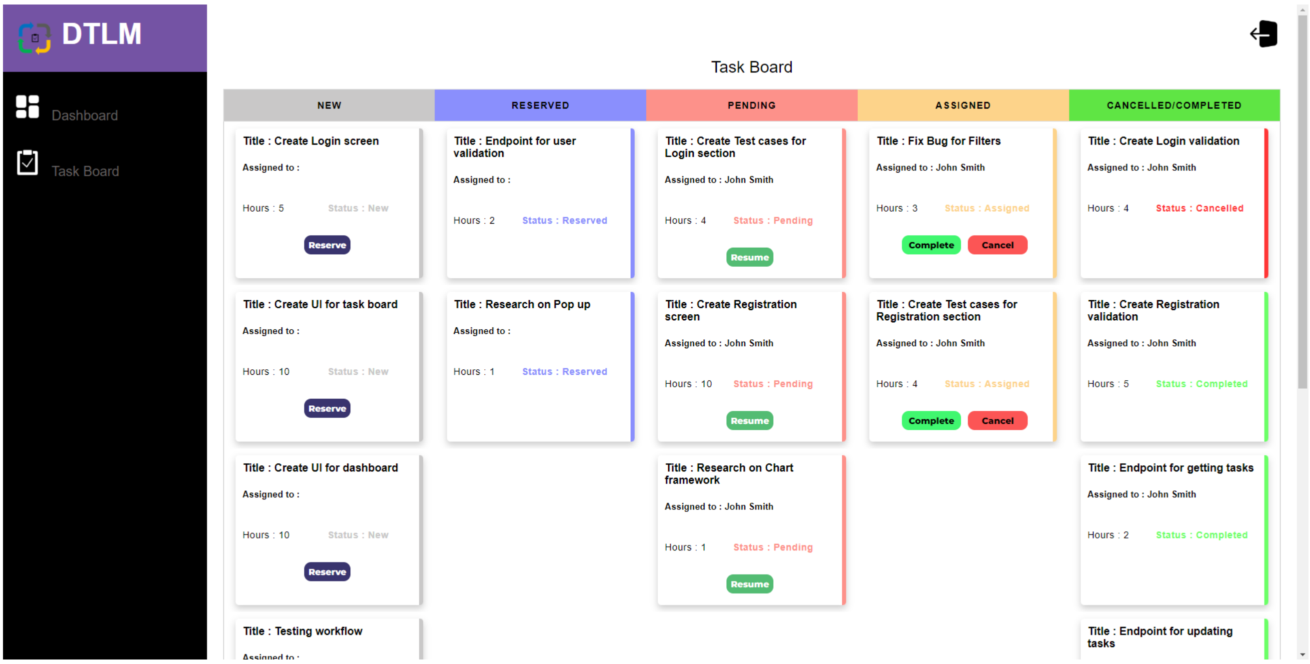

Figure A.9: Taskboard

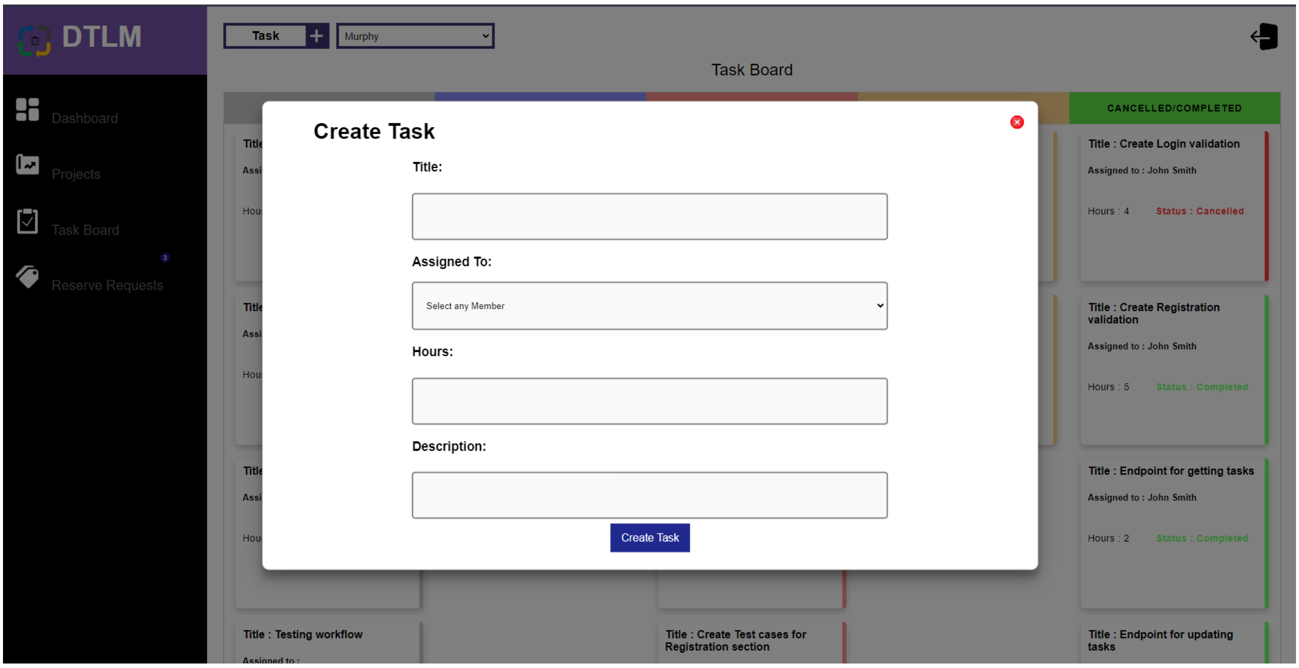

Figure A.10: Create Task

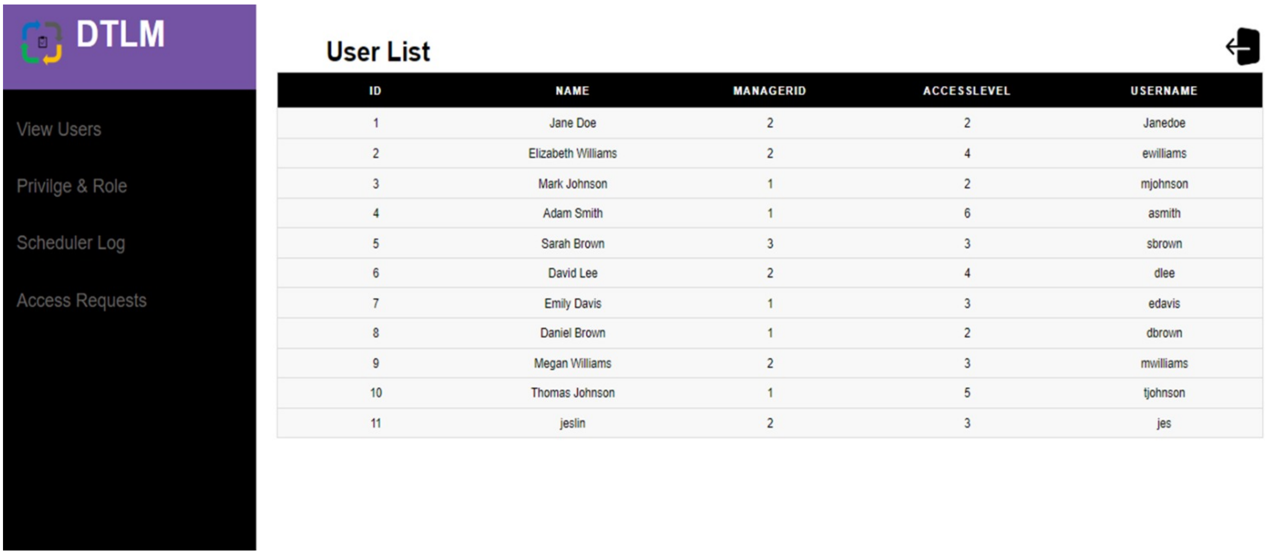

Figure A.11: Admin View Users

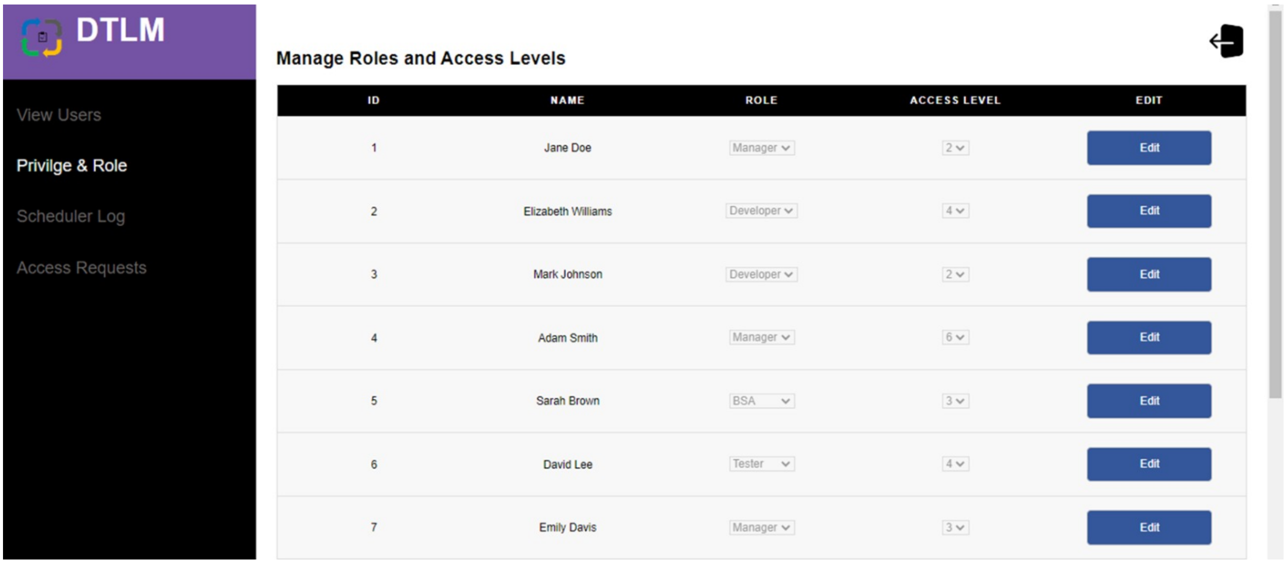

Figure A.12: Role and Privilege

Figure A.13: Accept Manager

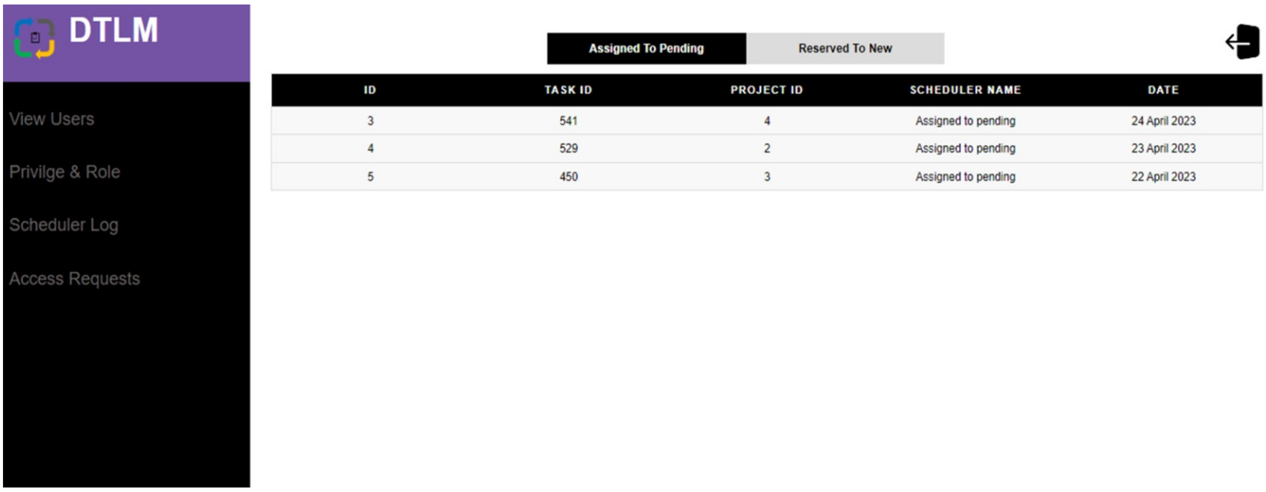

Figure A.14: Scheduler Log