LAB MASTER

Submitted in partial fulfillment of the requirements of the degree of

BACHELOR OF COMPUTER ENGINEERING

by

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A. P. SHAH INSTITUTE OF TECHNOLOGY, THANE

(2022-2023)

A. P. SHAH INSTITUTE OF TECHNOLOGY, THANE

CERTIFICATE

This is to certify that the Mini Project 2B entitled "**LAB MASTER**" is a bonafide work of **"SUHAS MURTHY (20102099), AJAY NIRMAL (20102170), MRUNAL MISALE (20102110), SUCHIT JAIN (20102163)"** submitted to the University of Mumbai in partialfulfilment of the requirement for the award of the degree of **Bachelor of Engineering** in **Computer Engineering.**

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Project Report Approval for Mini Project-2B

This Mini project report entitled "**LAB MASTER**" *by SUHAS MURTHY, AJAY NIRMAL, MRUNAL MISALE, SUCHIT JAIN* is approved for the partial fulfilled of the degree of *Bachelor of Engineering* in *Computer Engineering*, *2022-23*.

Examiner Name   Signature

1.————————————————   ——————————————

2.————————————————   ——————————————

Declaration

We declare that this written submission represents my ideas in my own words and where others' ideas or words have been included, I have adequately cited and referenced the original sources. I also declare that I have adhered to all principles of academic honesty and integrity and have not misrepresented or fabricated or falsified any idea/data/fact/source in my submission. I understand that any violation of the above will be cause for disciplinary action by the Institute and can also evoke penal action from the sources which have thus not been properly cited or from whom proper permission has not been taken when needed.

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ABSTRACT

"Lab Master" is a smart online website with a simple looking interface designed to reduce manual work and automate things with just a few clicks. Basically, there are 3 types of users : Admin, System Administrator & Faculty each with a separate dashboard and can perform tasks based on their assigned roles.

This website allows Admin to add/remove/view users and labs, generate monthly reports, and print them for documentation.

System administrators (technicians) can make the configuration of newly added labs by admin by providing the appropriate inputs. The second task as system administrator is to troubleshoot lab equipment problems mentioned by the faculty members and also receives a notification whenever an issue is triggered.

Faculties can view labs and report issues by selecting the PC icon and writing down the issue. When a faculty member selects a specific PC to report a problem with, that PC is flagged red to indicate that there is a problem with that PC. Good PCs are marked in green. Faculties also get notification whenever the issue is been resolved by the System Administrator.

Keywords: web-based reporting management system, computer labs, peripheral equipment, technicians, automated system, productivity, efficiency.

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Chapter 1
Introduction

The advancements in technology have played a vital role in revolutionizing the way we live and work. With the advent of computers, the world has become a global village, and technology has now become an integral part of our lives. Today, computers are used in every sector, be it education, business, healthcare, or any other field. Computer labs are an essential part of educational institutions, where students can access technology and learn using it. However, managing the peripheral equipment in these labs is a challenging task, which is currently done manually. The manual system is ineffective and time-consuming, leading to lowered productivity and irritation for the lab users.

To address this issue, we propose the development of a web-based reporting management system for managing peripheral equipment in computer labs. The system will allow lab users to report issues with peripheral equipment such as monitors, keyboards, and mouse quickly. The system will then notify the technicians responsible for fixing the issue, and the technician can mark the issue as resolved once the problem is fixed. By giving technicians a centralized way to track and address reported issues, the suggested web-based lab management system will increase efficiency and productivity.

The proposed system will be developed using modern web technologies such as HTML, CSS, and ReactJS framework for the front end, Node.js for the backend, and Firebase as the database. The system will be accessible to lab users and technicians through a web browser.

The primary objective of the proposed system is to provide an efficient and automated system for managing peripheral equipment in computer labs. This will help educational institutions increase productivity and ensure that lab users have access to technology without any hindrance.

This lab reporting management project aims to create a web-based reporting system for managing computer laboratories and their ancillary equipment in the modern developing world. The suggested method will enable lab administrators to add labs, after which technicians are authorized to configure the labs, arrange PCs in grids, and allow users to submit issues with a single click. When a problem is discovered, the system will notify technicians via email.

As it offers a centralized method for tracking and resolving reported issues, the saved information is a crucial part of the suggested system. Details like the date and time the issue was reported, the apparatus involved, the nature of the problem, and the technician tasked with fixing it are all included in the stored information. Lab managers and technicians will have quick access to the data because it is kept in a database.

The data will also give technicians important insights into the general condition of the lab equipment, enabling them to spot recurring problems and take preventative action to stop them from occurring again. In addition, the information will allow Admin to generate reports on the functionality of the lab apparatus, simplifying resource allocation and future update planning.

In summary, the information recorded is an essential part of the proposed lab report management system. The proposed web-based lab management system will provide an efficient and automated system for managing peripheral equipment in computer labs. This will help educational institutions increase productivity and ensure that lab users have access to technology without any hindrance. It provides a centralized way to track, address and resolve reported issues and valuable insights into the performance of lab equipment. The document contains a detailed description of our project.

Chapter 2

Literature Survey

1.**ComTrack**: Implementation of Innovative Computer Lab Management Tool for Academic Institutions.

Computer lab management tools are essential for academic institutions in ensuring the efficient delivery of computer-based learning. ComTrack is an innovative computer lab management tool designed to assist educational institutions in efficiently managing their computer labs. ComTrack provides features such as usage tracking, reservation management, remote deployment of software and updates, and monitoring of lab equipment. While limited research has been conducted on the effectiveness of ComTrack, available studies indicate that the tool is effective in reducing the workload of lab administrators and improving lab utilization rates. Popular computer lab management tools include LabStats, LabMan, and Labstats Cloud. Academic institutions face several challenges when managing computer labs, and these challenges can be addressed by computer lab management tools.[1]

2.**Red Bus:** Red Bus is an online bus ticketing platform that enables users to book bus tickets for various routes across India. The seating layout information on the Red Bus website provides users with a visual representation of the seating arrangements on the bus one is booking. The layout typically includes information such as the number of seats inside the bus, the type of seats available, and the position of each seat on the bus.[2]

Table no. 1 - Summarization of Reference Paper and Hosted Website

TITLE OF REFERENCE PAPER	ABSTRACT	SUMMARIZE
1. ComTrack: Implementation of Innovative Computer Lab Management Tool for Academic Institutions N. A. Harron	The ComTrack tool is a computer lab management tool implemented in academic institutions to improve lab efficiency through real-time monitoring, software inventory management, and user authentication.	The implementation of the ComTrack tool has shown significant improvements in computer lab efficiency, leading to a more organized and streamlined process for both students and staff.
2. Redbus Phanindra Sama, Sudhakar Pasupunuri, and Charan Padmaraju	BookMyShow is a popular online entertainment ticketing platform that provides a user-friendly and convenient booking experience, with a key feature of real-time seat color change updates on confirmation.	This website gives ideas about UI/UX design and also ideas about the color change of PCs after reporting the problems faced by the user.

Chapter 3

Problem Statement, Objectives, and Scope

3.1 Problem Statement

To design and develop a web-based lab management system that can efficiently manage and address reported issues with peripheral equipment in computer labs by using modern web technologies such as HTML, CSS, and ReactJS framework for the front end, Node.js for the backend, and Firebase as the database.

Managing computer labs and their peripherals has become increasingly complex in recent years. The current system for managing these devices, based on manual monitoring and troubleshooting, is inefficient and time-consuming. Lab technicians often have to rely on users to report equipment problems, which slows down the resolution process. This can lead to reduced productivity in the lab and can cause frustration for users. In addition, existing systems are not able to store and track reported incidents, making it difficult for technicians to identify and resolve recurring problems. This can lead to the same issues being reported over and over again, wasting time and resources.

Therefore, there is a need for a more streamlined and automated system that can quickly identify and resolve problems with peripheral equipment in the computer lab. The proposed solution is to develop a web-based report management system that allows lab technicians to create lab layouts, place PCs in a grid, and allow users to report problems with a single click. click. This system will archive reported issues and provide technicians with a quick and efficient way to resolve them, increasing productivity and user satisfaction.

The proposed system will also send email notifications to each technician when a problem is reported. This will ensure that the technician responsible for the affected peripheral is aware of the problem and can resolve it quickly.

In summary, the current manual system for managing computer lab peripherals is inefficient and time-consuming, leading to reduced productivity and frustration for users. A more

streamlined and automated system is needed to quickly identify and resolve problems with computer lab peripherals. The proposed web-based report management system will provide technicians with a centralized way to track and resolve reported issues, increasing efficiency and productivity.

3.2 Objective

- To develop a web application for lab management.
- To automate the process of reporting and resolving lab-related issues.
- To provide a user-friendly interface for both technicians and users.
- To provide real-time updates to users and technicians about the status of lab PCs.
- To provide a dynamic grid layout of the lab configuration.
- To provide a report-generation feature for admins.

3.3 Scope

- Device Management
- Status Tracking
- Customizable Fields
- Record-Keeping
- Automated Notifications

Chapter 4

Proposed System Architecture

4.1 Architecture Diagram:
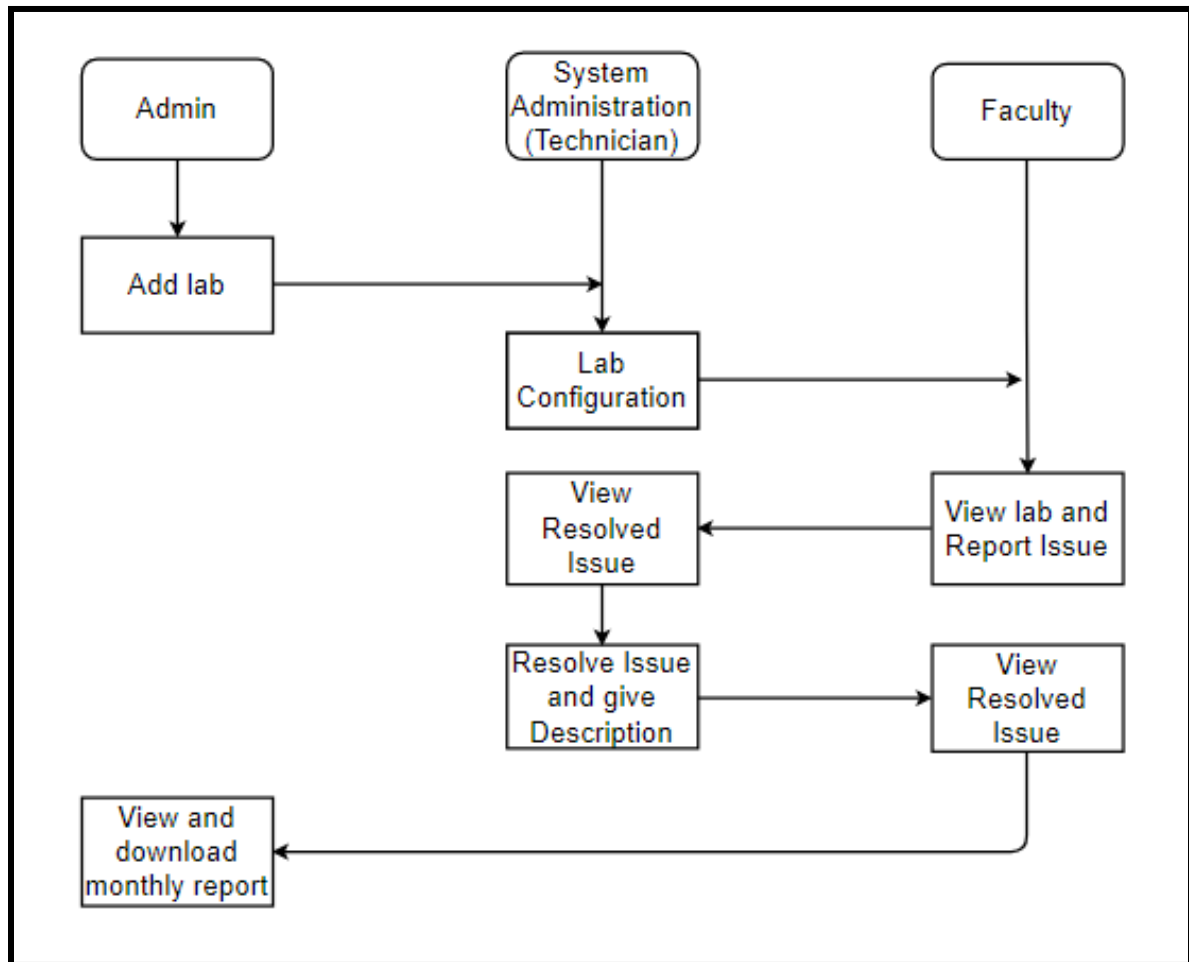
Fig no.4.1-Architecture Diagram

4.2 Block Diagram
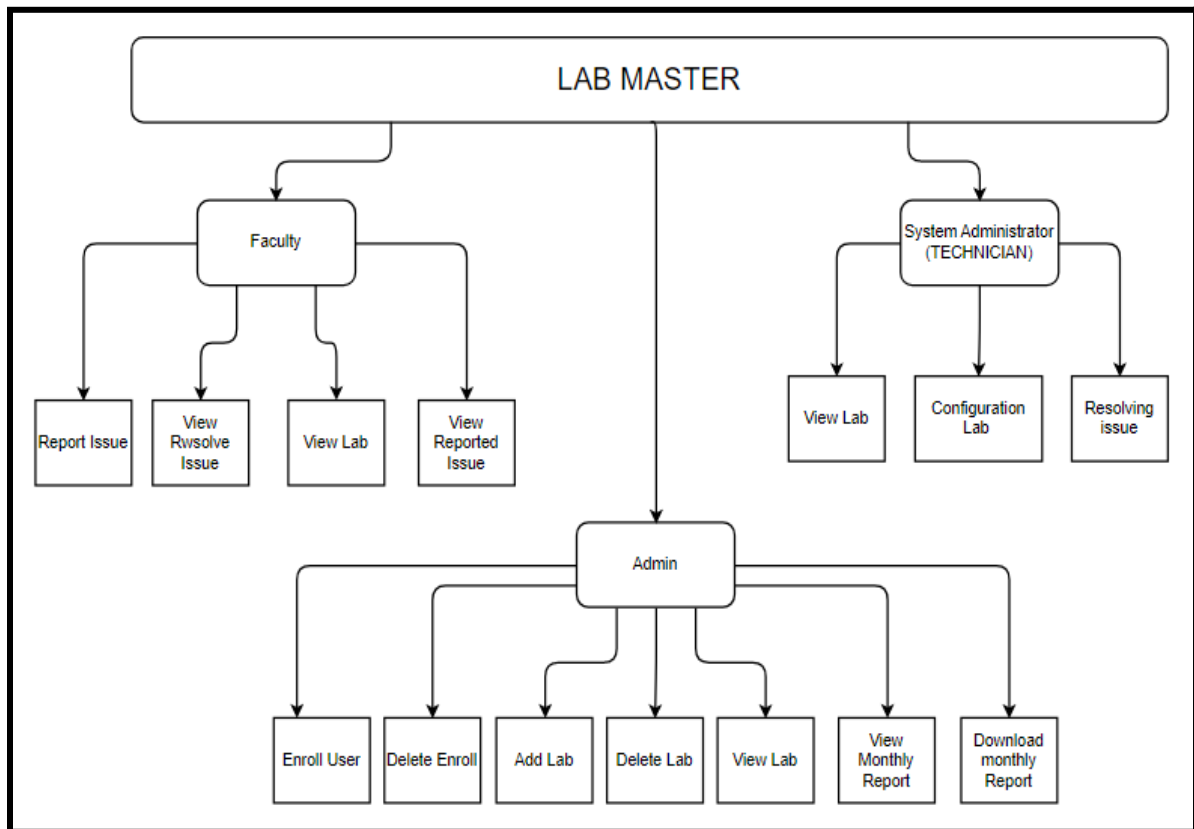
Fig no.4.2 - Block Diagram

4.3 Use Case Diagram
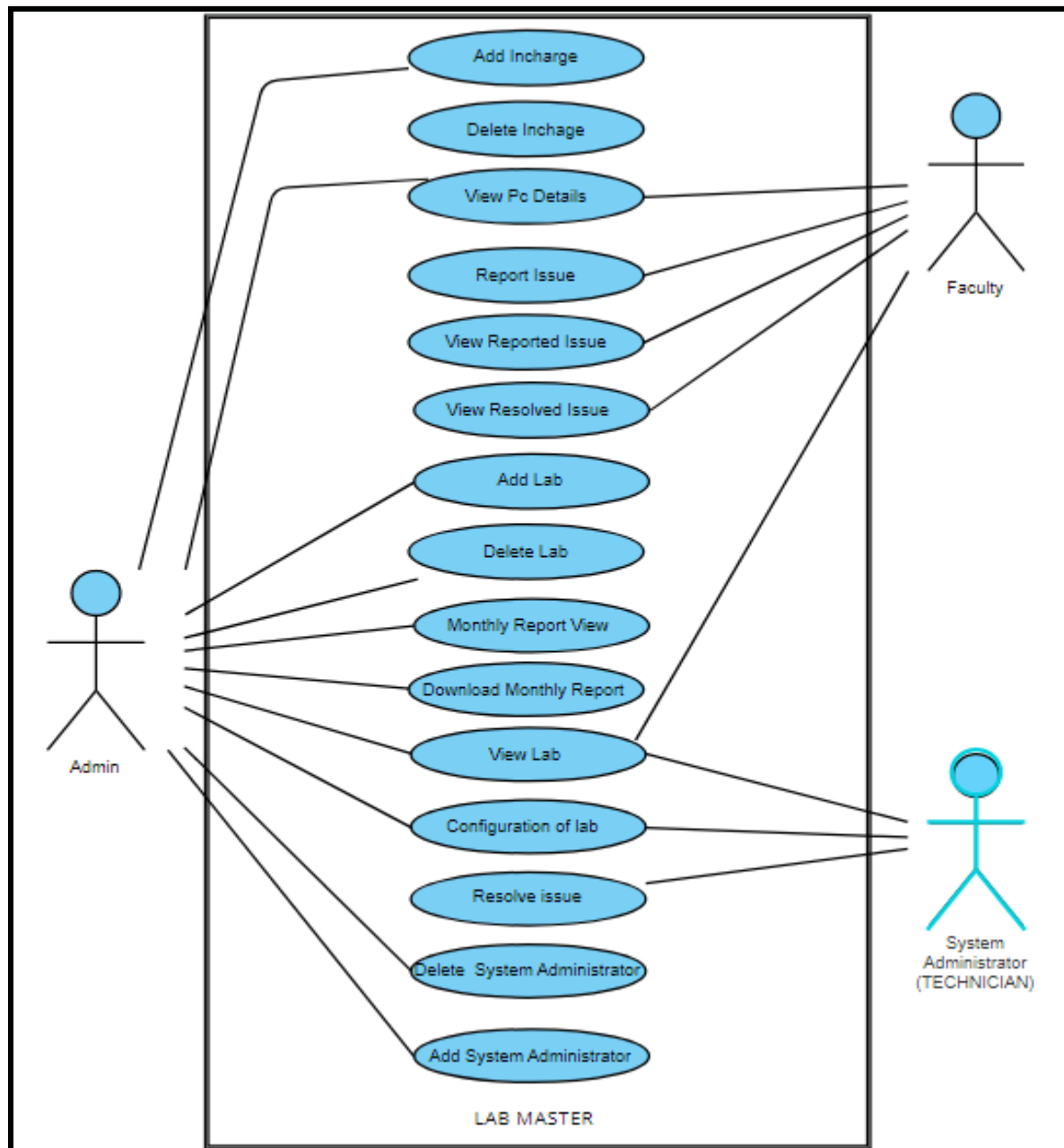
Fig no.4.3 - Use Case Diagram

4.4 DFD - Data Flow Diagram

DFD LEVEL 0
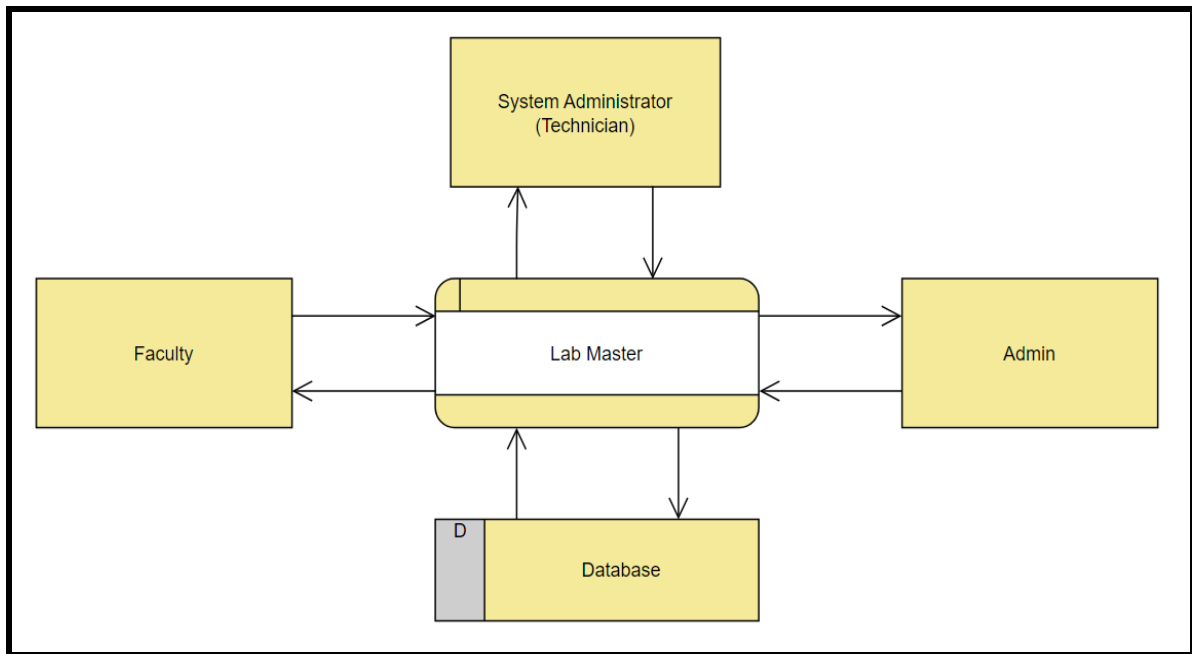
Fig no.4.4.1 - DFD Level 0
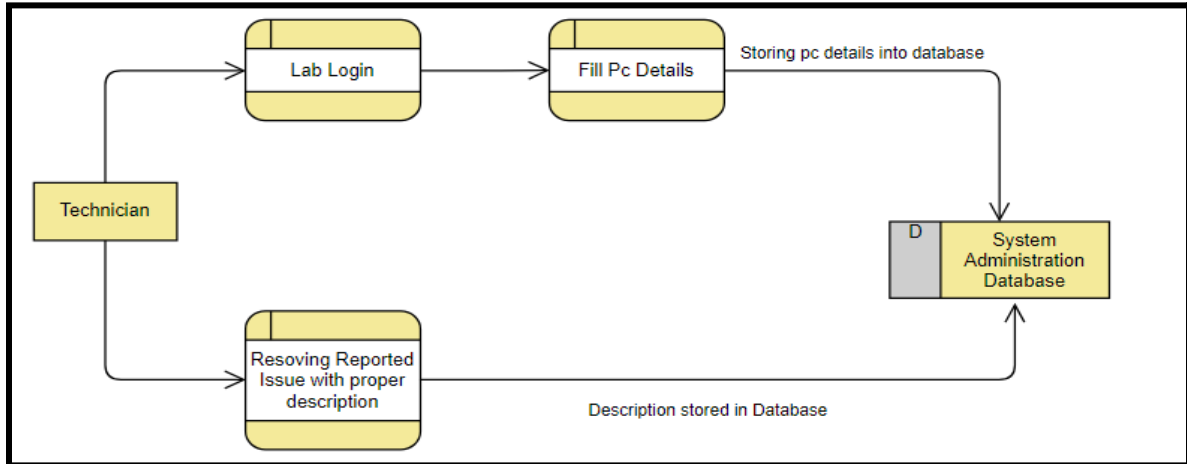
DFD LEVEL 1
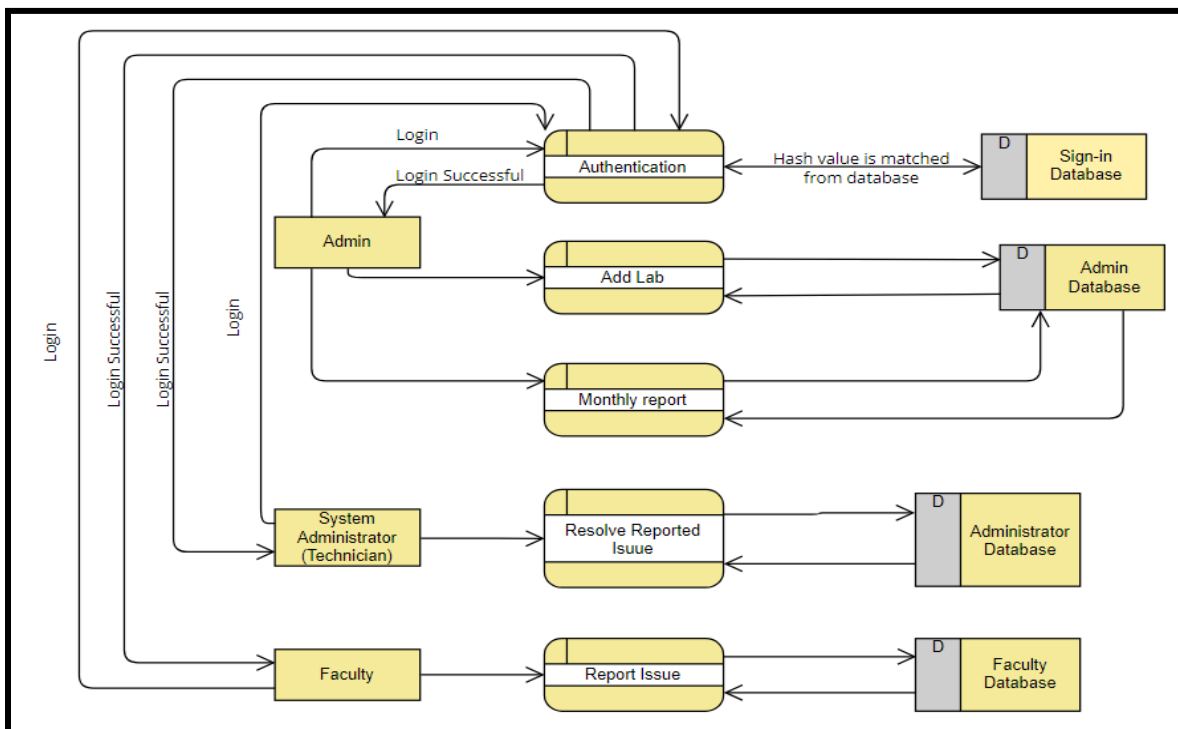
Fig no.4.4.2 - DFD Level 1

DFD LEVEL 2

Fig no.4.4.3 - DFD Level 2(Technician)
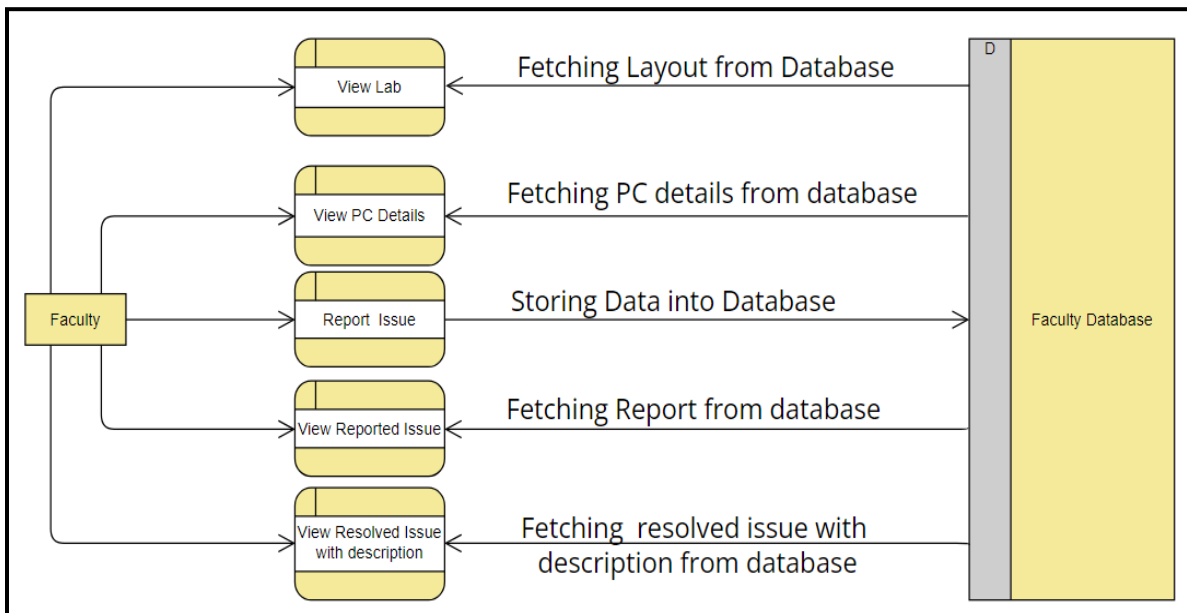
Fig no.4.4.4 - DFD Level 2(Faculty)
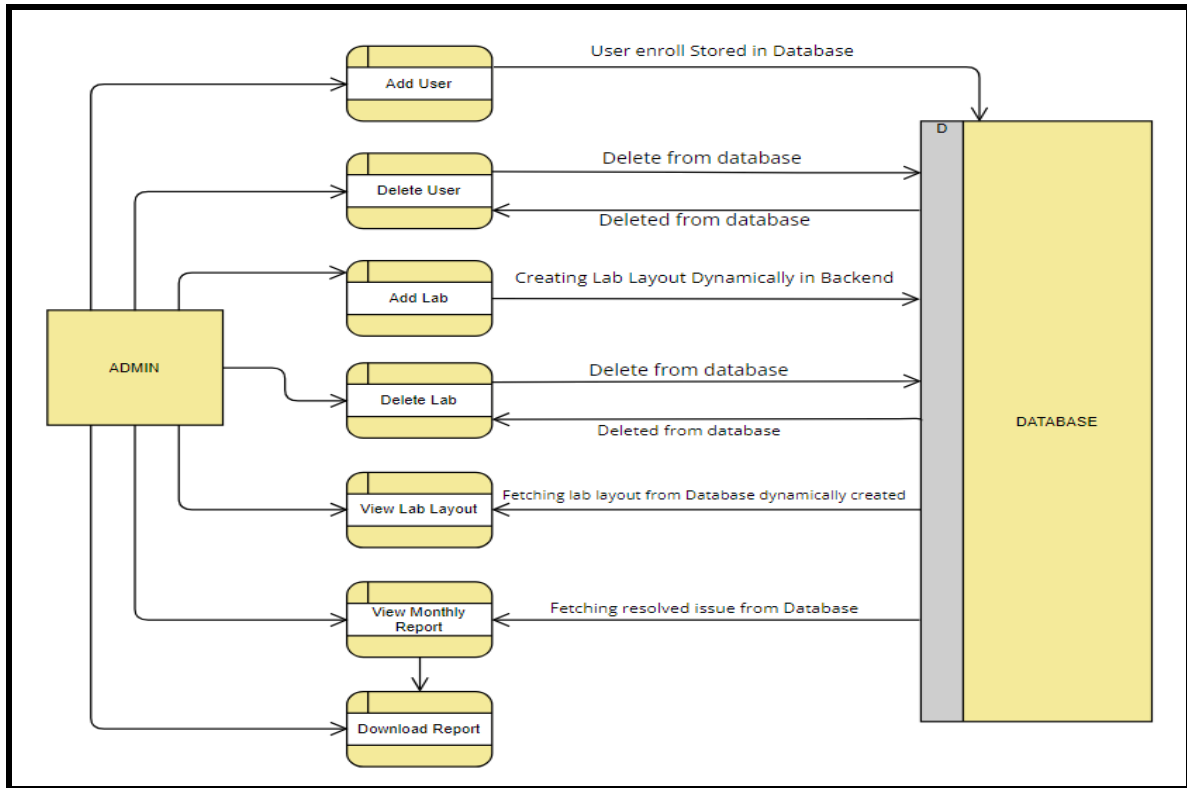
Fig no.4.4.5 - DFD Level 2(Admin)

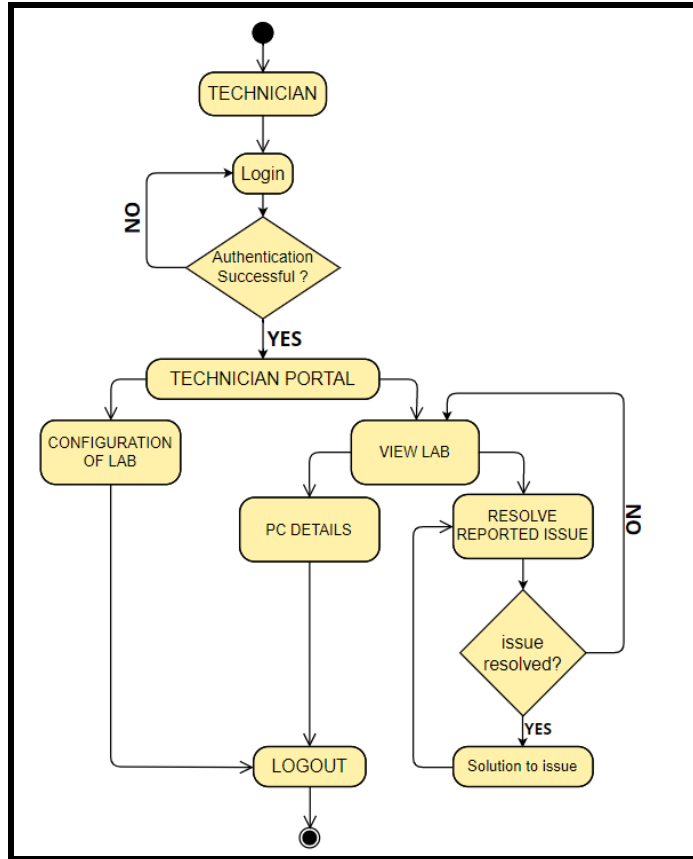## 4.5 Activity Diagram
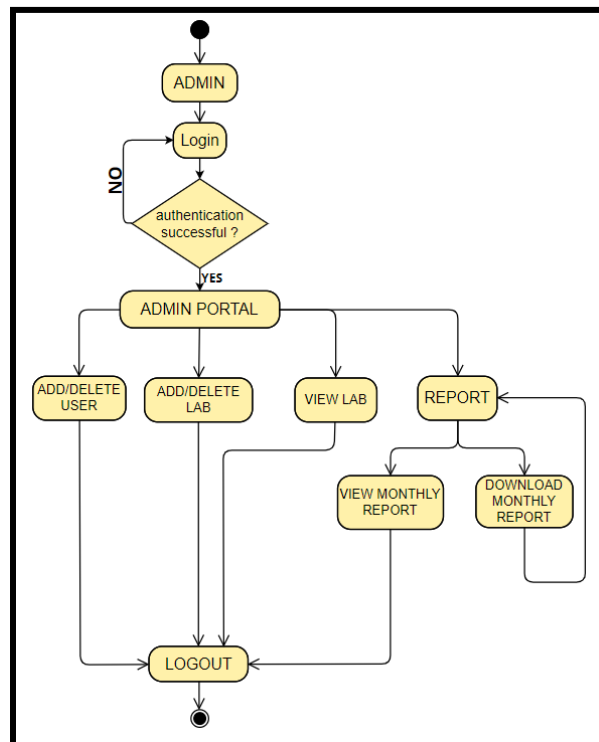
Fig no.4.5.1 - Admin Activity Diagram

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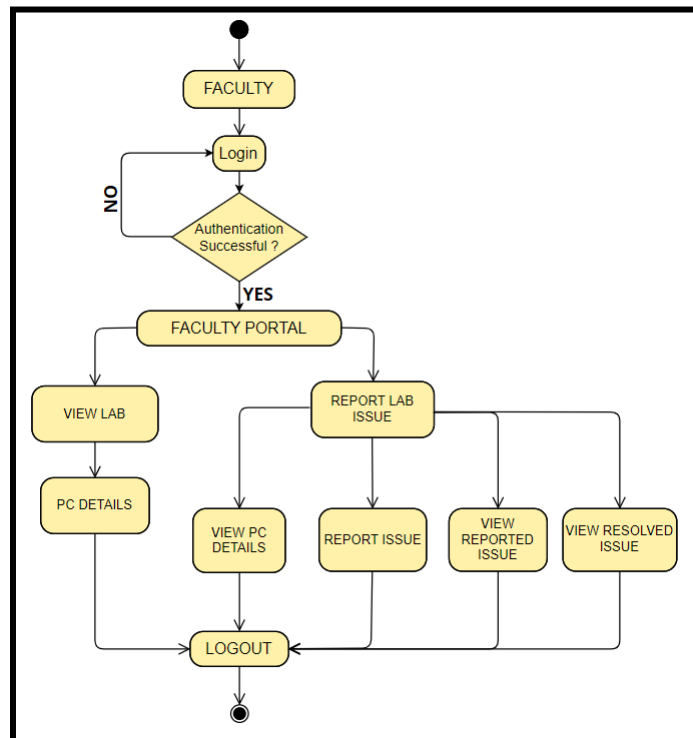**Fig no.4.5.2 - Technician Activity Diagram**

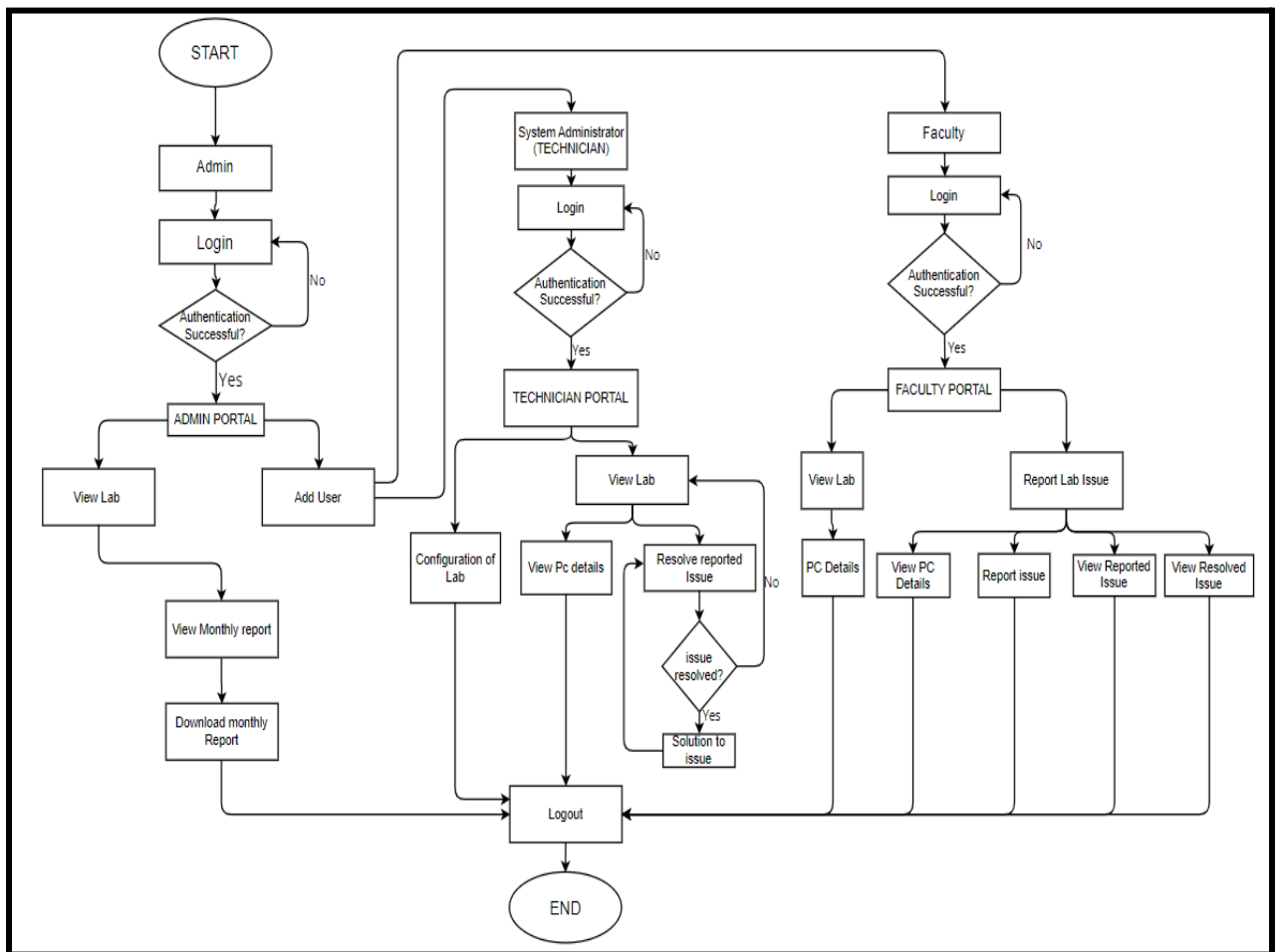**Fig no.4.1.5.3 - Faculty Activity Diagram**

4.6 Flow chart

Fig no.4.6 - Flow chart

Chapter 5

Project Planning

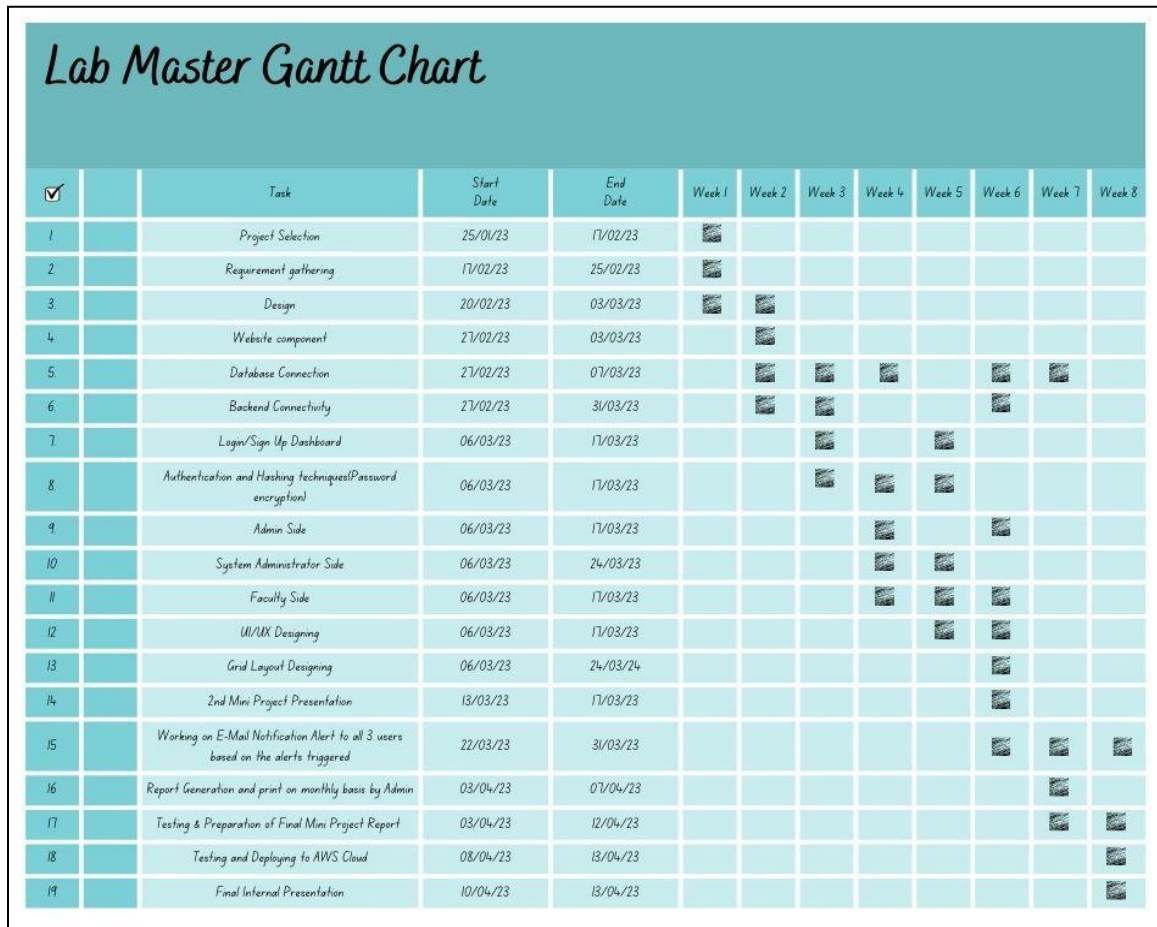The below Fig. shows the Planning of our Project from 25.01.23 to 13.04.23

Lab Master Gantt Chart

☑		Task	Start Date	End Date	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8
1.		Project Selection	25/01/23	17/02/23	■							
2.		Requirement gathering	17/02/23	25/02/23	■							
3.		Design	20/02/23	03/03/23	■	■						
4.		Website component	27/02/23	03/03/23		■						
5.		Database Connection	27/02/23	07/03/23		■	■	■		■	■	
6.		Backend Connectivity	27/02/23	31/03/23		■	■			■		
7.		Login/Sign Up Dashboard	06/03/23	17/03/23			■		■			
8.		Authentication and Hashing techniques(Password encryption)	06/03/23	17/03/23			■	■	■			
9.		Admin Side	06/03/23	17/03/23				■		■		
10.		System Administrator Side	06/03/23	24/03/23				■	■			
11.		Faculty Side	06/03/23	17/03/23				■	■	■		
12.		UI/UX Designing	06/03/23	17/03/23					■	■		
13.		Grid Layout Designing	06/03/23	24/03/24						■		
14.		2nd Mini Project Presentation	13/03/23	17/03/23						■		
15.		Working on E-Mail Notification Alert to all 3 users based on the alerts triggered	22/03/23	31/03/23						■	■	■
16.		Report Generation and print on monthly basis by Admin	03/04/23	07/04/23						■		
17.		Testing & Preparation of Final Mini Project Report	03/04/23	12/04/23							■	■
18.		Testing and Deploying to AWS Cloud	08/04/23	13/04/23								■
19.		Final Internal Presentation	10/04/23	13/04/23								■

Fig no.5 - Gantt Chart: Lab Master

Chapter 6

Experimental Setup

5.1. Software Requirements: -

1. Editor used for this project is Visual Studio Code
2. HTML and CSS - Tailwind CSS for Web Designing
3. Reactjs for better functionality
4. Firebase for Database
5. Express js for Backend

5.2. Hardware Requirements: -

Modern Operating System:

1. Windows 7 or 10

2. Mac OS X 10.11 or higher, 64-bit

3. Linux: RHEL 6/7, 64-bit (almost all libraries also work in Ubuntu) x86 64-bit CPU (Intel / AMD architecture)

4. 4 GB RAM

Chapter 7
Implementation Details

1. **Creation of Lab Layout**

   Technology: Render.grid - There is no built-in render.grid function in JavaScript, as it is not a part of the standard library or any widely recognized third-party library. It is possible that render.grid is a custom function created by a developer to generate and display a grid or table-like structure in a web page or graphical user interface (GUI) application.

2. **Used to iterate the PCs**

   Technology: array.map function - In JavaScript, the array.map() function is a built-in method of the Array object that allows you to create a new array by applying a function to each element of an existing array. The map() function takes a callback function as its argument, which is called once for each element in the array. The callback function is passed through three arguments: the current element being processed, the index of the current element, and the array that the map() method was called upon.

3. **Dynamic Layout Allocation**

   Technology: Variable set operator - In JavaScript, the variable set operator is used to assign a value to a variable

Methodology

The Below represents the Methodology for our Project.

Creation of Lab Layout uses render.grid function:

To create a CSS grid for our project, we utilized a function called render.grid. This function takes input from the system administrator and creates a grid layout based on the specified number of rows and columns. This grid layout serves as a visual representation of the lab layout. We used the array.map or data.map function to create the grid layout based on the number of rows and columns specified by the system administrator. To create the layout, we used variables and the CSS set operator, which is a static property. However, in order to make the grid layout dynamic, we had to call or render data from the database. This is done by using the document.getElementById function to set the CSS property first, and then using data.map to arrange the PCs in a grid form instead of a linear form.

Array.map function used to iterate the PCs:

The render.grid function takes in the number of rows and columns as input parameters, and creates a two-dimensional array based on those parameters. This array represents the grid layout, where each cell in the array represents a PC in the lab. We then use the array.map function to loop through each element in the array and create a div element for each cell in the grid.

Variable Set Operator Property for Dynamic Layout Allocation:

We also utilized the variable set operator property in CSS to specify the CSS properties for the grid layout. This includes the grid-template-rows and grid-template-columns properties, which define the number of rows and columns in the grid, and the grid-gap property, which specifies the space between each cell in the grid. To make the grid layout dynamic, we fetched data from the database using the document.getElementById function. This allowed us to retrieve the necessary data to populate the grid, including the PC names and their status. We then used the data.map function to loop through each element in the data array and update the corresponding div element in the grid with the appropriate PC name and status.

The result is a dynamic grid layout that accurately reflects the lab layout and the status of each PC in real-time. This allows system administrators and technicians to easily monitor the lab and quickly identify any issues with individual PCs.
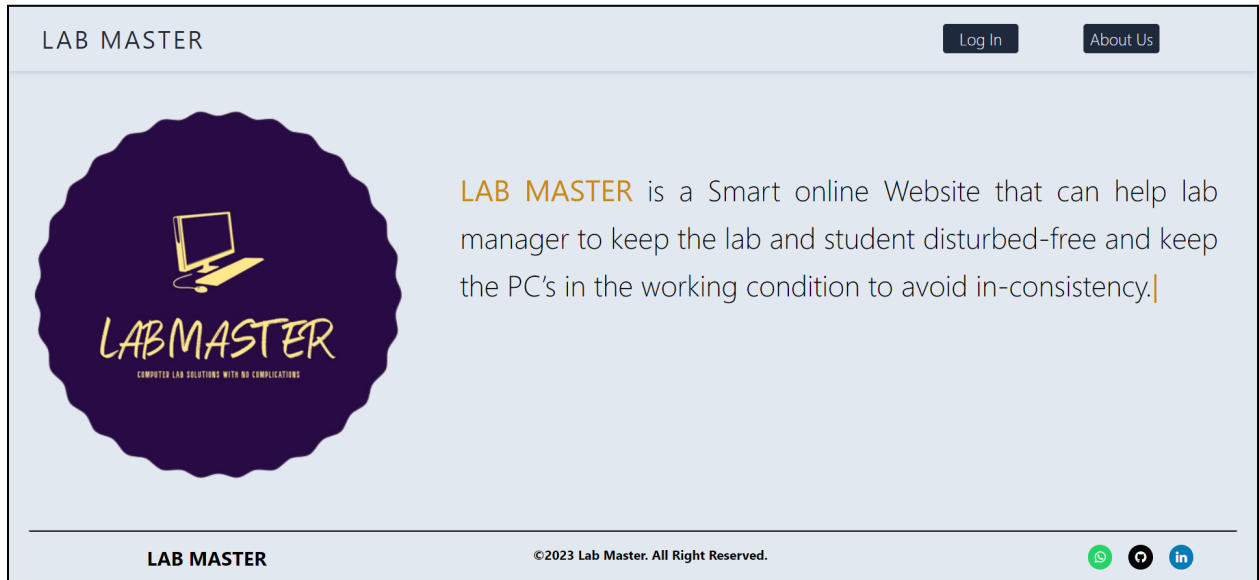
Chapter 8

Result

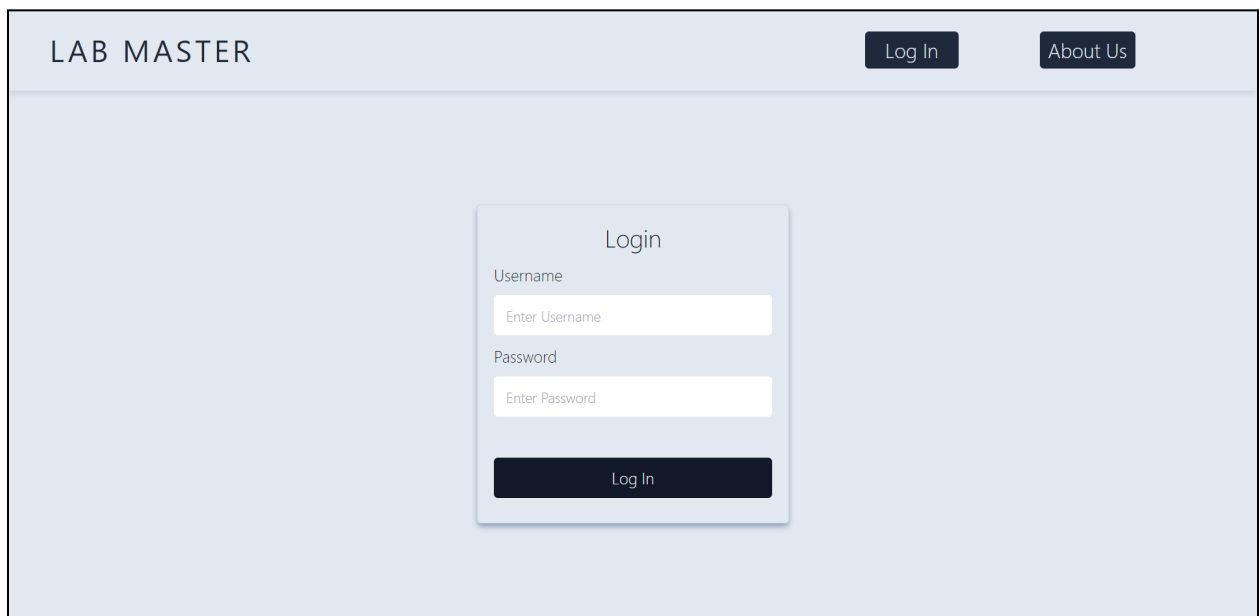**Fig no.8.2.1 - Home Page:** It gives a short introduction to our website.
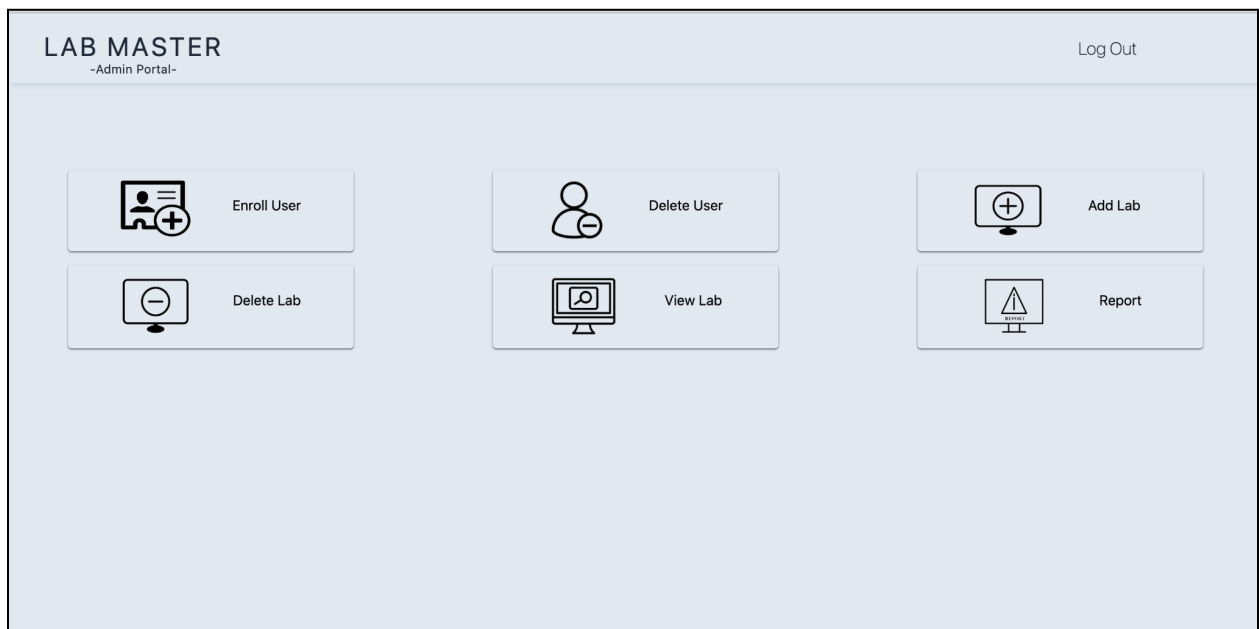

Fig no.8.2.2 - Authentication page

LAB MASTER
-Admin Portal-

Log Out

Enroll User

Delete User

Add Lab

Delete Lab

View Lab

Report

Fig no.8.2.3 -Admin Portal

LAB MASTER
-System Administrator Portal-

Log Out

Lab Configuration

View Configured Lab
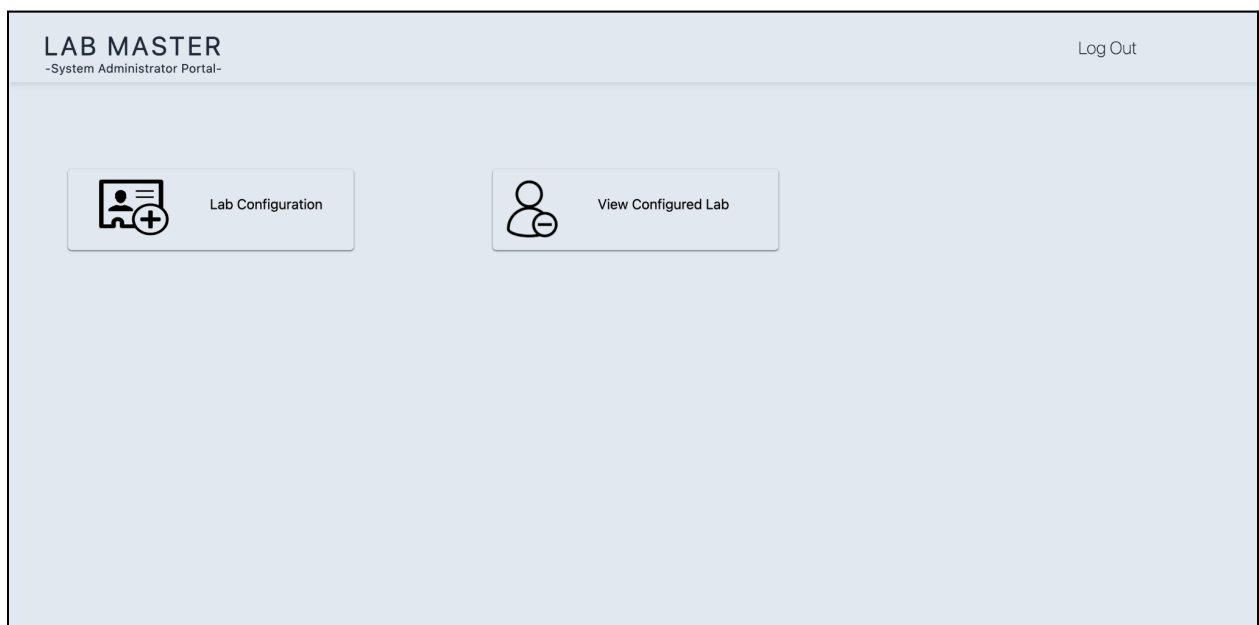
Fig no.8.2.4 - System Administration Portal
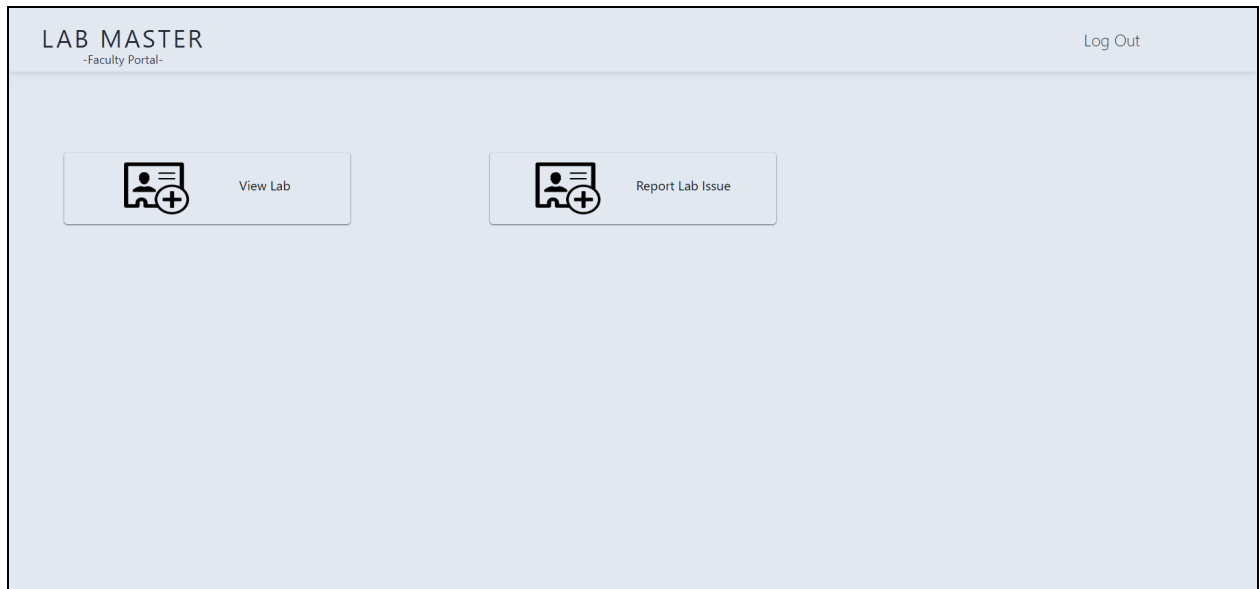
Fig no.8.2.5 - Faculty Portal

Fig no.8.2.6 - Enroll New User
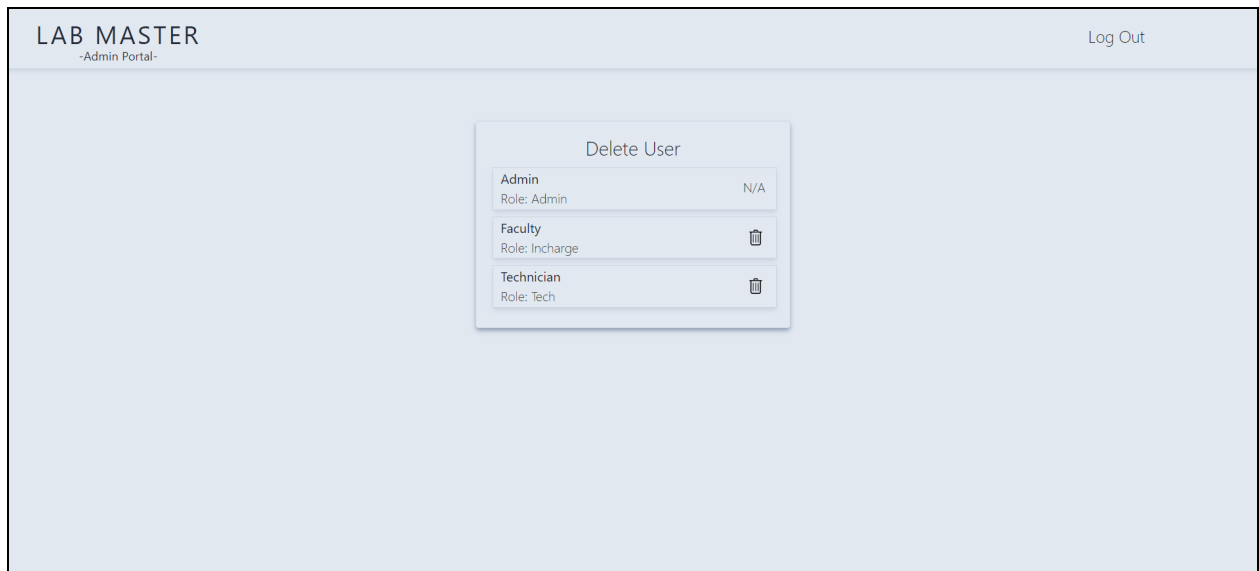
Fig no.8.2.7 - Delete an Existing User

Fig no.8.2.8 - Add a New Lab

Delete Lab

310
Database Management System Lab
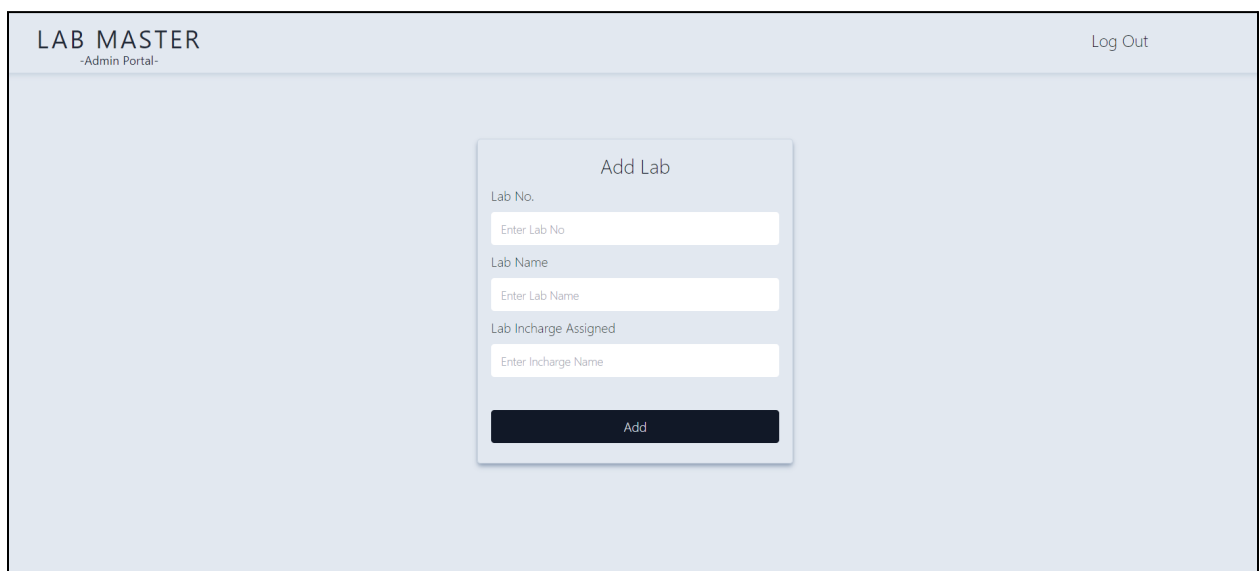
311
System Management Lab
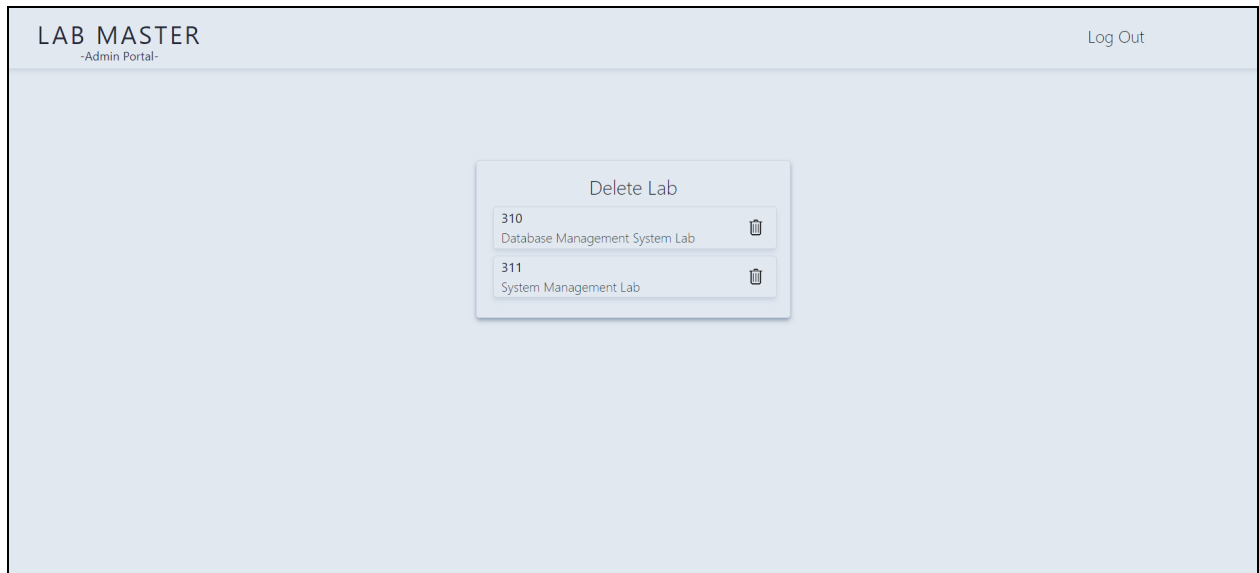
Fig no.8.2.9 - Delete an Existing Portal

LAB MASTER
-Admin Portal-

Log Out

Labs

310
Database Management System Lab

311
System Management Lab
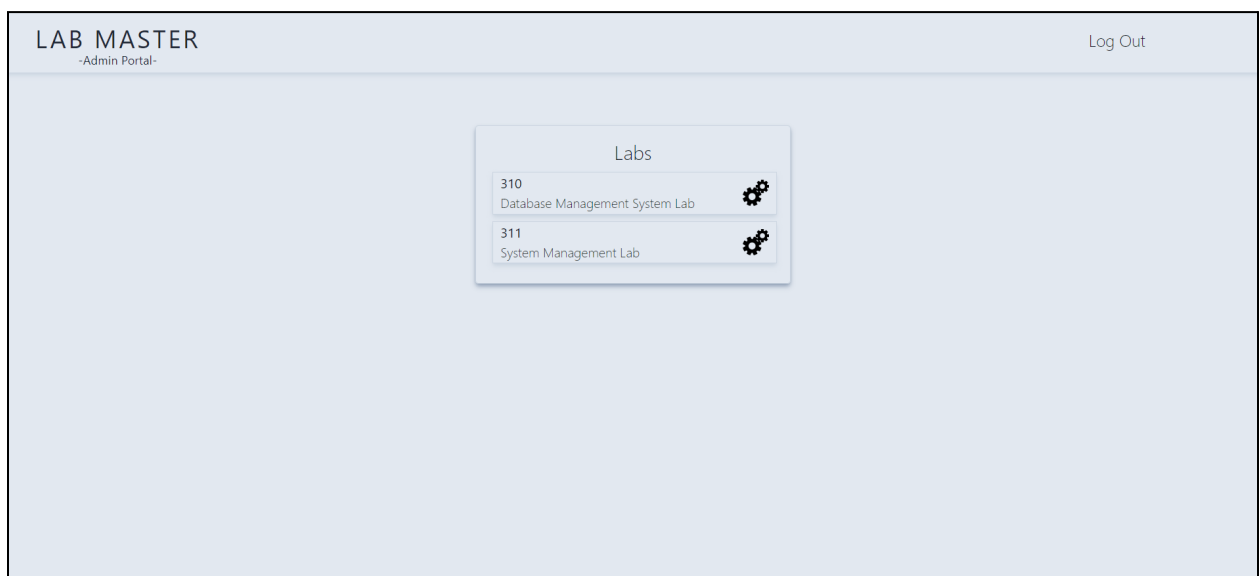
Fig no.8.2.10 - View Lab List
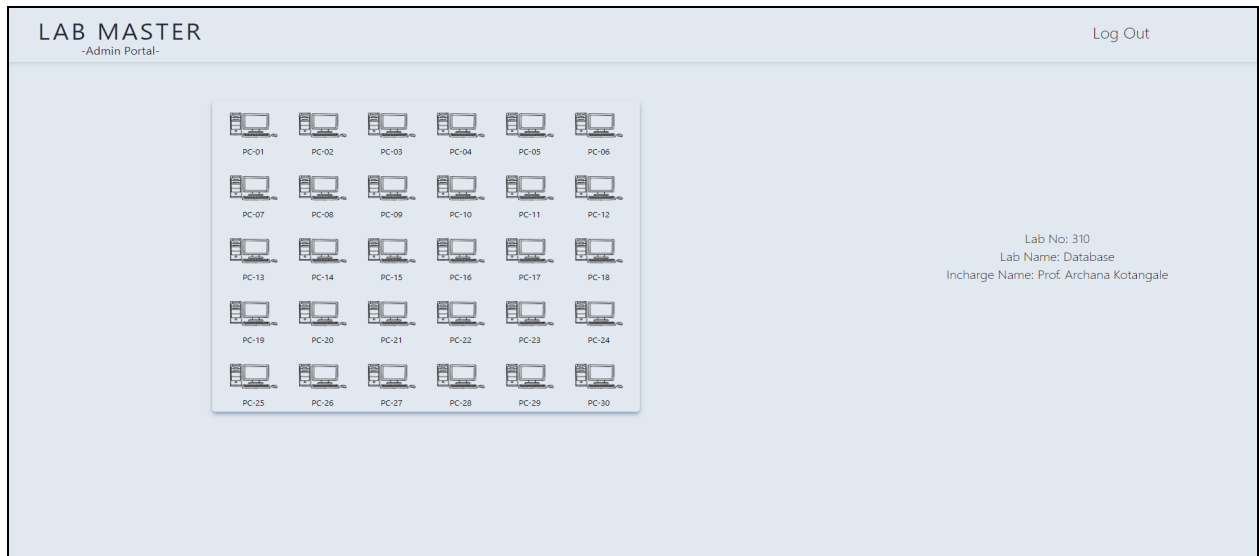
Fig no.8.2.11 - View Lab Configuration

"View Lab Configuration" is a feature in the LAB MASTER project that enables users to visualize the lab layout and locate specific PCs quickly. It also contains details such as Lab No, Lab Name, and Incharge Name
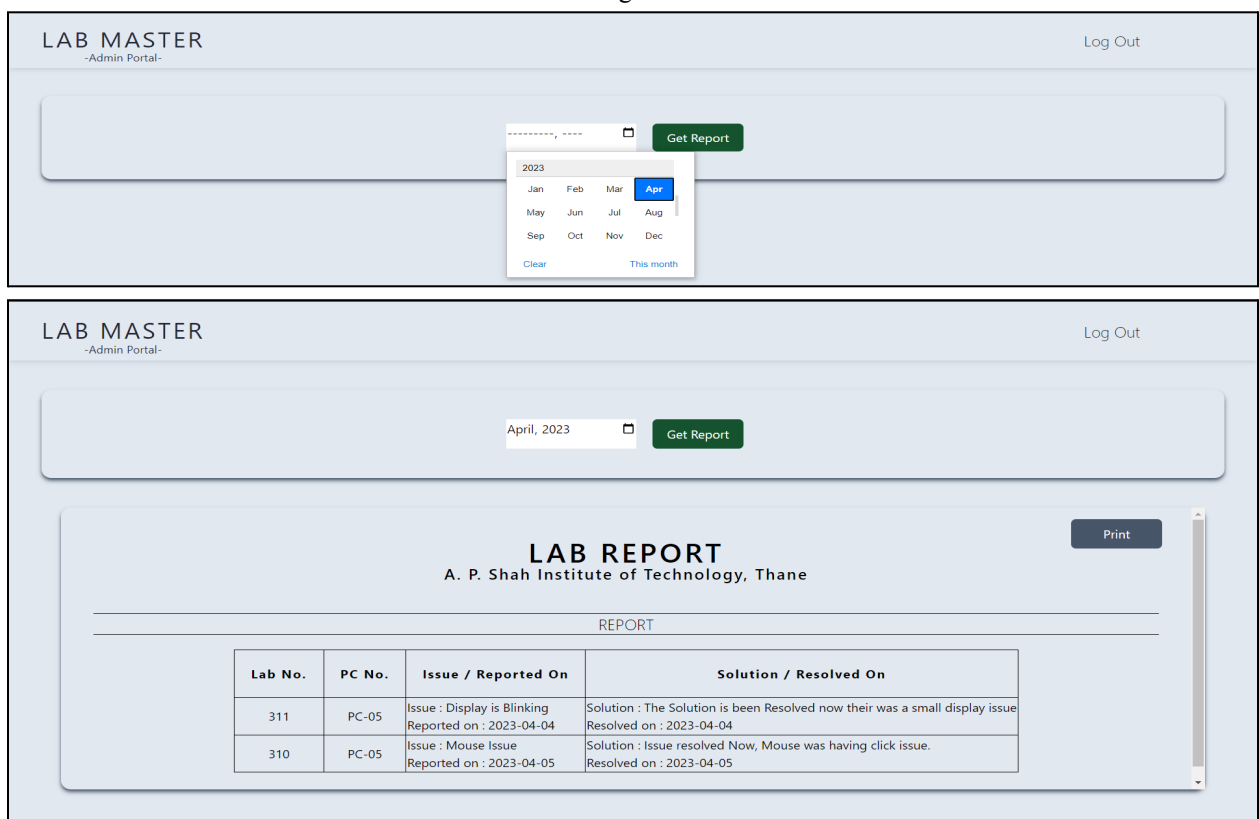
Fig no.8.2.12 - Generate Lab Report

The "Generate Lab Report" feature of our Lab Master project allows users to generate monthly reports of the labs. The system fetches relevant data from the database, including information on the lab No, PC No, and issue/Reported On along with the solution of resolved issues.

31
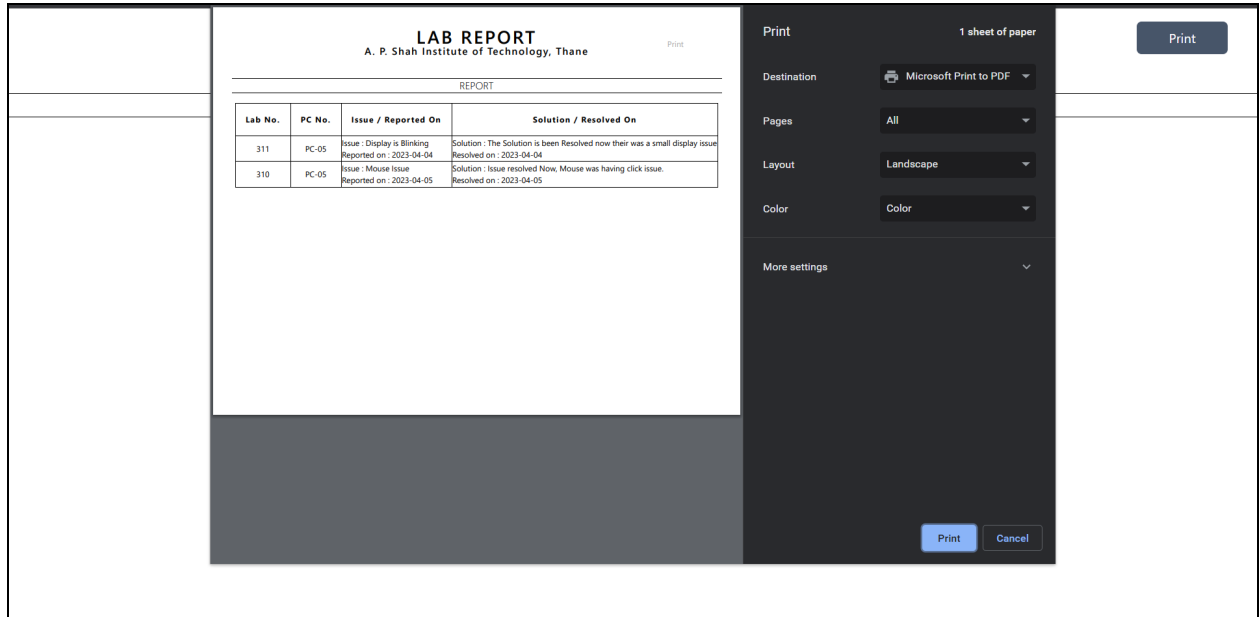
Fig no.8.2.13 - Print Lab Report

"Print Lab Report" is a feature of LAB MASTER that enables users to generate and print monthly reports related to computer lab issues. This feature involves applying the 'windows.print' function to a specific 'div' section, allowing users to generate a report with ease. The report contains details of the lab No, PC No, and issue/Reported On along with the solution of resolved issues.
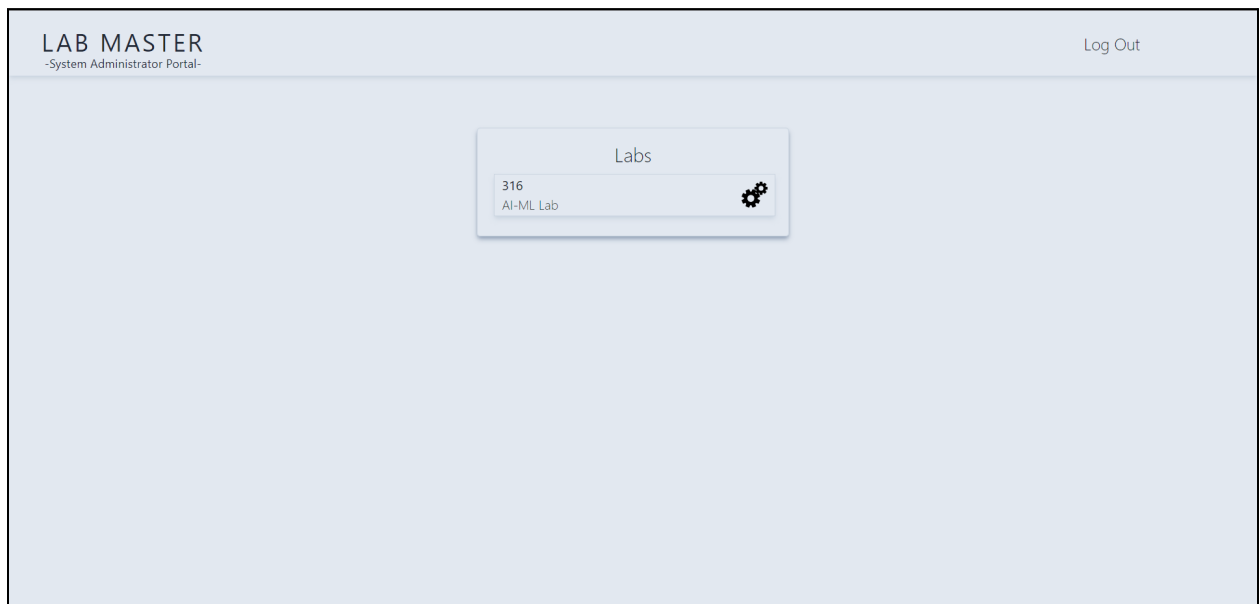

Fig no.8.2.14 - Labs Configuration List

System Administration Configuration Portal to configure the labs when a new lab is added by the Admin
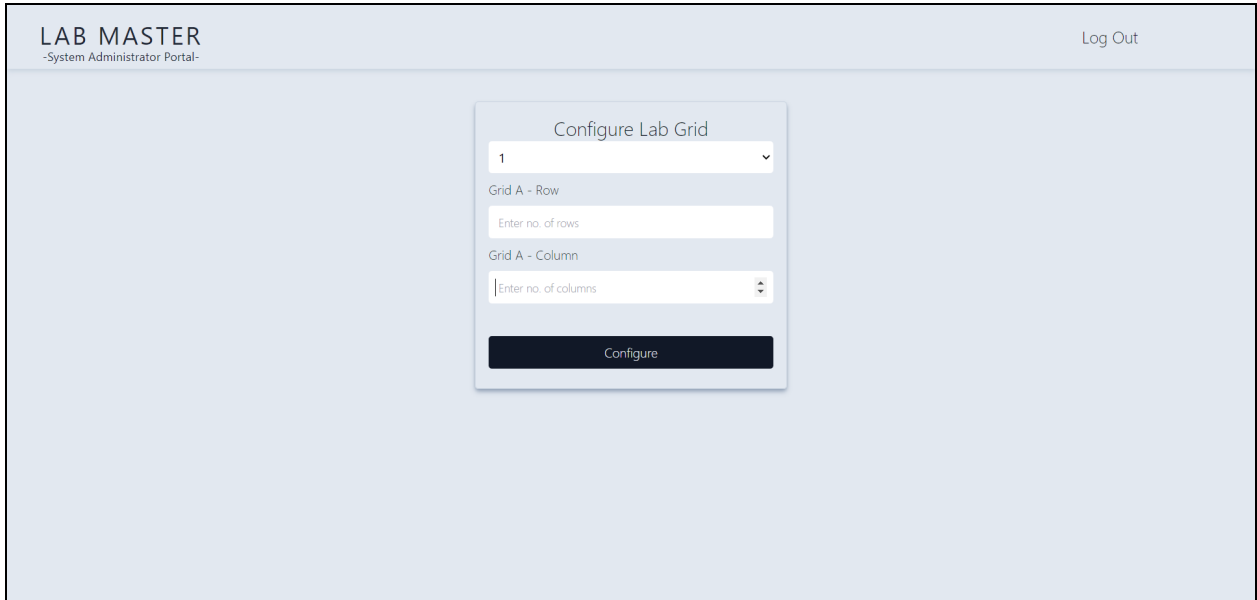
Fig no.8.2.15 - Configuration of Lab Grid Layout

"Configuration of Lab Grid Layout" is a key feature of LAB MASTER that allows users to specify the layout of computer labs in a graphical format. Users can set the number of rows and columns in the lab and place PCs in the corresponding grids, generating a graphical representation of the lab layout.
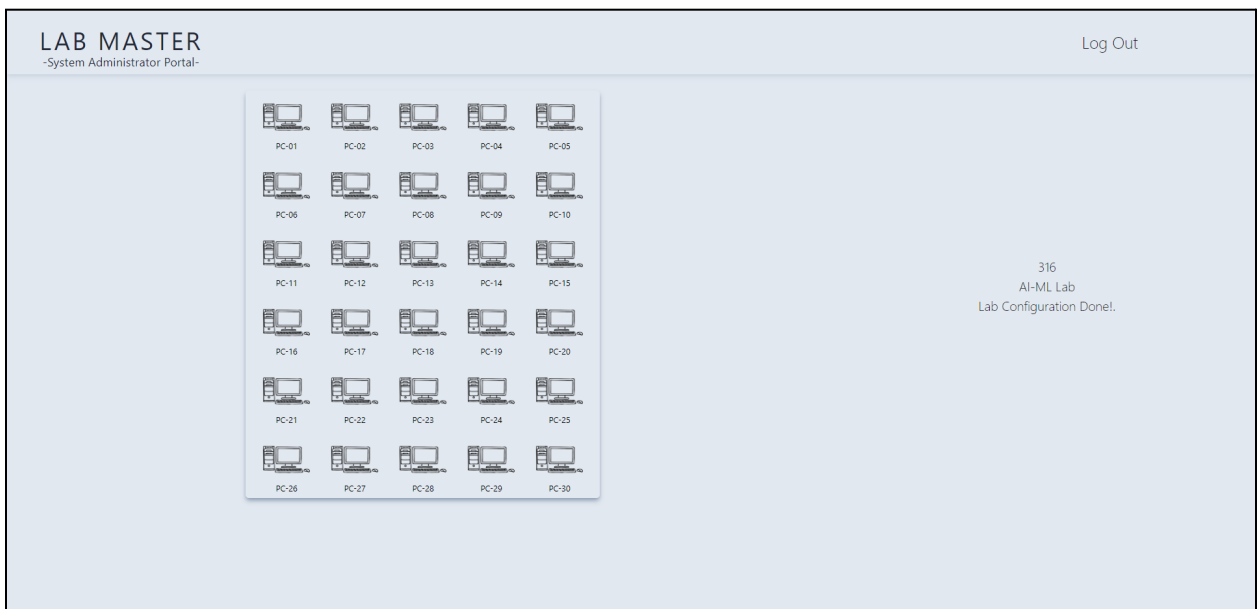

Fig no.8.2.16 - View Configured Lab Grid Layout

"View Configured Lab Grid Layout" is a feature in the LAB MASTER project that enables users to visualize the lab layout and locate specific PCs quickly
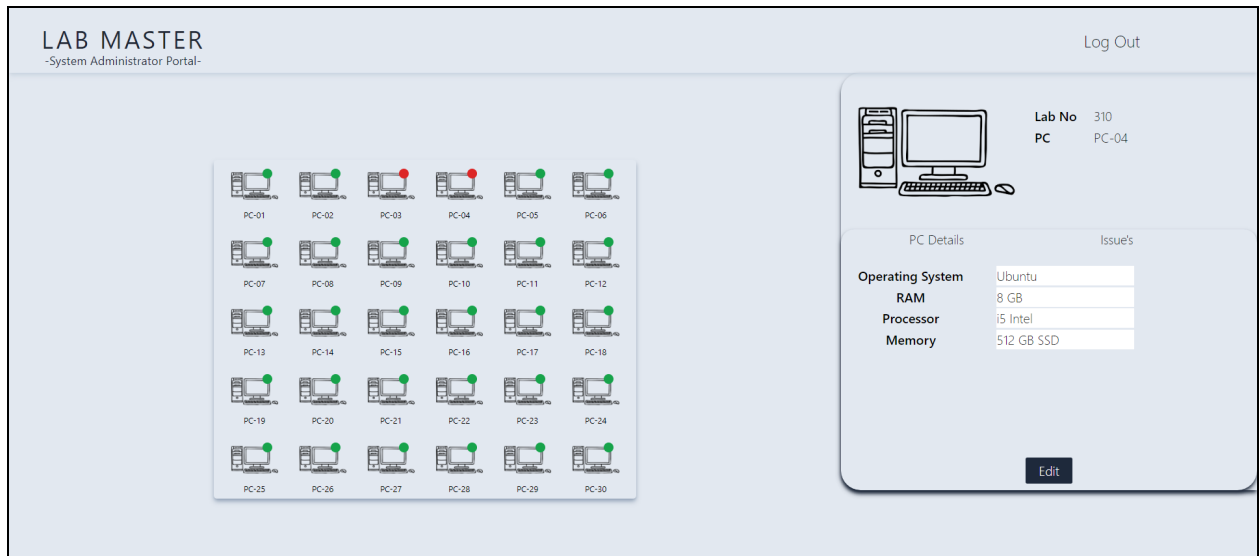
Fig no.8.2.17 - View Lab, Edit & Update PC Details

"View Lab, Edit & Update PC Details" is a feature in the LAB MASTER project that allows lab administrators to view and manage the details of the computer systems in their lab. With this feature, administrators can see the current status of each PC, including any reported issues and their resolution status. They can also edit and update the information associated with each PC, such as the Operating System, RAM, Processor, and Memory.
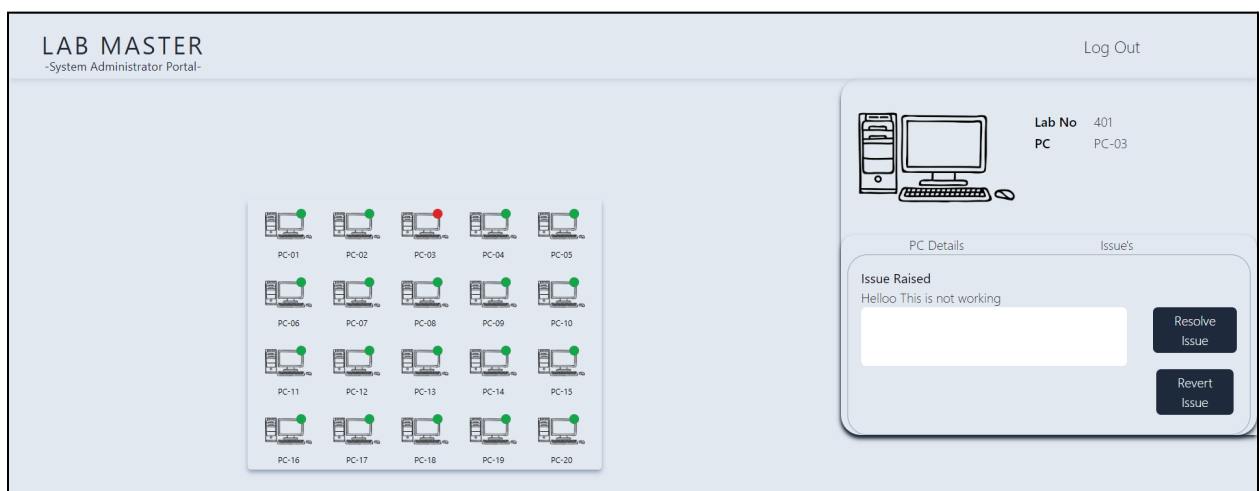

Fig no.8.2.18 - View Reported Lab Issue

"View Reported Lab Issue" is a feature in the LAB MASTER project that enables lab technicians to monitor the status of PCs and peripheral devices in real-time. When a user reports an issue, the corresponding PC is marked as "red" in the system, indicating that it requires attention from the lab technician. Technicians can then access the system to view the details of the reported issue, such as the location and description of the problem, and take appropriate action to resolve the issue. If any of the Issue is out of the technician's control for example the requirement of a new PC etc then the technician reverts the issue to the Admin and Faculty.
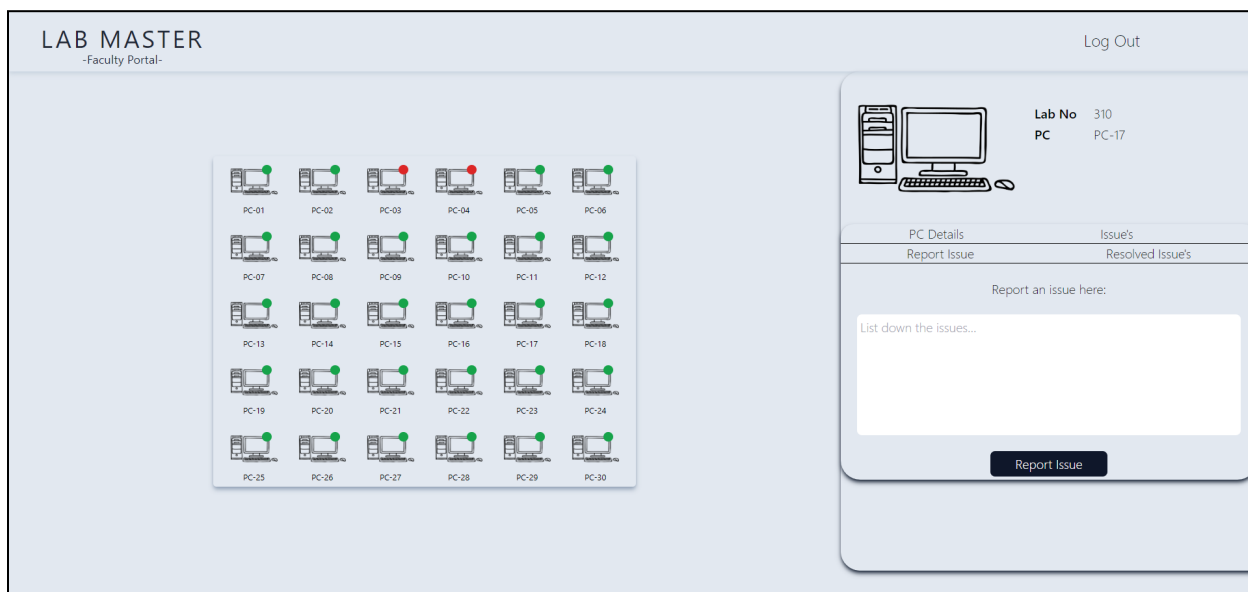
Fig no.8.2.19 - Report Issue

"Report Lab Issue" is a feature in the LAB MASTER project that enables lab users to report any issues or problems with the lab's computer systems or peripherals. With this feature, lab users can easily log an issue and describe the problem they are experiencing.
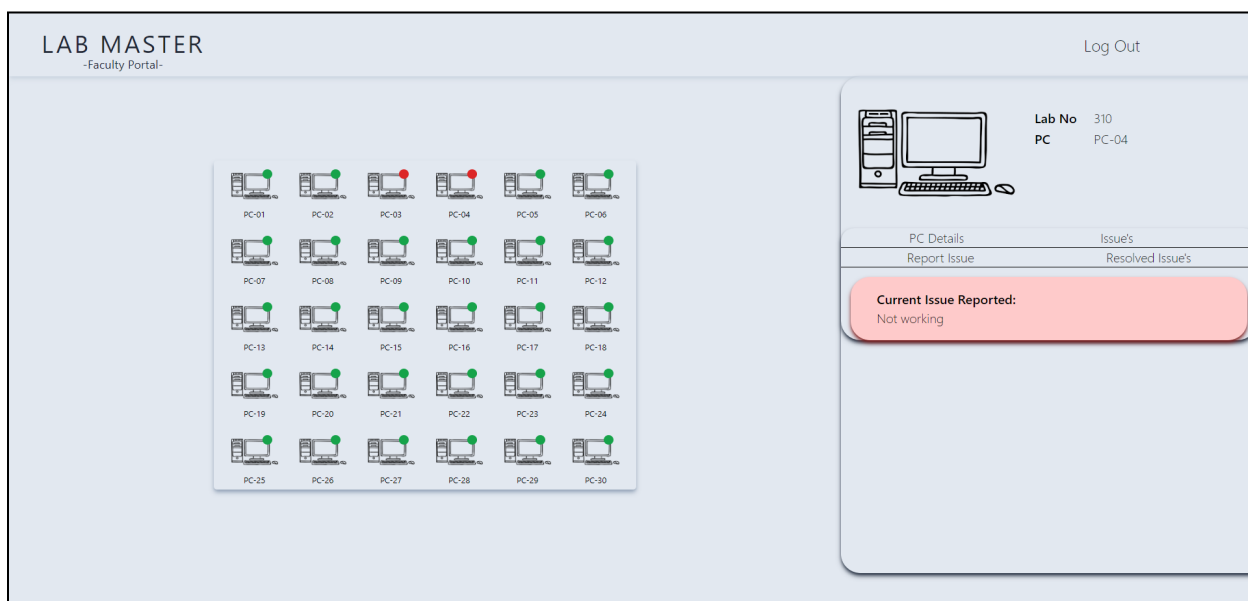

Fig no.8.2.20 - Current Reported Issue

"Current Reported Issue" is a feature in the LAB MASTER project that allows faculty members to quickly identify any reported issues in the lab. When a user reports an issue with a PC or peripheral device, the corresponding PC is marked as "red" in the system, indicating that it requires attention from the lab technician. Faculty members can then access the system to view the details of the reported issue.
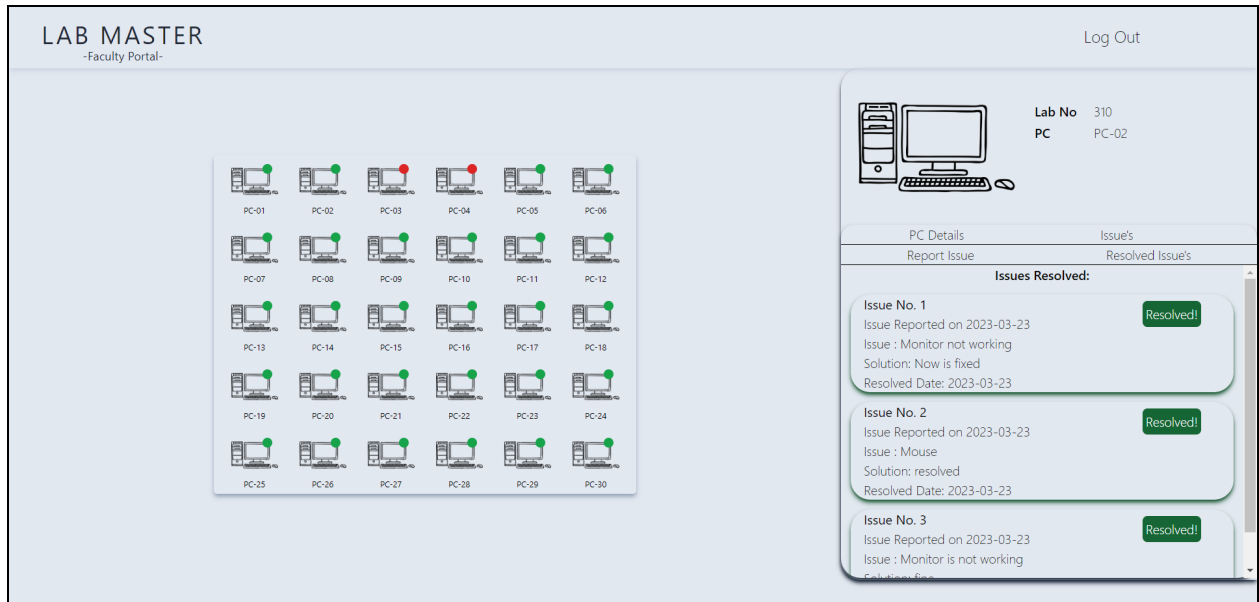
Fig no.8.2.21 - Resolved Issues History

"Resolved Issue History" is a feature in the LAB MASTER project that allows faculty members to view the history of issues reported and resolved in the lab. With this feature, faculty members can see the details of each resolved issue and the corresponding PC turns from "red" to "green" in the system, indicating that it is functioning properly.
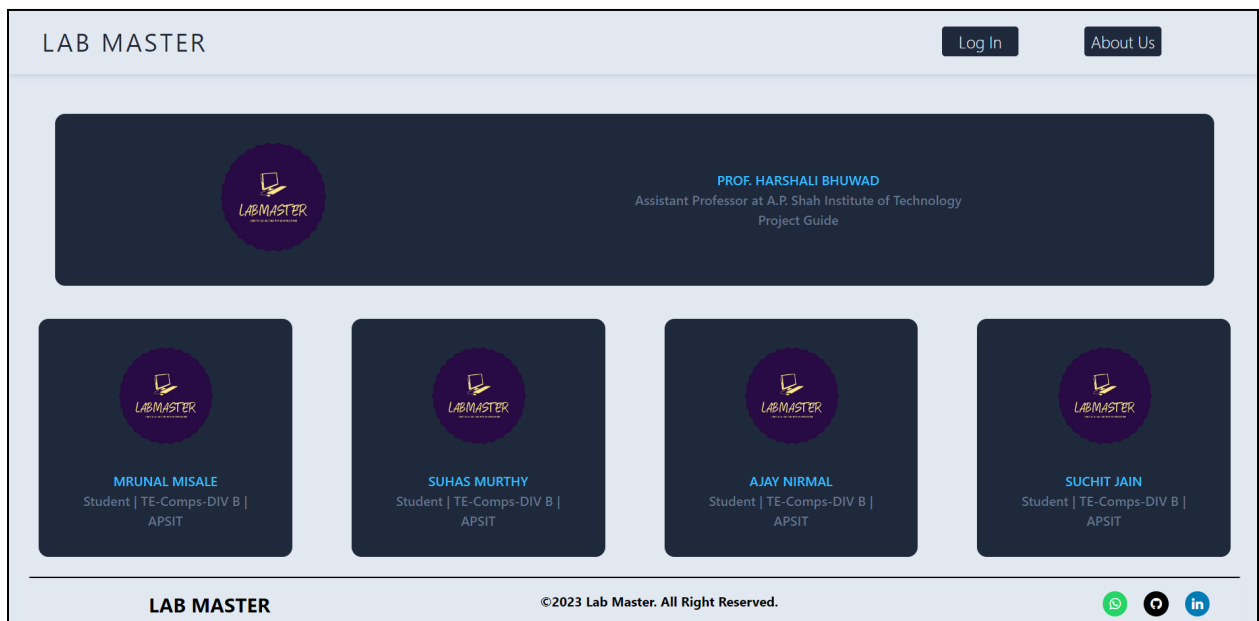

Fig no.8.2.22 - About Us Page

"The 'About Us' page provides an introduction to the developers who worked on this project, offering insights into their background and expertise."
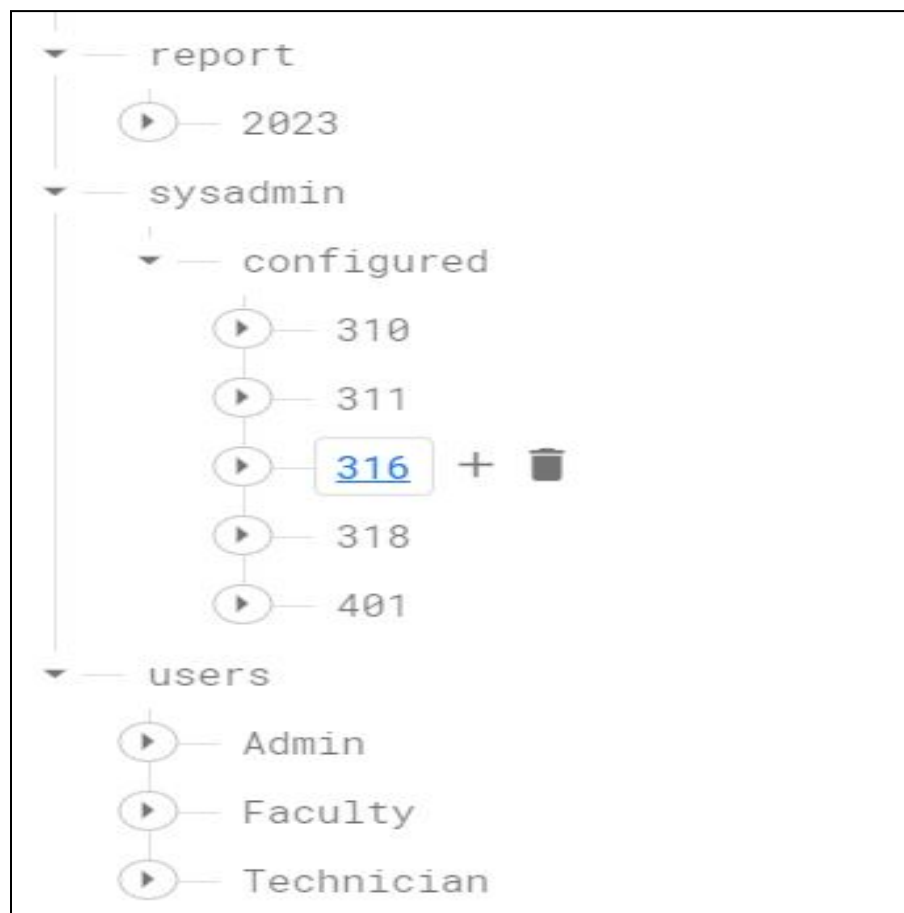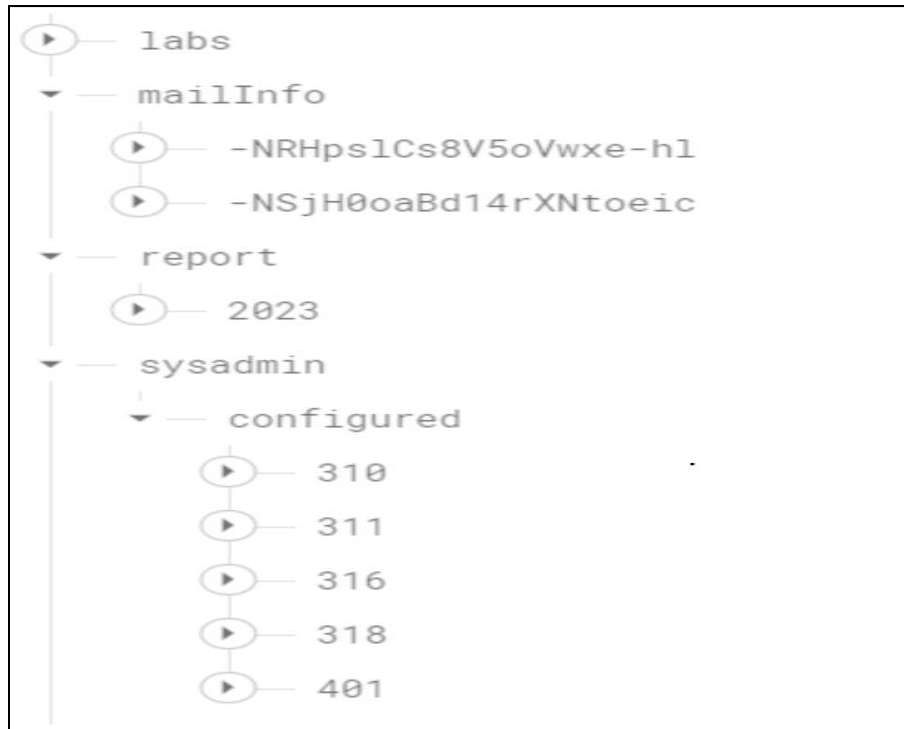
Fig no.8.2.23 - Firebase Database Structuring

Chapter 9

Conclusion

Time is one of the most important factors for any organization. Implementing such software in the education suite can undoubtedly be a profitable business as this site makes it easy to perform tasks and thus reduces the time spent on manpower.

"Lab-Master" benefits the industry as it helps to maintain the lab's efficiency and productivity. This system can provide real-time updates on the status of peripherals such as mouse, keyboards, and monitors, allowing lab administrators and faculty to identify and resolve issues quickly. It also helps to maintain equipment usage and provides data for decision-making regarding the purchase or replacement of equipment. To fill the gaps in the current laboratory management system, this system is needed, where the complexity of the management process is minimized for the convenience of the faculty and technicians. This system, therefore, attempts to improve the existing system and provide a more efficient approach to maintenance management.

To overcome the disadvantages of the existing laboratory management system, this web-based application will provide a platform to improve communication between faculties and technicians by allowing faculties to report problems online, thus reducing the need for face-to-face interaction. This can save time and increase the overall efficiency of the lab, and can significantly reduce the manual labor associated with peripheral monitoring and troubleshooting.

In summary, this computer lab system can be an essential tool to keep the lab running smoothly. This system automatically generates the layout of the lab grid in the backend by taking the number of rows and columns from the user as input, which improves communication by online reporting and troubleshooting, reducing manual labor and duty work. It also provides valuable data such as basic PC configuration like Processor, RAM for decision making, and email notifications sent to each technician for real-time updates.

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[2]Red Bus Website Link:- https://www.redbus.in/