



VISUAL PROGRAMMING

COSC 31112

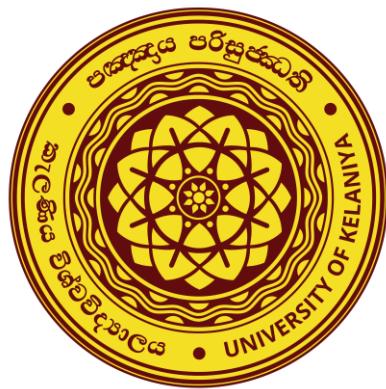


FINAL REPORT

PROJECT MANAGEMENT SYSTEM
BUILDING & CONSTRUCTION



GROUP NO : 01



UNIVERSITY OF KELANIYA
DEPARTMENT OF STATISTICS & COMPUTER SCIENCE
ACADEMIC YEAR 2021/2022

COSC 31112 – VISUAL PROGRAMMING
FINAL PROJECT REPORT

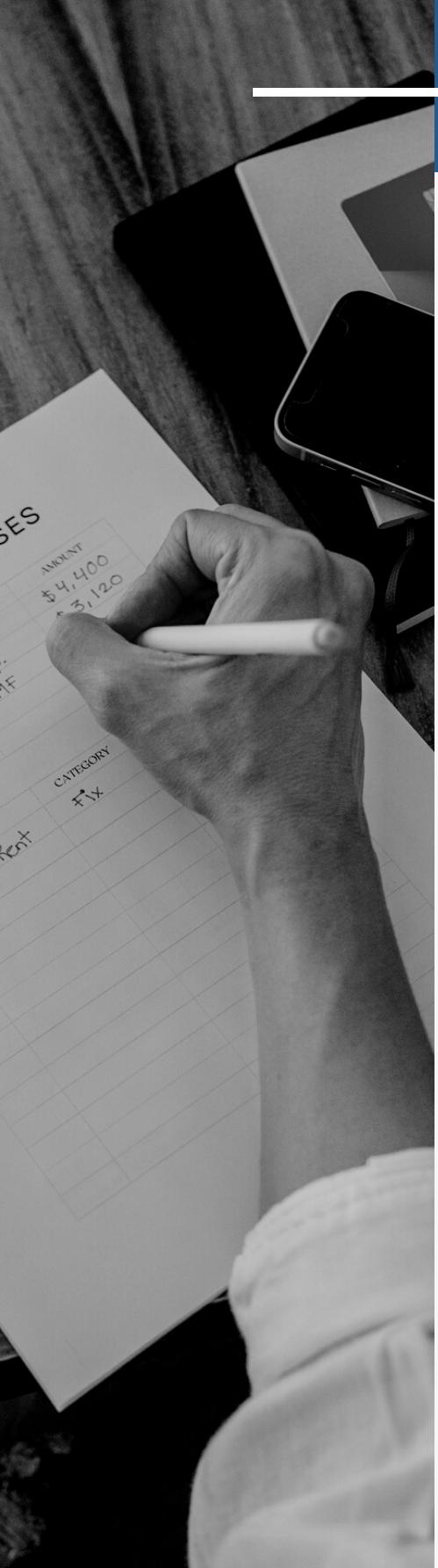
PROJECT MANAGEMENT SYSTEM
GROUP 01



Contents

Topics	Page No
[01]. Introduction	02
[02]. Problem Identification	03
[03]. Our Goals & Objectives	04
[04]. Functional & Non functional requirements	07
[05]. Diagram explanation	12
[06]. Design & code implementation of each form in the application	19
[07]. Tools and things used for design	68
[08]. Initial plan vs. Actual plan	69
[09]. Work contribution & Chalengers	70
[10]. Future enhancements	73
[11]. Our team	76

Introduction



A project management system is a digital tool designed to help individuals and teams efficiently plan, execute, and track the progress of projects. It provides a centralized platform where users can define project goals, allocate tasks, set deadlines, assign responsibilities, and monitor the overall project timeline. This system facilitates collaboration by allowing team members to communicate, share files, and update their progress in real-time. Additionally, it offers features such as milestone tracking, resource management, and reporting to ensure projects are completed on time and within scope.

In this introduction, we provide an overview of such a system, its key components, and how the .NET Framework can be leveraged to build a visual project management tool.

.NET Framework and C# language have been used to create a project management system for building and construction. A user-friendly visual interface is used to make the project management system efficient. We use Visual Studio software for that.

The project consists of three main interfaces, each tailored to the unique needs of customers, employees, and management. These interfaces act as portals to the system, giving users access to specific functionalities that align with their roles and responsibilities. In addition, nine additional models are accessible through these primary interfaces, providing additional functionality and enhanced data management capabilities as needed.

01



Problem identification

- **Complexity and Scale**

Construction projects involve numerous stakeholders, intricate processes, and extensive data.

Managing all these aspects manually can lead to errors, delays, and cost overruns.

- **Communication Challenges**

Effective communication between contractors, subcontractors, architects, engineers, and clients is critical.

Inefficient communication can lead to misunderstandings and project delays.

- **Resource Allocation**

Efficiently allocating and managing resources, including labor, materials, and equipment, is vital.

Poor resource management can lead to inefficiencies and increased costs.

We will give a brief introduction to the identified problems.

02



Our Goals and Objectives

03

- **Efficient Project Planning**

Enable project managers to efficiently plan construction projects, including defining tasks, allocating resources, setting timelines, and establishing dependencies.

- **User-friendly interface design**

Create intuitive and user-friendly interfaces for all modules to ensure ease of use for customers, employees, and management.

Prioritize clear navigation, consistent layouts, and easy access to relevant information on each interface.

Conduct user testing to gather feedback and improve the interface.

Our Goals and Objectives

03

- **Authentication and Access Control**

Implement secure login and authentication mechanisms for customers, employees, and management to ensure that only authorized users can access the system.

Define and enforce access controls based on user roles to restrict access to specific interfaces and functionalities.

Include password encryption and protection against common security vulnerabilities.

- **Security and Data Protection**

Guarantee the security and confidentiality of sensitive project data and documents.

- **Scalability and Flexibility**

Design the system to be scalable, accommodating projects of various sizes and complexities.

Our Goals and Objectives

03

- **Document and Data Management**

Streamline document management, including contracts, blueprints, permits, and other project-related files.

- **Data Analytics and Reporting**

Provide insights into project performance through data analytics and reporting tools.

- **Resource Optimization**

Develop optimization algorithms to make efficient use of resources, minimizing waste and costs.

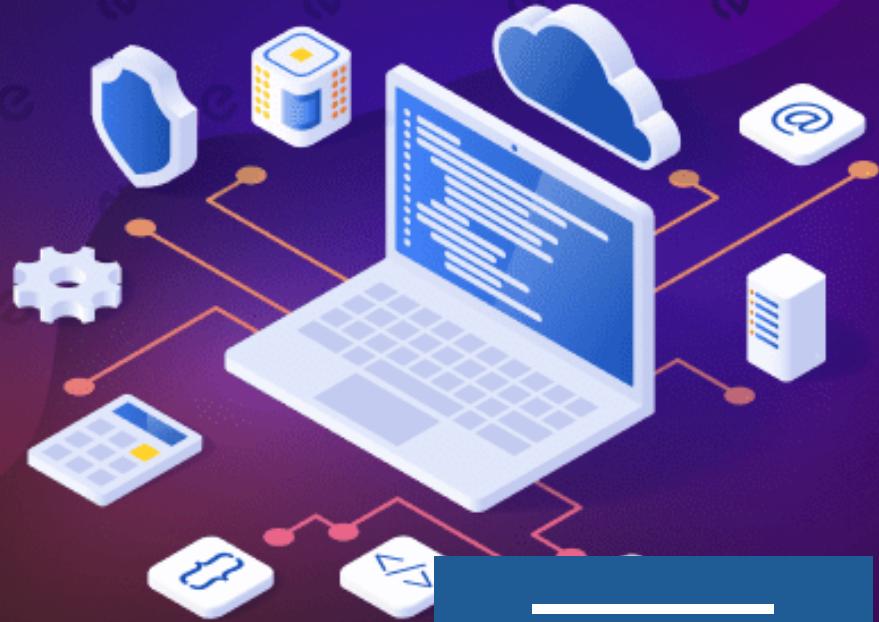
- **Cost Estimation**

Build applications for project managers to track progress, allocate resources, and manage budgets effectively.

- **Real-Time Communication**

Enhance communication between project stakeholders, ensuring that contractors, subcontractors, architects, and clients can share information and updates in real time.

Functional vs Non-functional Requirements



Functional Requirement

- **Project Planning and Scheduling**

Allow users to create and manage project plans.

Support task allocation, dependencies, and timelines.

Enable the creation of Gantt charts for visual project scheduling.

- **Resource Management**

Provide tools for resource allocation, including labor, equipment, and materials.

Allow users to assign resources to specific tasks.

Generate resource utilization reports.

Functional requirements are explicit descriptions of what a software system or product must do to meet user needs and perform its intended tasks.

04

Functional Requirements

• Reporting and Analytics

Generate customizable project performance reports. Provide data visualization tools, including charts and graphs. Offer dashboards for real-time project monitoring.

04

• Document and Data Management

Create a centralized repository for project-related documents. Implement version control for documents. Allow users to set access permissions and manage document revisions.

• Risk Management

Allow users to identify, assess, and manage project risks. Provide risk mitigation strategies and risk response planning tools. Generate risk assessment reports and risk dashboards.

• Budget Control and Cost Tracking

Allow users to set project budgets and track expenses. Generate cost reports and alerts for budget overruns. Enable users to manage change orders and their impact on costs.

• Communication and Collaboration

Offer real-time messaging and discussion forums for project teams. Facilitate document sharing and collaboration on blueprints, plans, and project-related files. Provide comment and annotation features for document collaboration.

Functional Requirements

04

- **Reporting and Analytics**

Generate customizable project performance reports.
Provide data visualization tools, including charts and graphs.
Offer dashboards for real-time project monitoring.

- **Document and Data Management**

Create a centralized repository for project-related documents.
Implement version control for documents.
Allow users to set access permissions and manage document revisions.

- **Risk Management**

Allow users to identify, assess, and manage project risks.
Provide risk mitigation strategies and risk response planning tools.
Generate risk assessment reports and risk dashboards.

- **Budget Control and Cost Tracking**

Allow users to set project budgets and track expenses.
Generate cost reports and alerts for budget overruns.
Enable users to manage change orders and their impact on costs.

- **Communication and Collaboration**

Offer real-time messaging and discussion forums for project teams.
Facilitate document sharing and collaboration on blueprints, plans, and project-related files.
Provide comment and annotation features for document collaboration.

Non Functional Requirement

• Security and Privacy

Data Security: Ensure strong encryption mechanisms to protect sensitive customer and financial data in transit and at rest.

Authentication Security: Implement strict security measures for facial recognition to prevent unauthorized access.

Compliance: Adhere to data protection regulations and industry standards to protect customer privacy.

• Performance:

Response time: Ensure that the system responds quickly to user interactions, including facial recognition, data retrieval, and transaction processing.

• Reliability:

Availability: ensuring high system availability, minimizing downtime and disruption to management operations.

Fault Tolerance: Implement mechanisms to properly recover from system failures or errors.

Non-functional requirements are specifications that define how a software system or product should perform, including attributes like speed, reliability, security, and usability, rather than specific functionalities.

04

Non Functional Requirement

- Usage

User-friendly interfaces: Design intuitive and user-friendly interfaces for all types of users, including clear navigation and helpful error messages.

Accessibility: Ensure that the system is accessible to users with disabilities, in accordance with applicable accessibility standards.

- Maintainability

Code maintainability: Write well-documented, modular, and maintainable code to facilitate future updates and enhancements.

Database maintenance: Develop routines for regular database maintenance, including backups and optimization.

- Compatibility:

Platform compatibility: Ensure that the application works seamlessly on different operating systems and browsers, if applicable.

Database Compatibility: Ensure compatibility with the selected database management system.

- User-friendly interface

Create intuitive and user-friendly interfaces for all modules to ensure ease of use for customers, employees, and management.

Prioritize clear navigation, consistent layouts, and easy access to relevant information on each interface.

Conduct user testing to gather feedback and improve the interface.

04

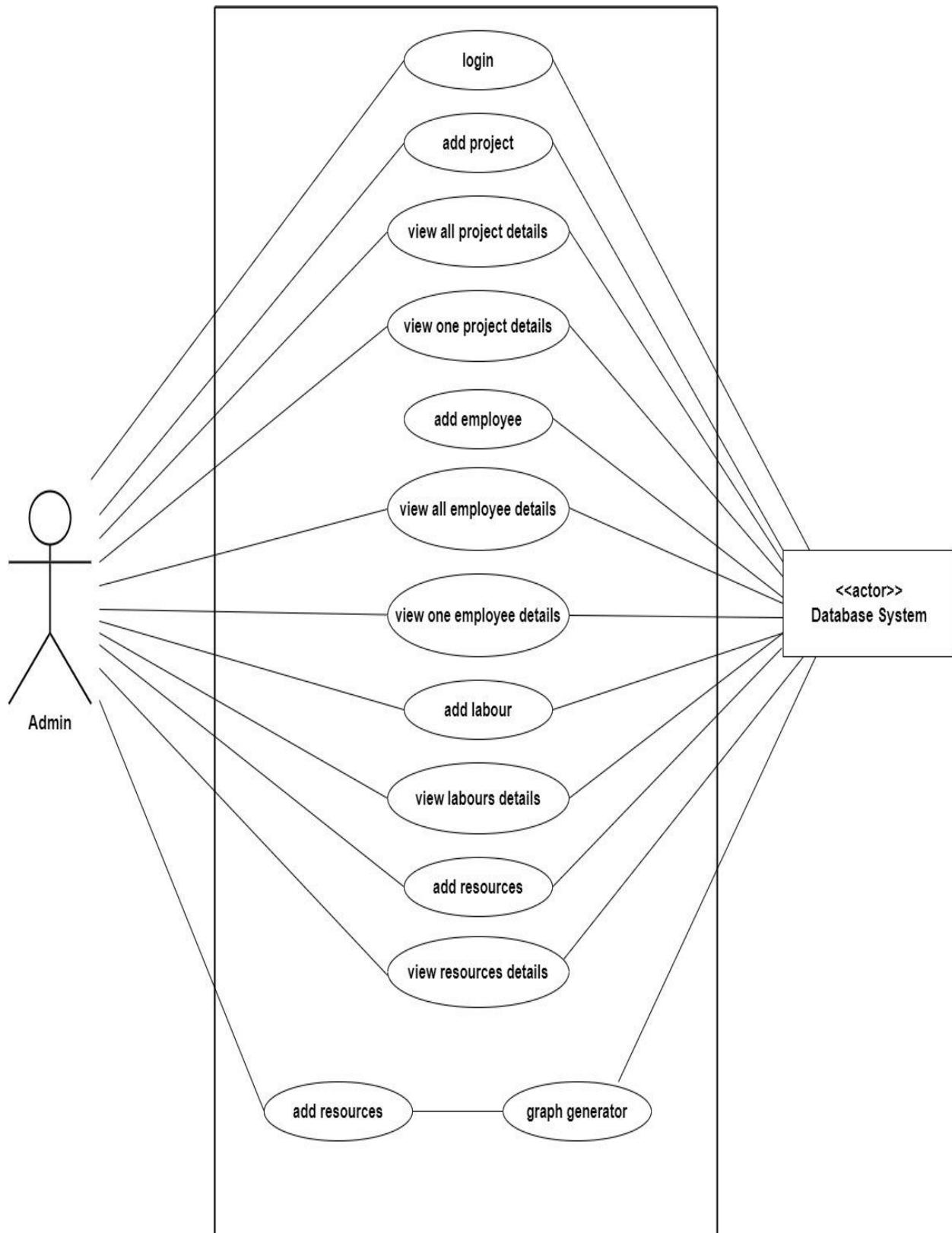


Diagram explanation

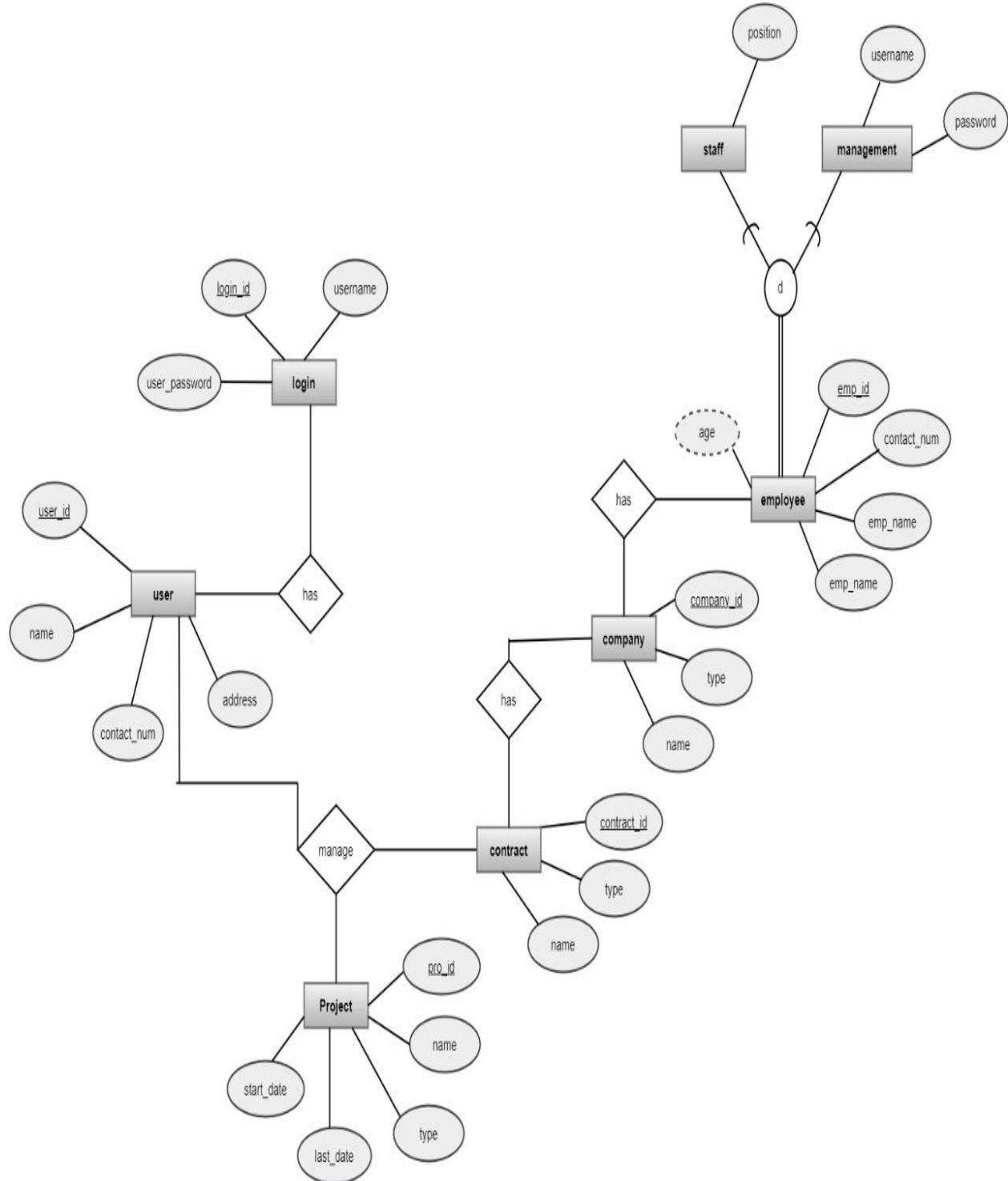
- User case diagram
- ER diagram
- Sequence diagram
- Class diagram



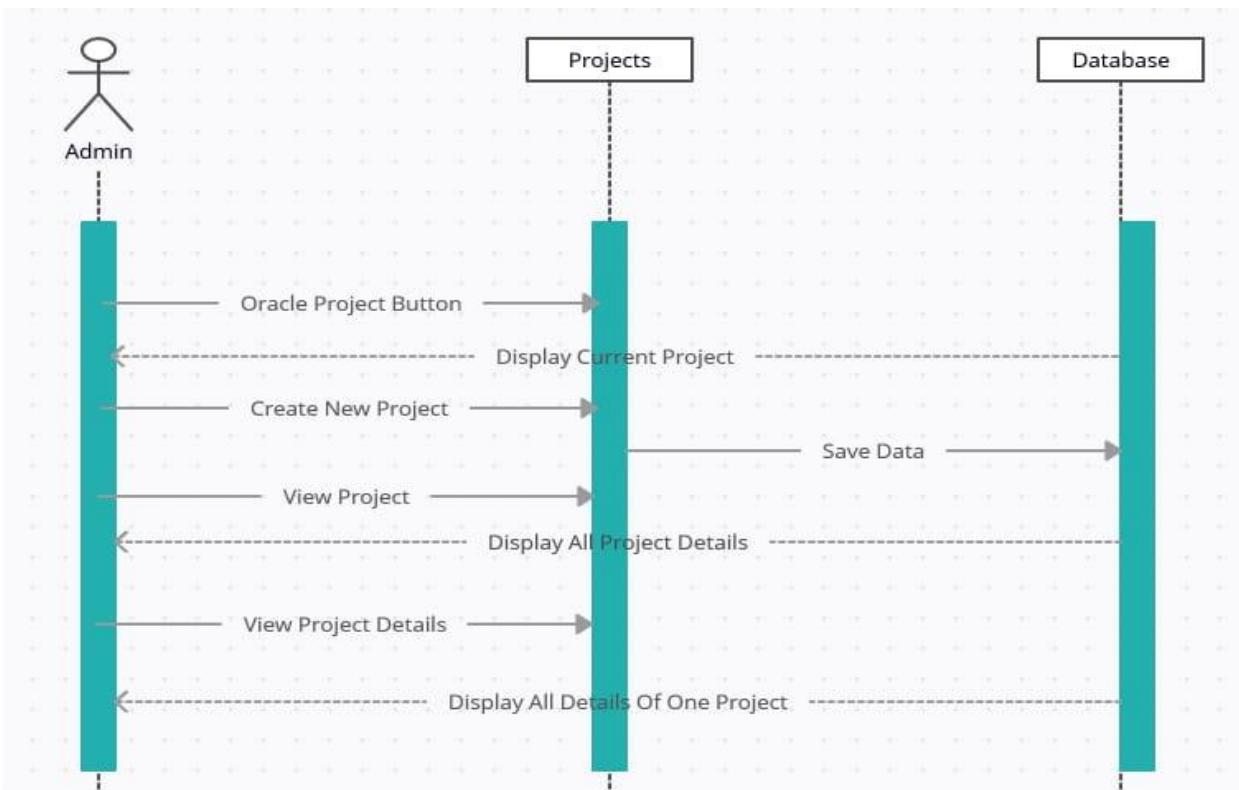
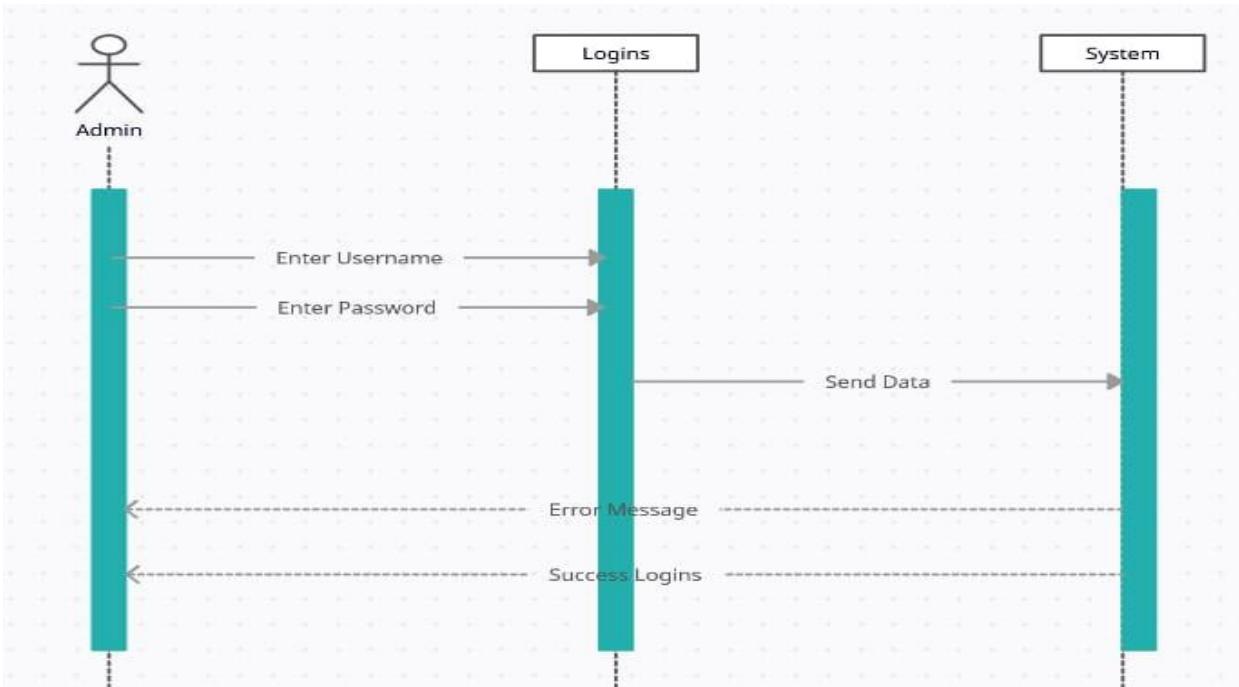
Use case diagram

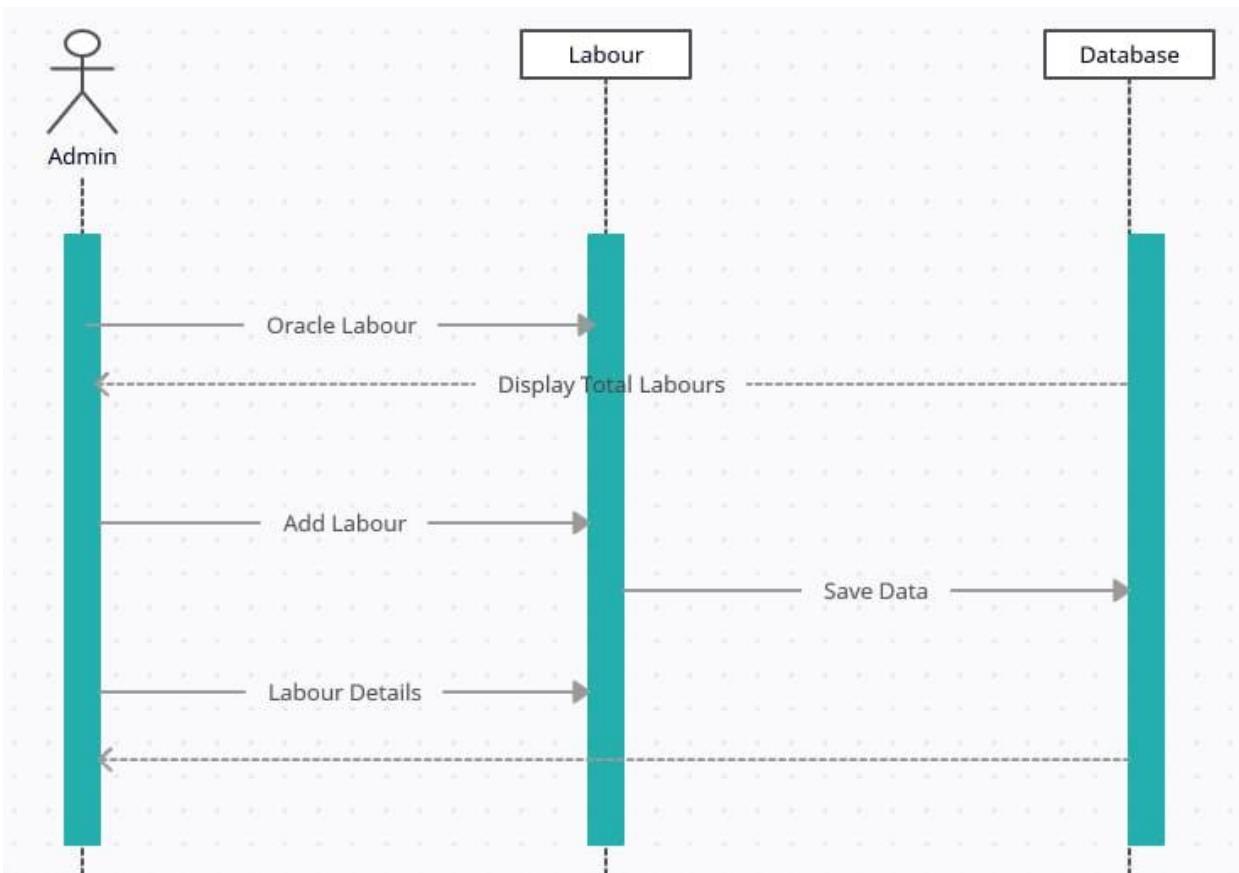
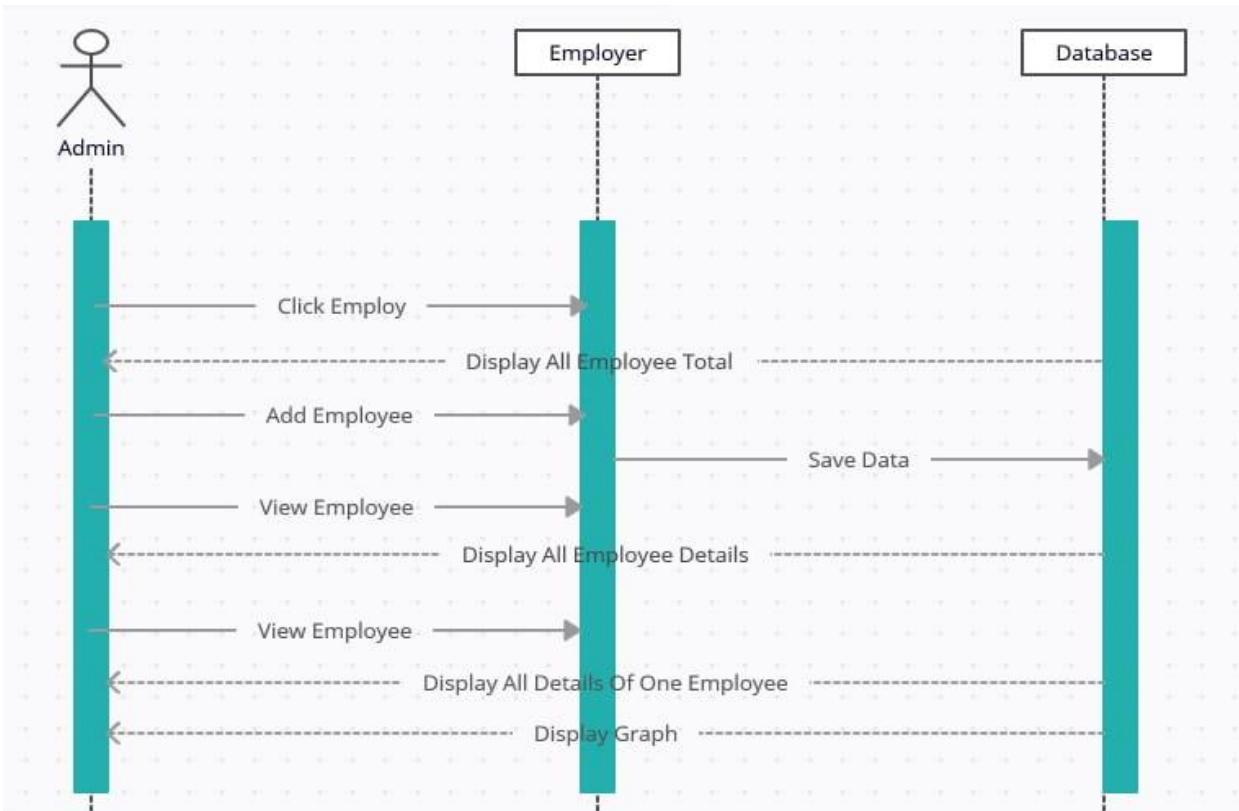


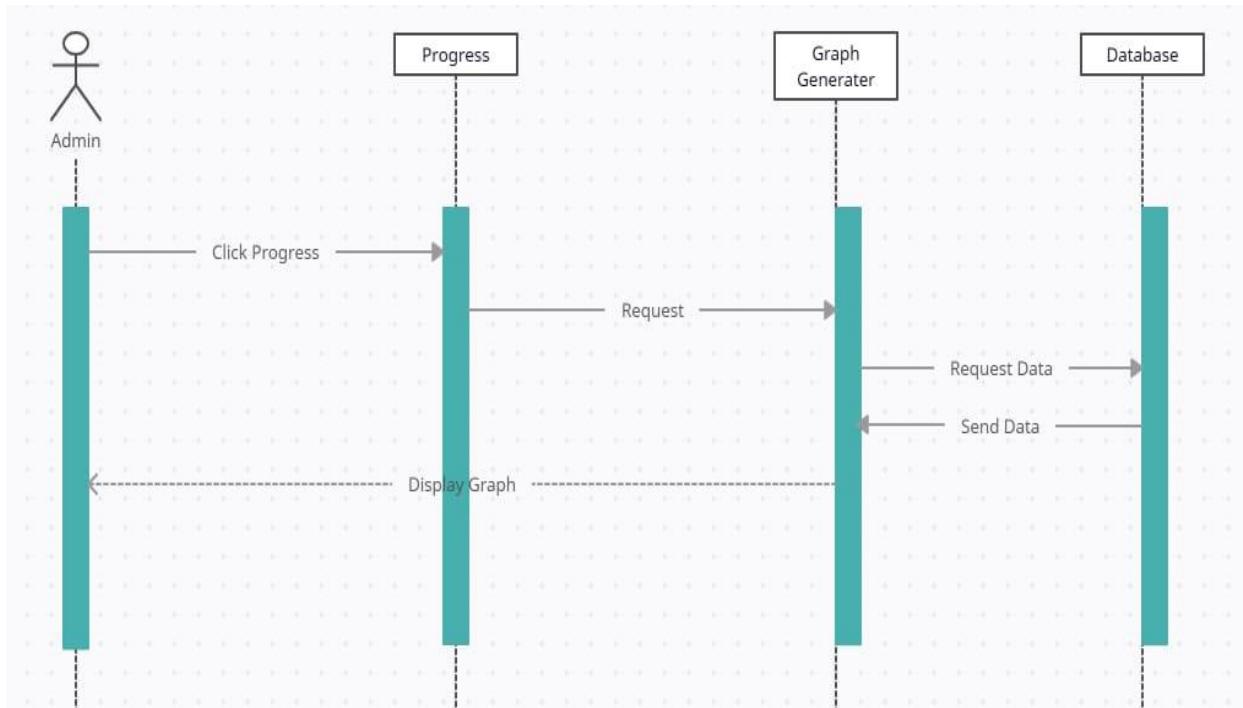
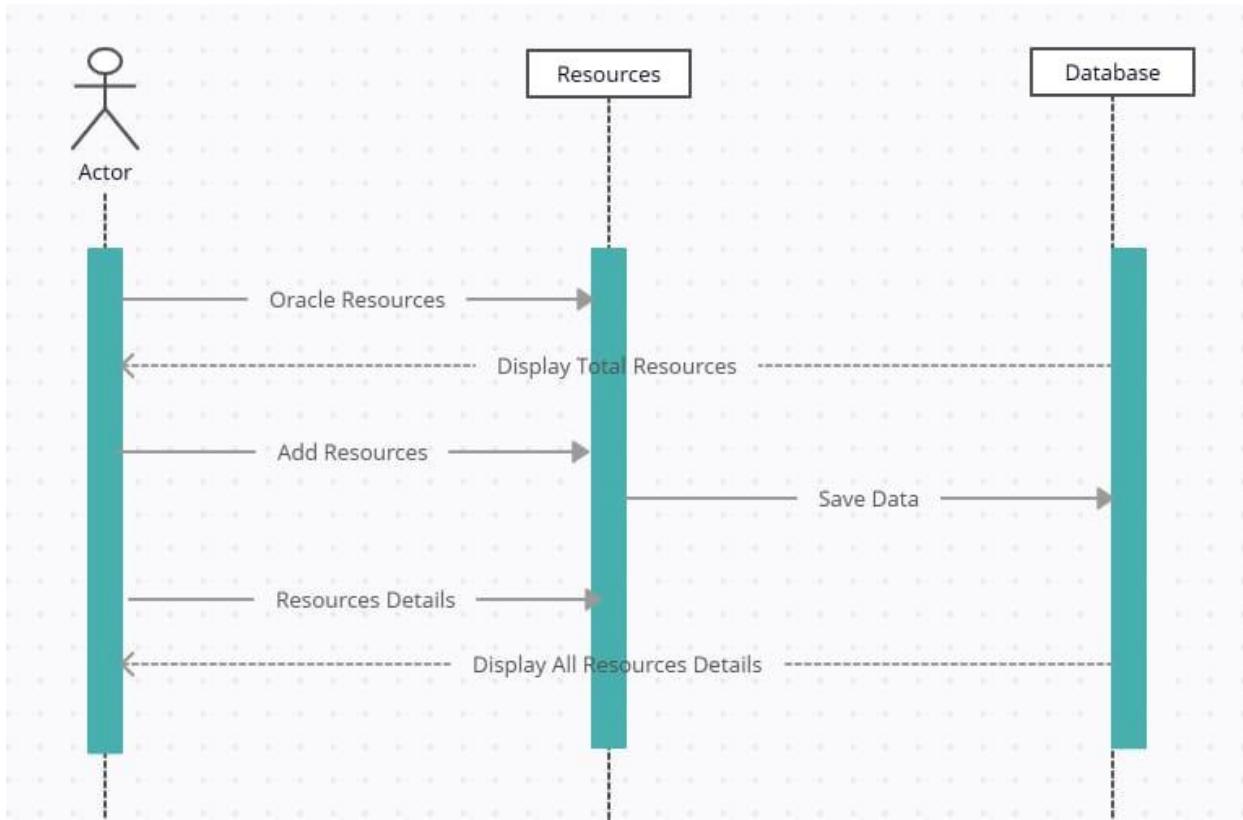
ER diagram



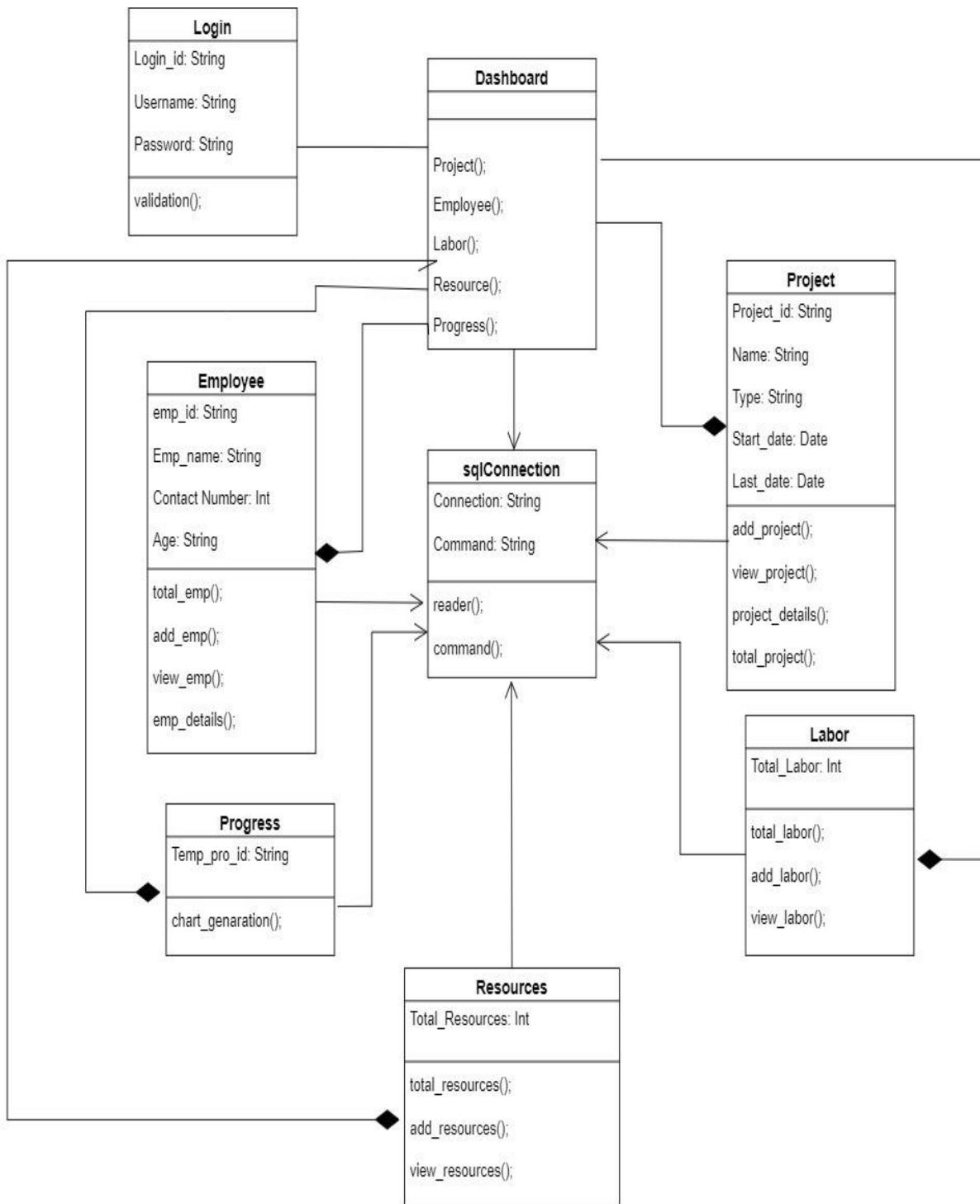
Sequence diagram







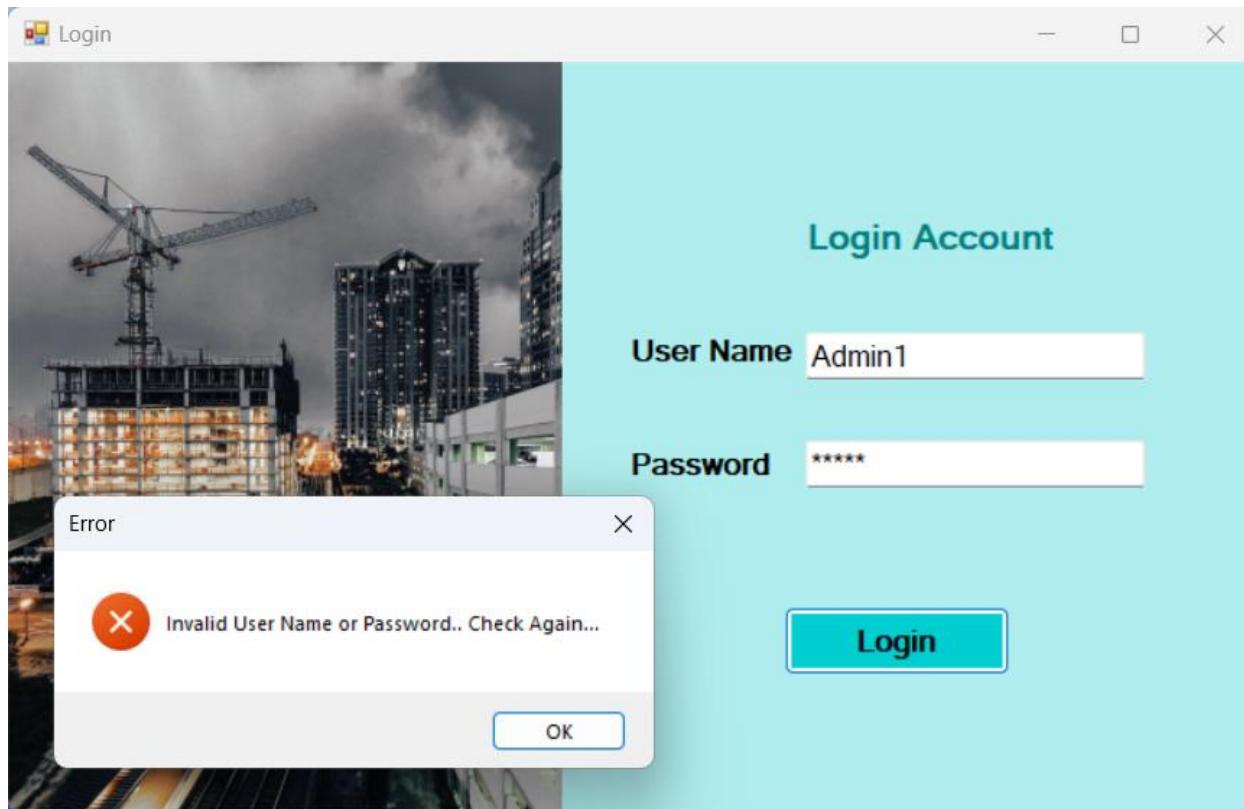
Class diagram

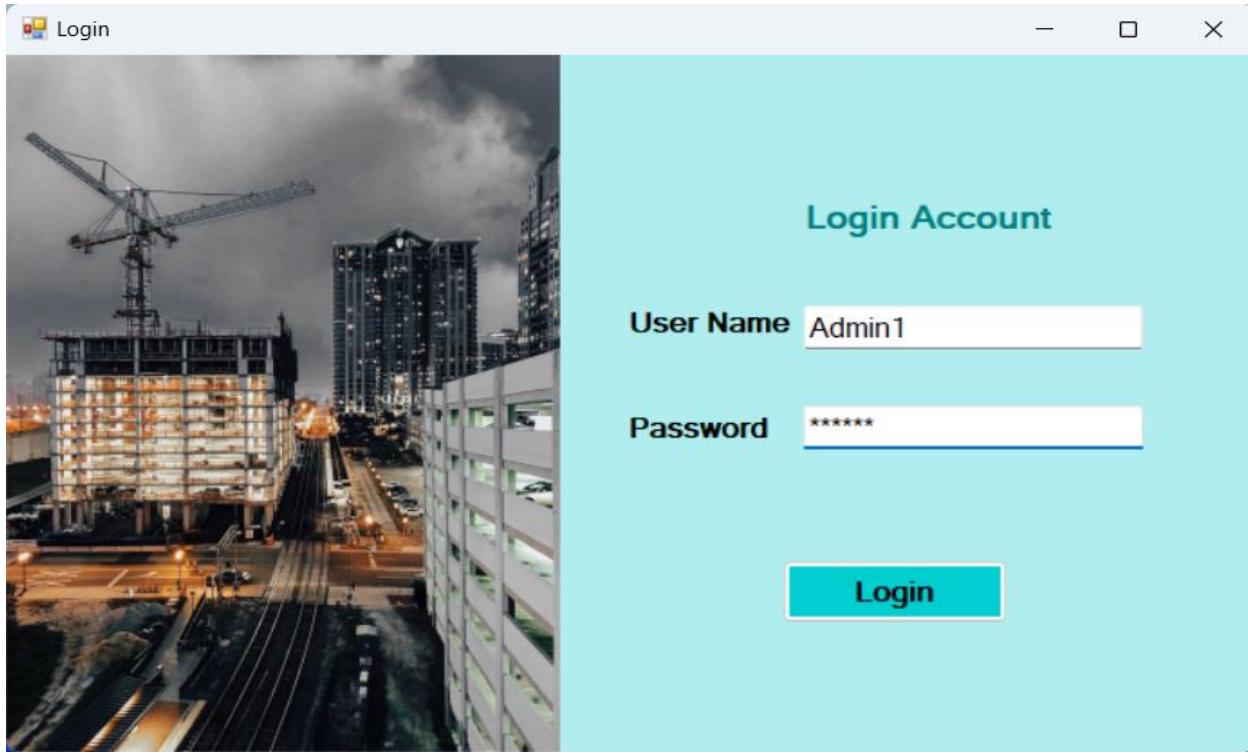




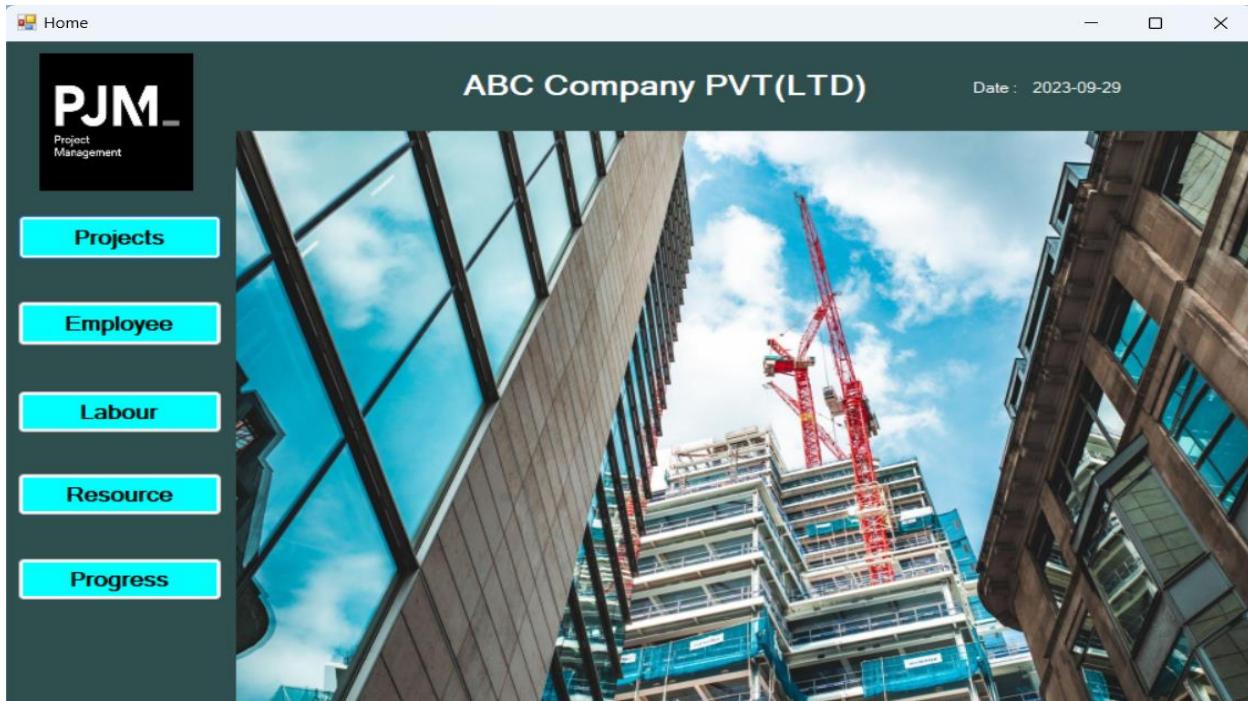
Design of each form in the application & code implementation

Login Page





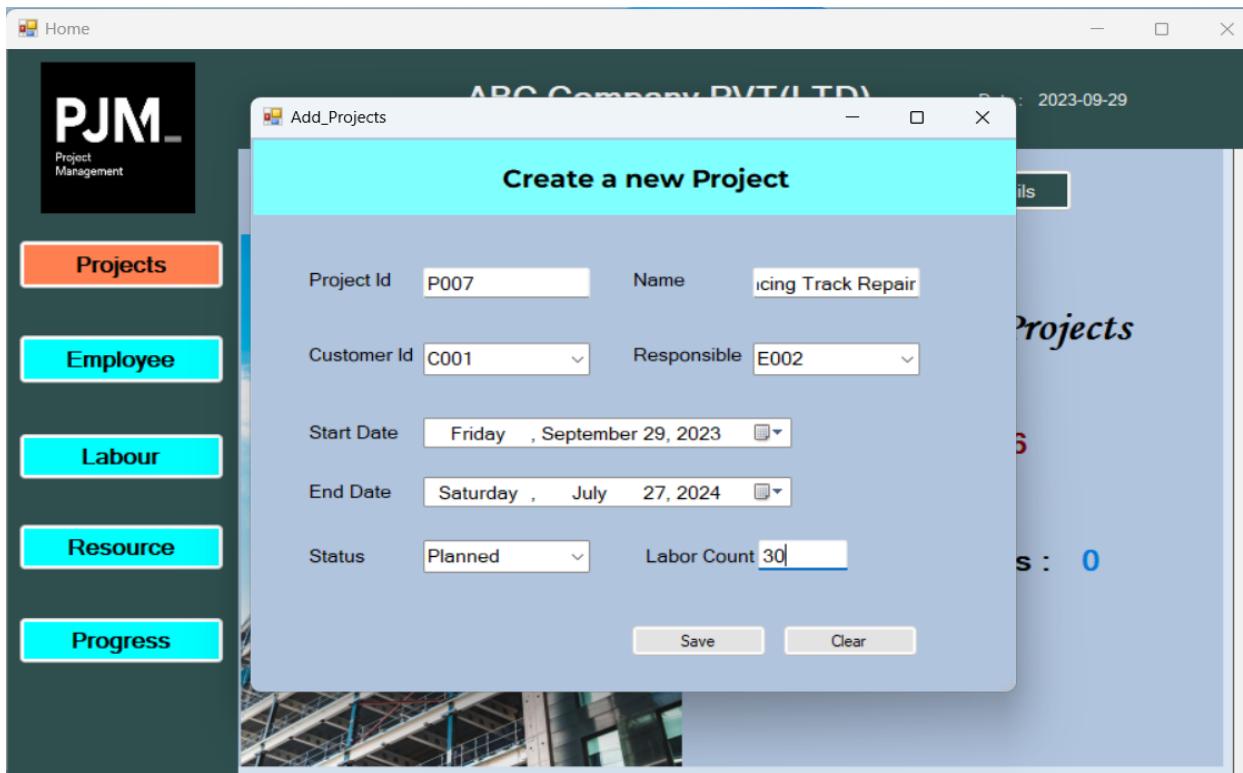
Dashboard

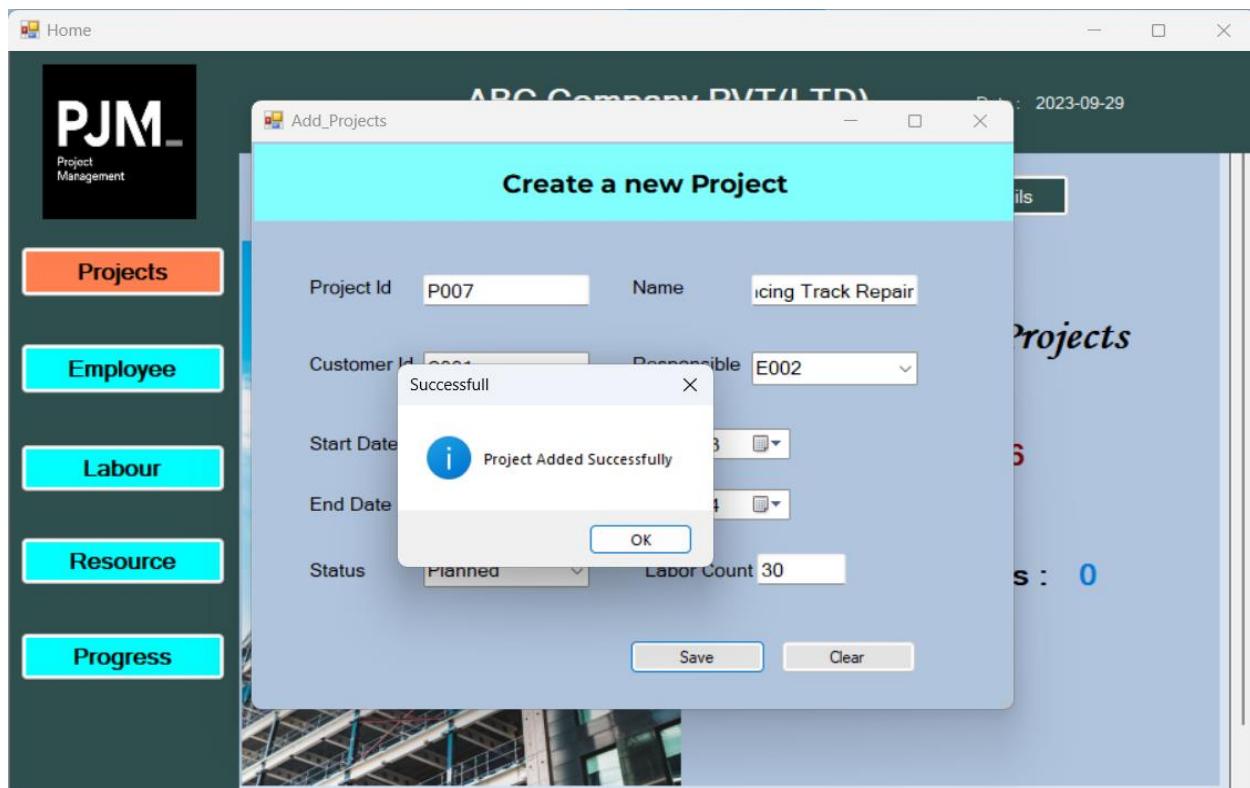


Projects Page



Add Project Form

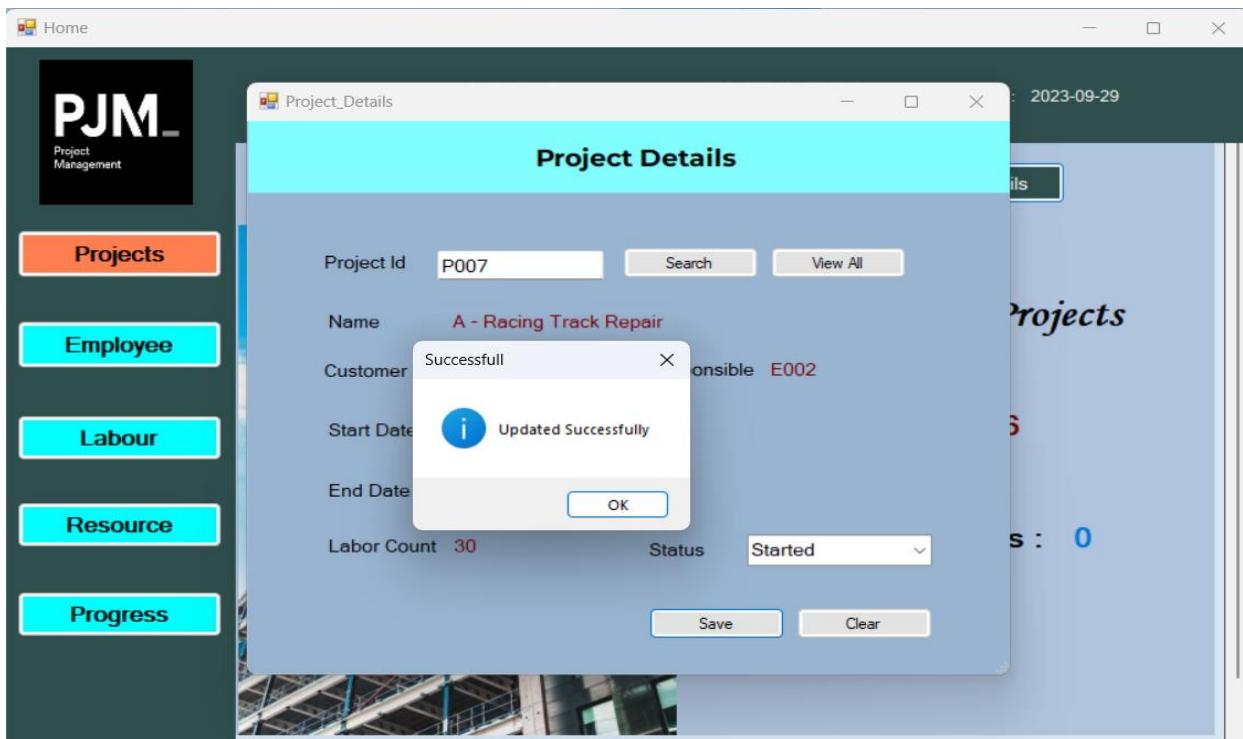
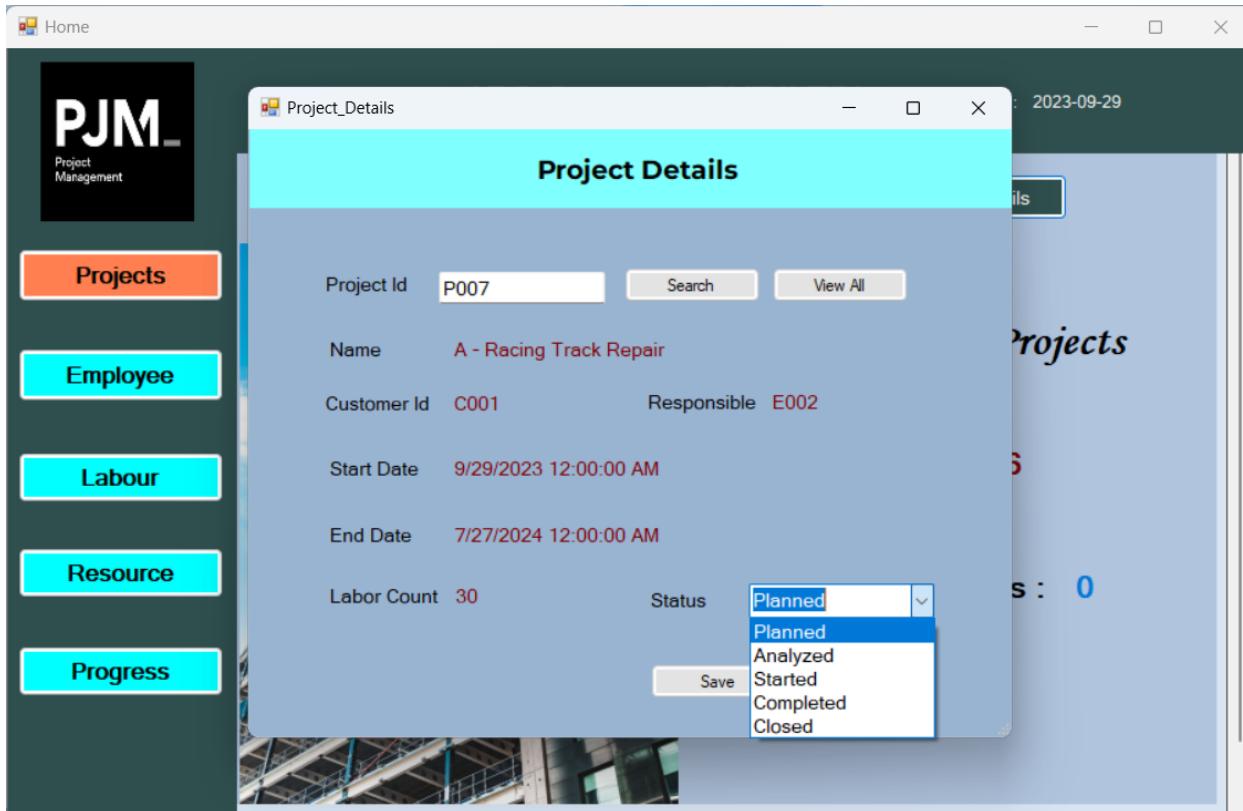




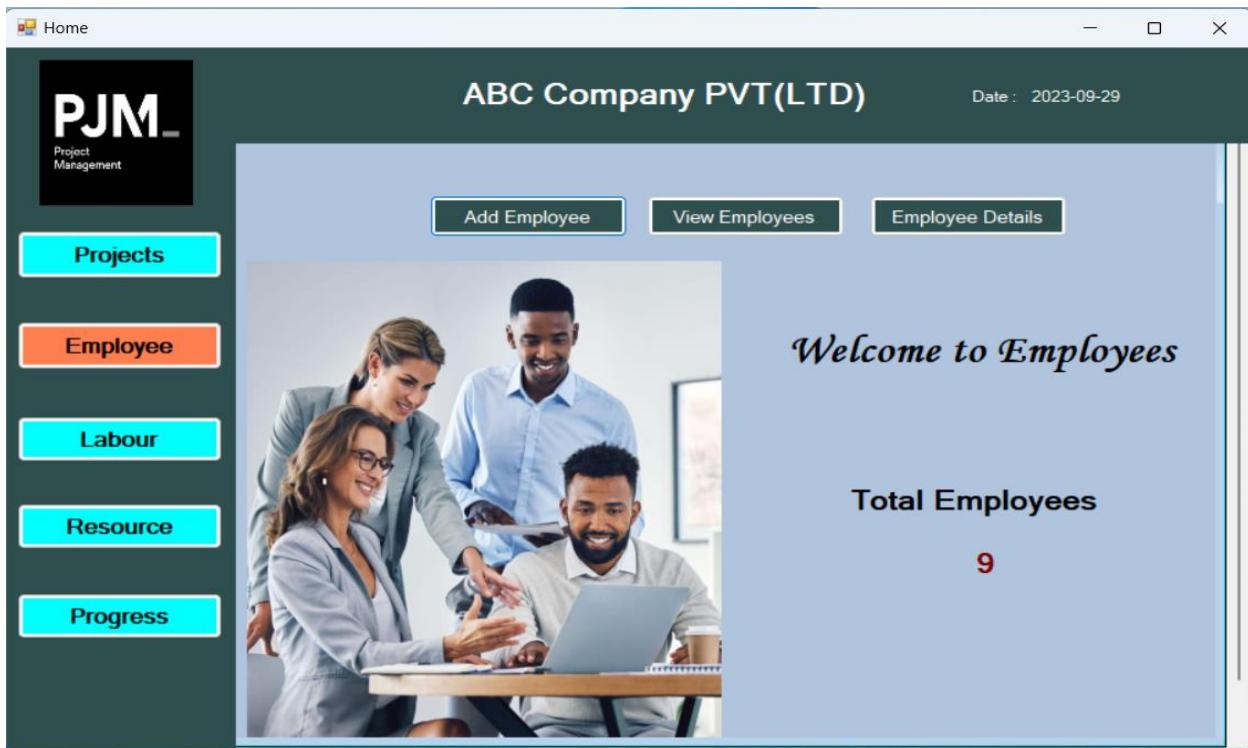
View Project Form

ProjectId	Name	StartDate	EndDate	Responsible	CustomerId	LaborCount	Status
P001	A-Construction	9/23/2023	6/30/2024	E001	C001	50	Analyzed
P002	A - Road Construction	9/24/2023	2/29/2024	E002	C002	60	Planned
P003	B-Construction	9/24/2023	12/31/2023	E001	C001	40	Analyzed
P004	B - Yard Construction	9/25/2023	12/31/2023	E002	C002	20	Planned
P005	B - School Building	9/28/2023	4/30/2024	E001	C001	70	Started
P006	C-Apartment Construc...	9/28/2023	8/31/2024	E002	C002	100	Analyzed
P007	A - Racing Track Repair	9/29/2023	7/27/2024	E002	C001	30	Planned

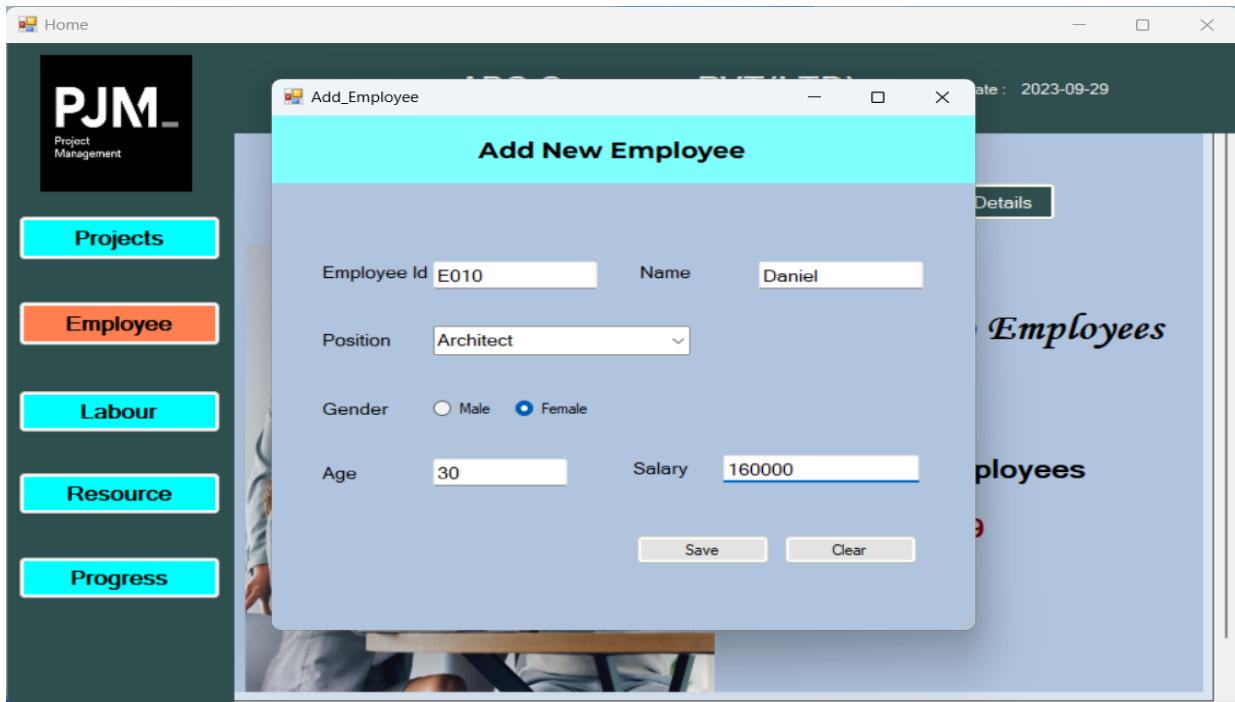
Project Details Form

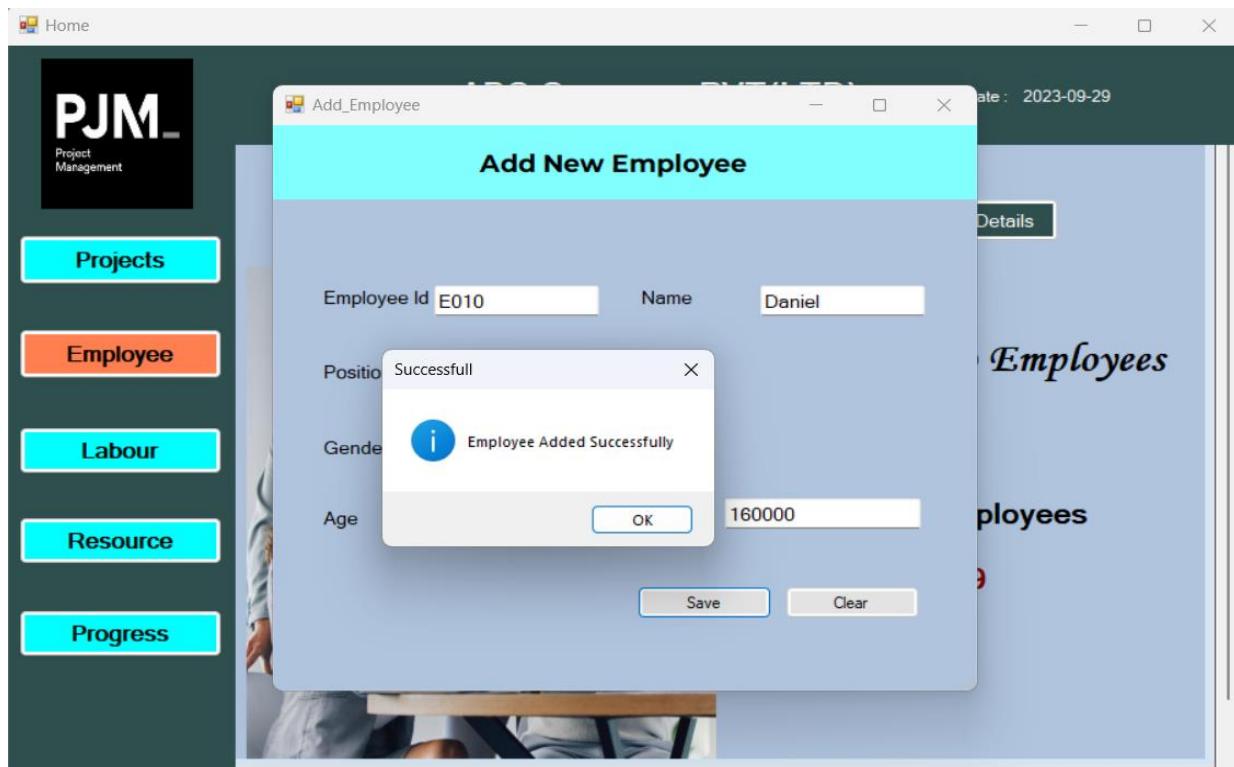


Employee Page



Add Employee Form

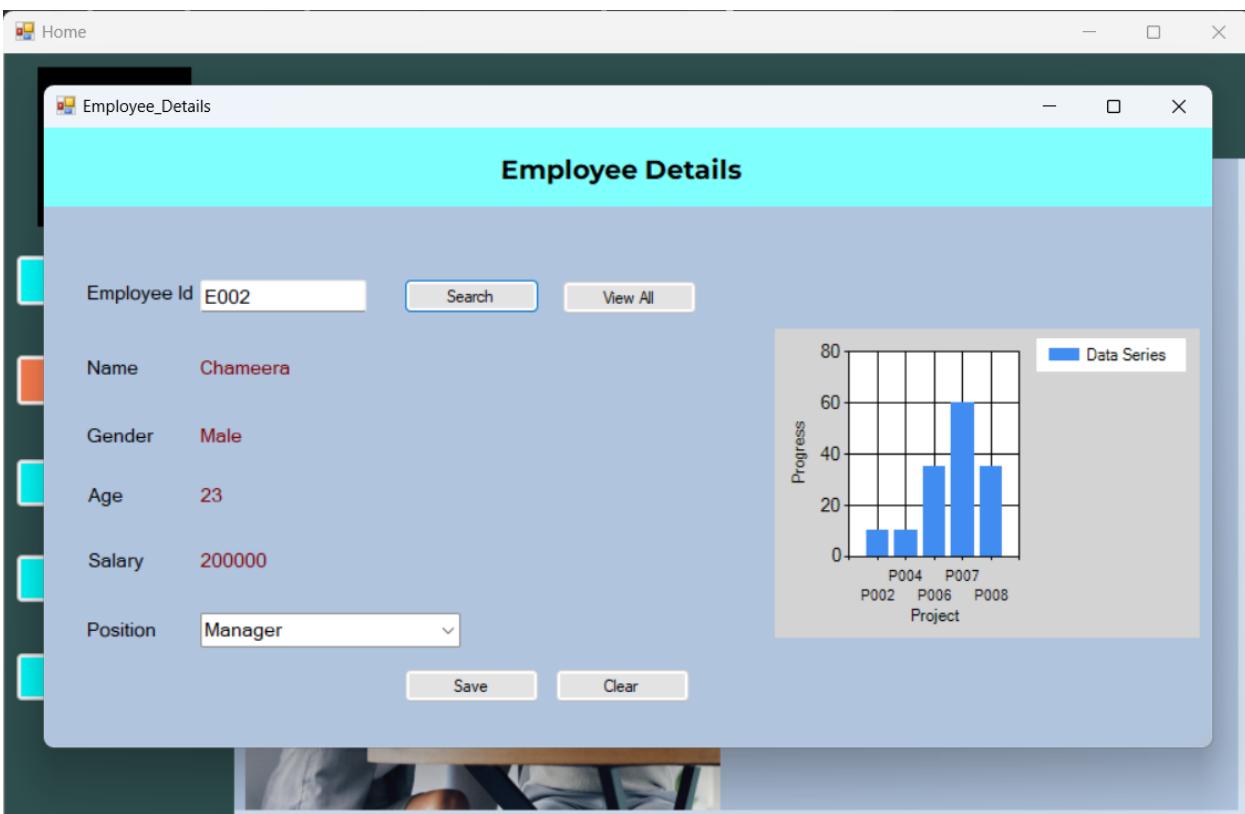
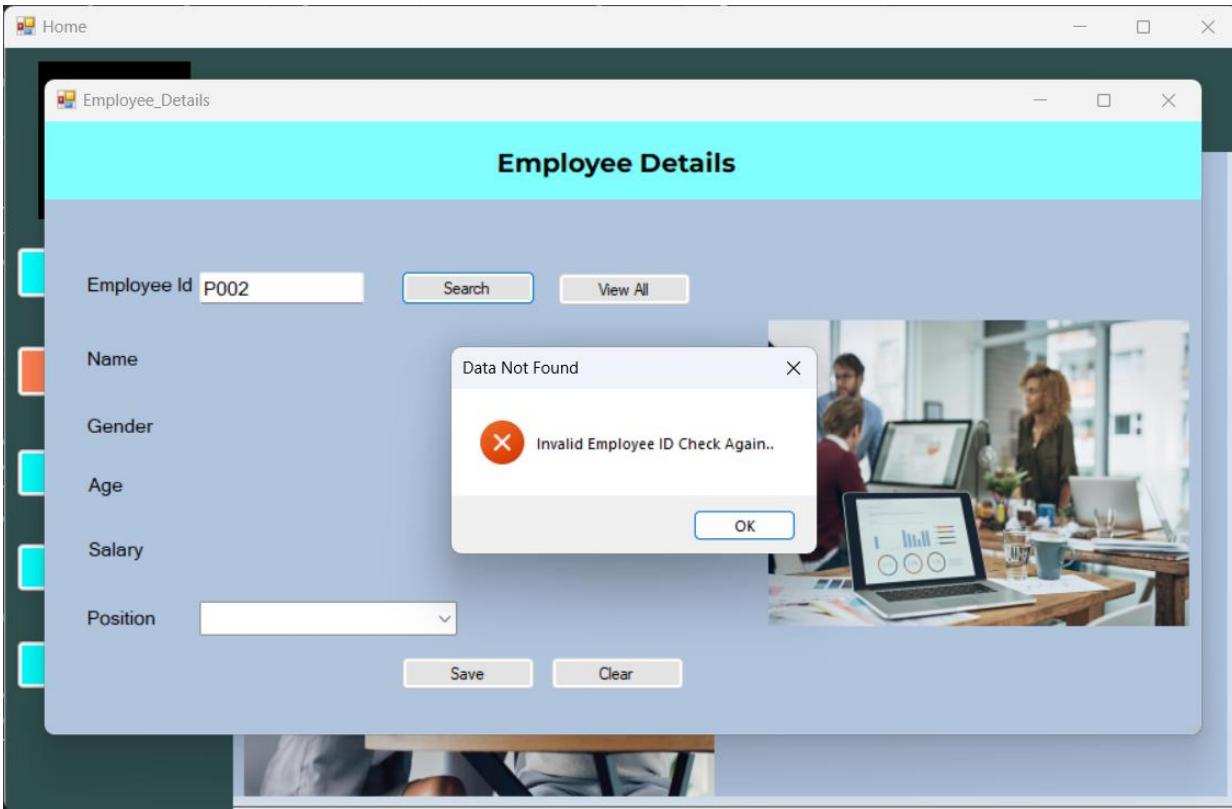


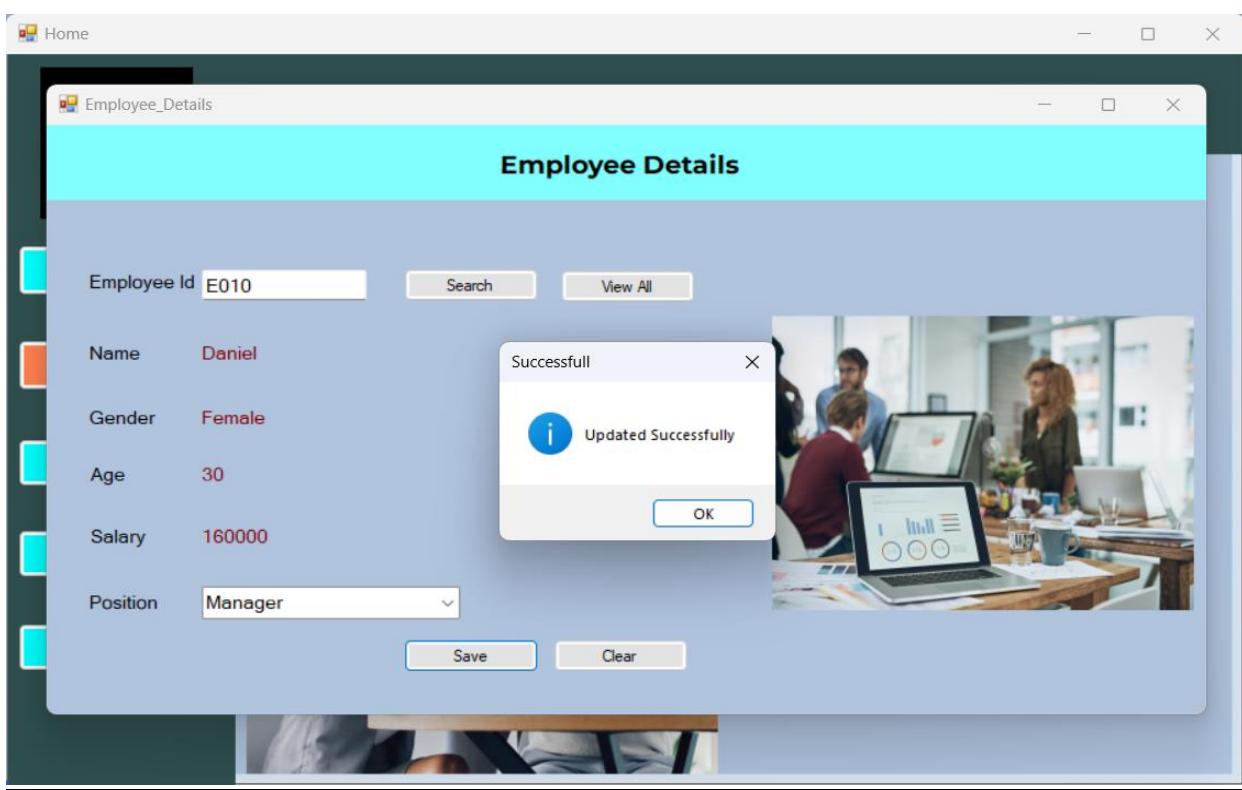
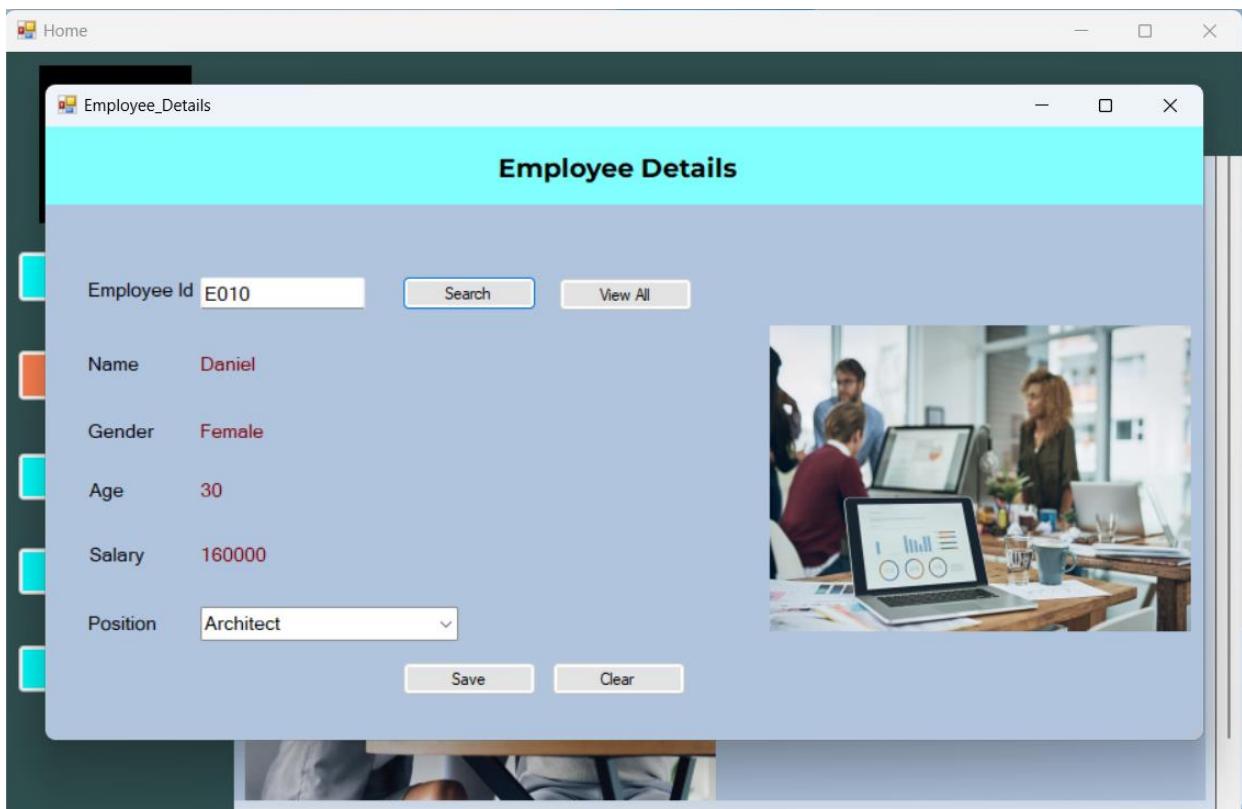


View Employee Form

	EmployeeId	EmpName	Role	Age	Gender	Salary
▶	E001	Harshana	Manager	24	Male	200000
	E002	Chameera	Manager	23	Male	200000
	E003	Smith	Clerk	25	Male	60000
	E004	Lahiru	Engineer	24	Male	200000
	E005	Kevin	Surveyor	28	Male	150000
	E006	David	Inspector	30	Male	120000
	E007	Dimuthu	Architect	34	Male	200000
	E008	James	Equipment Operator	30	Male	80000
	E009	Cameron	Engineer	28	Female	150000
	E010	Daniel	Architect	30	Female	160000

Employee Details Form

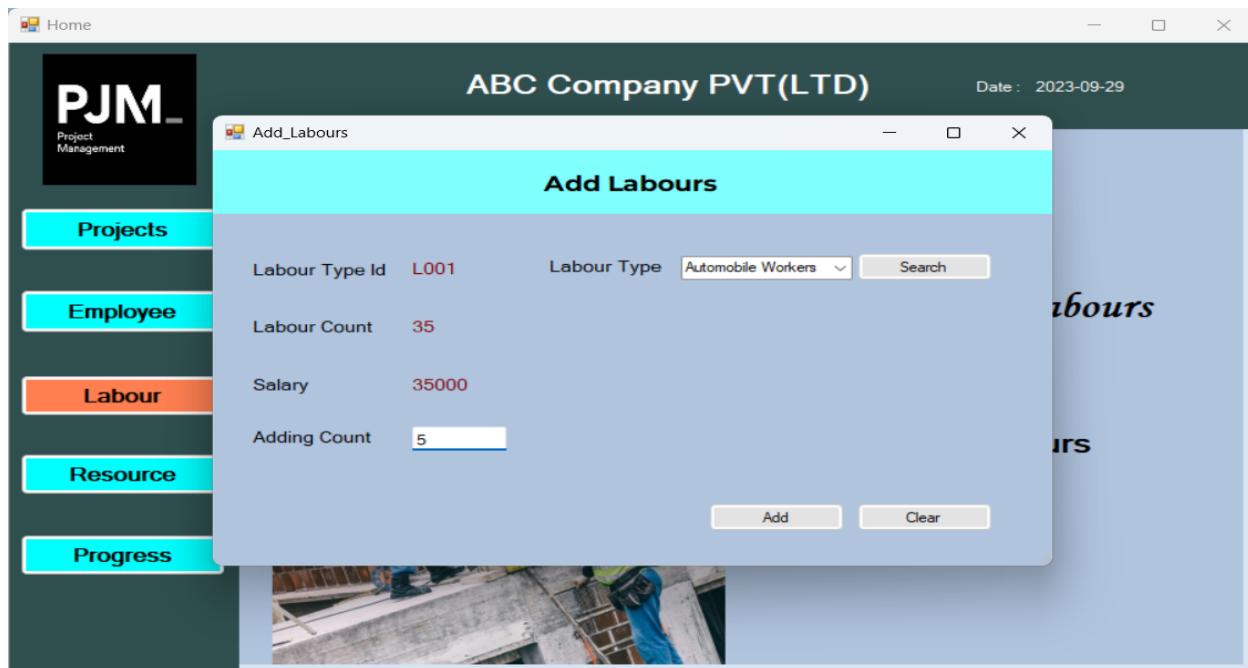


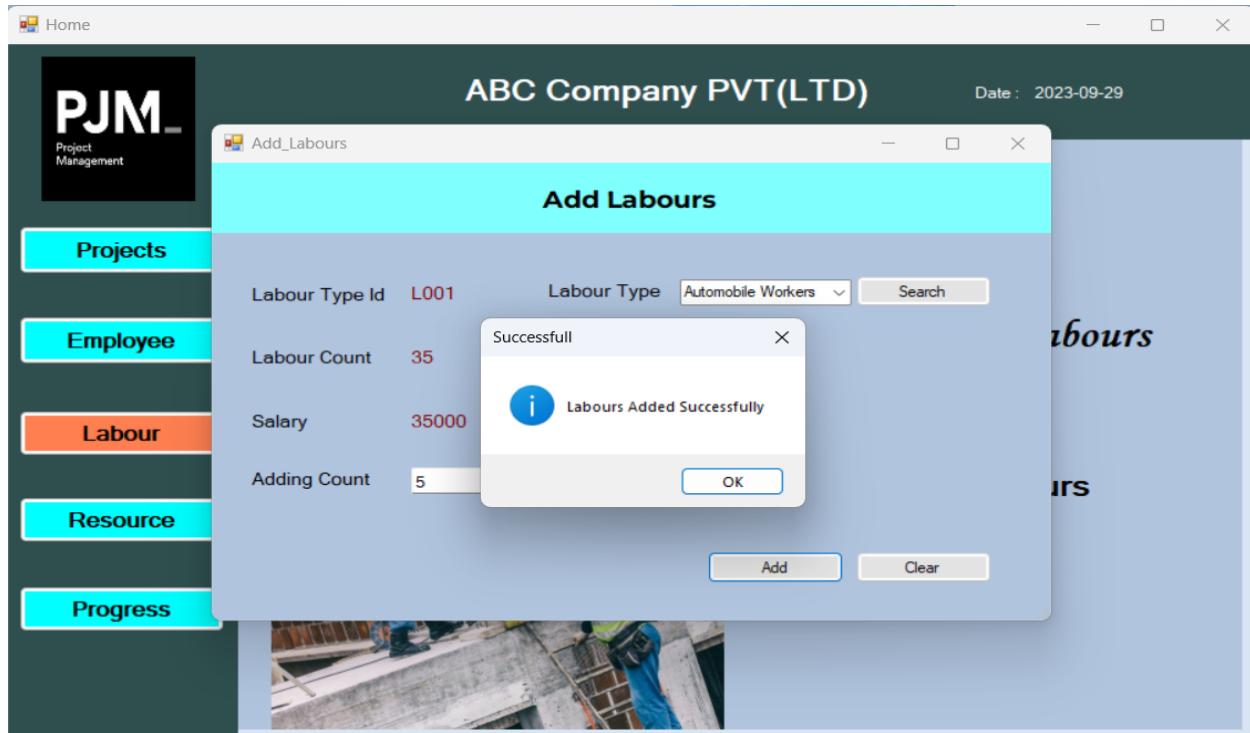


Labour Page



Add Labours Form





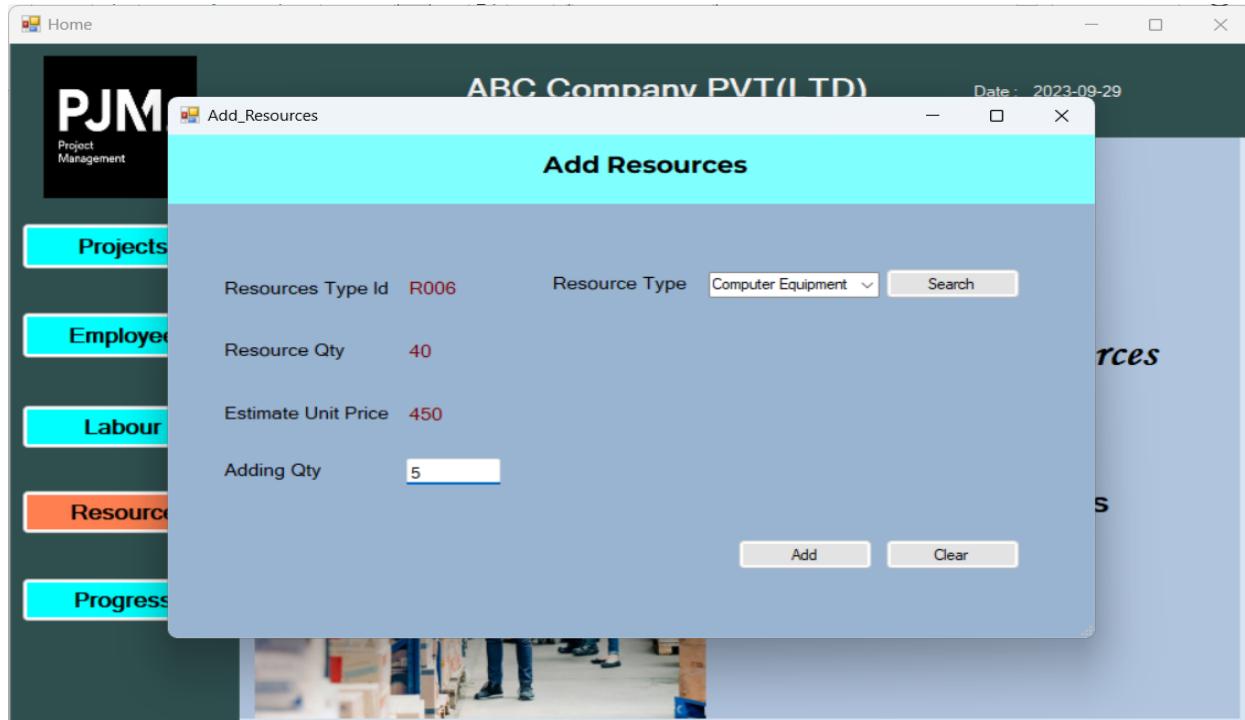
Labours Details Form

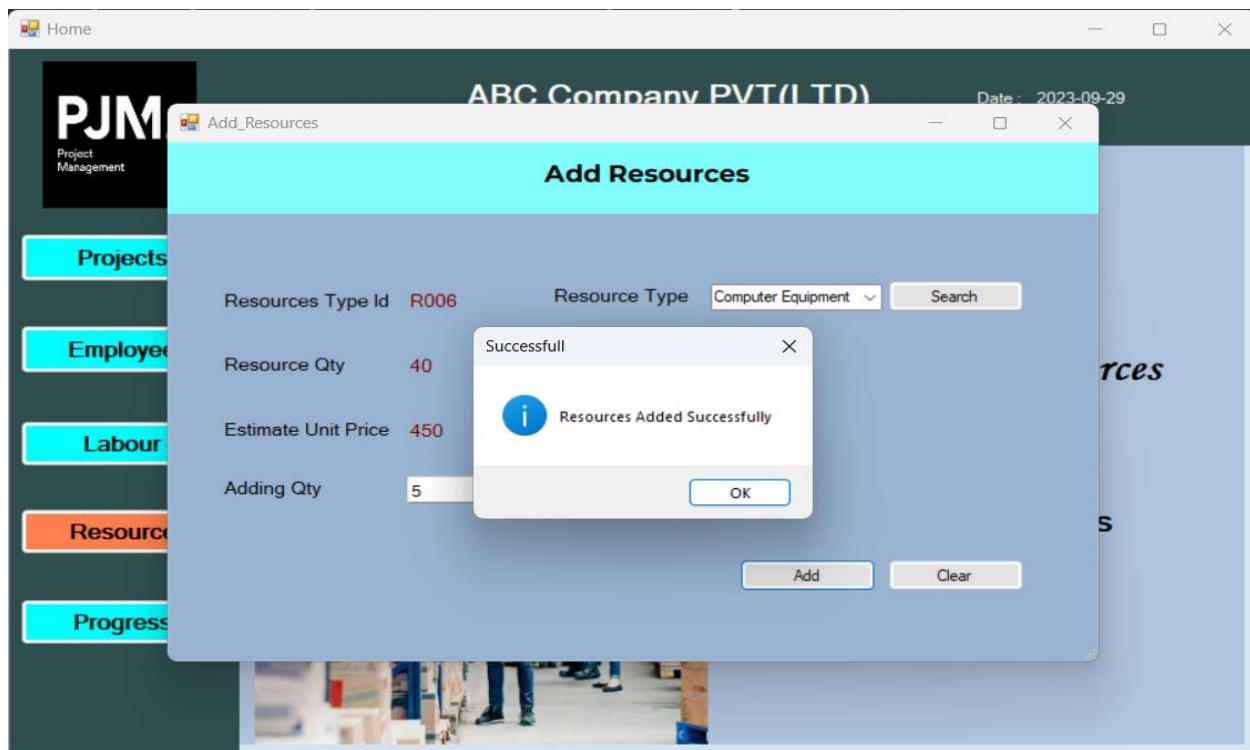
LabourTypeid	LabourType	Salary	Count
L001	Automobile Workers	35000	40
L002	Service Station Workers	30000	60
L003	Construction Site Wor...	35000	100
L004	Drivers	40000	30
L005	Machine Operators	35000	30
L006	Security Officers	50000	30
L007	Cleaning Service	30000	20

Resource Page



Add Resources Form



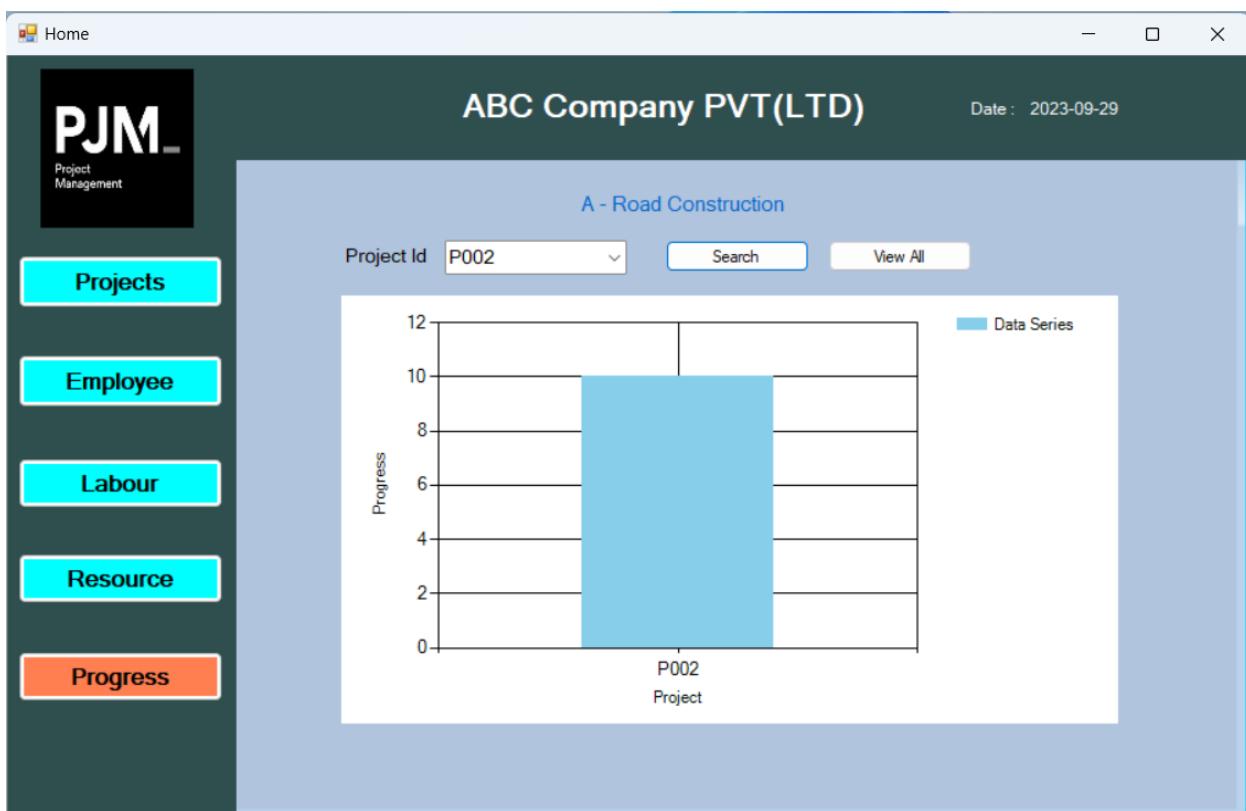
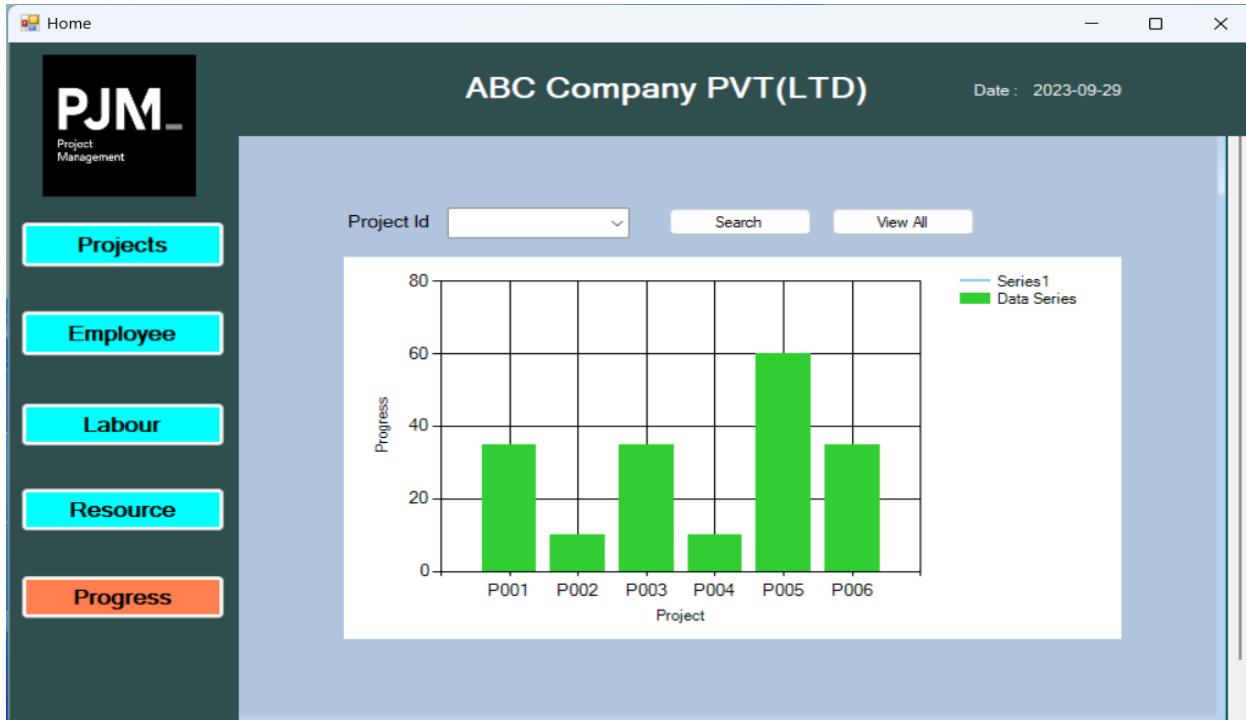


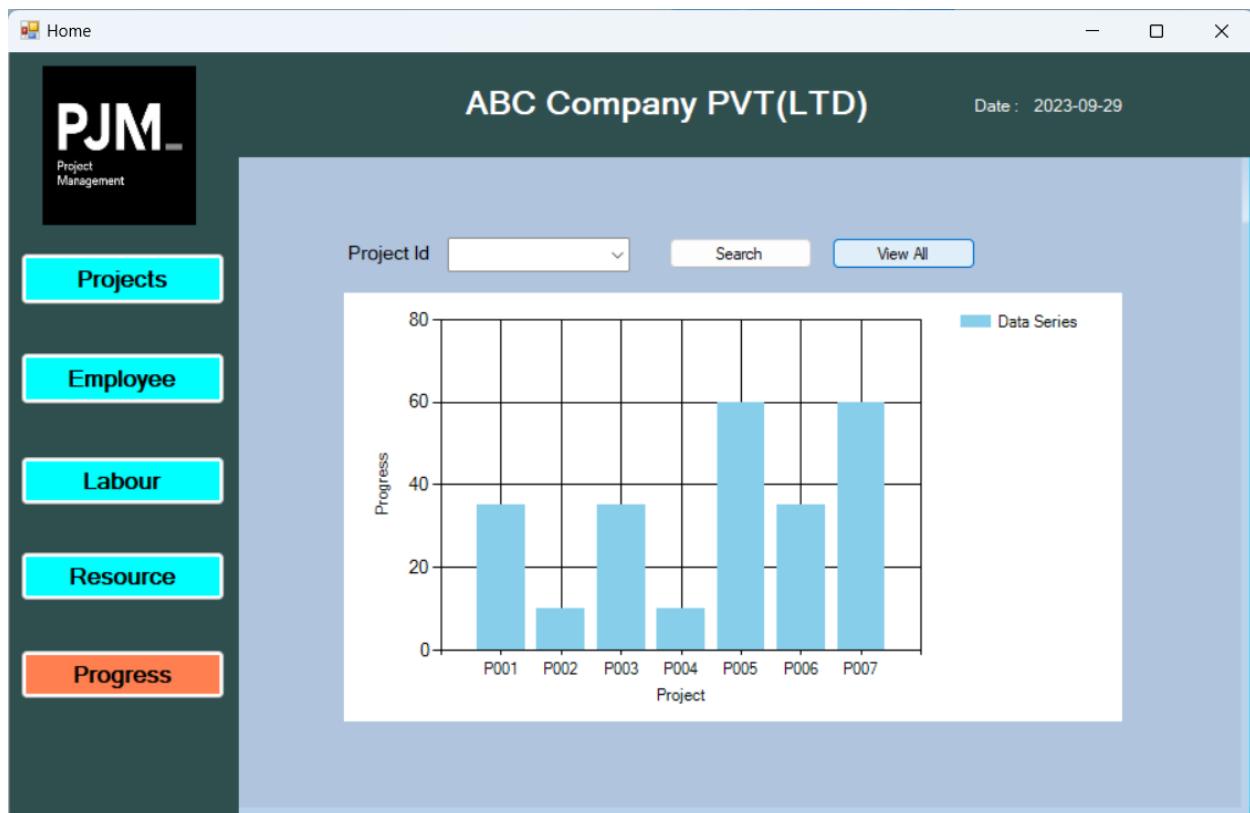
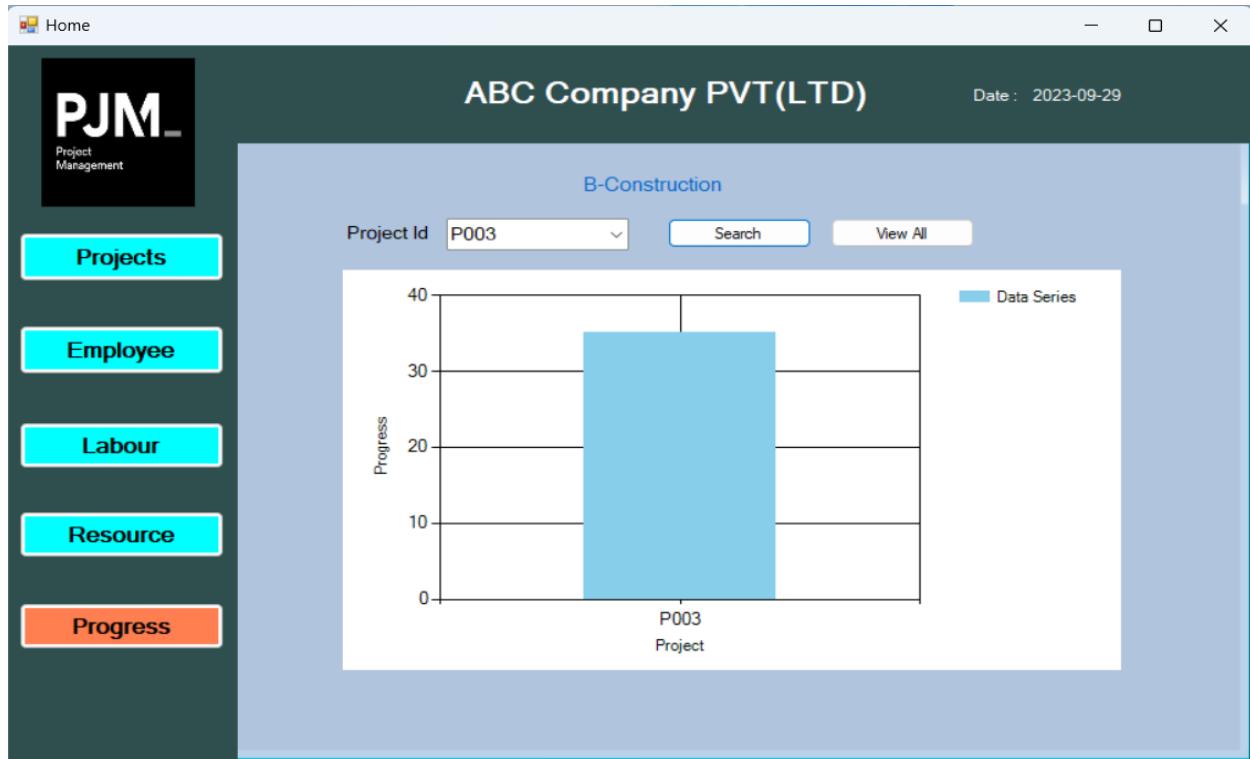
Resources Details Form

Resources				
	Resource Type Id	Resource Type	Qty	Estimate Unit Price
	R001	Flow Racks	90	400
	R002	Hand Trucks	60	500
	R003	Lifts	40	600
	R004	Paper Goods	30	200
	R005	Light Bulbs	45	400
	R006	Computer Equipment	40	450

Add Resources

Progress Page

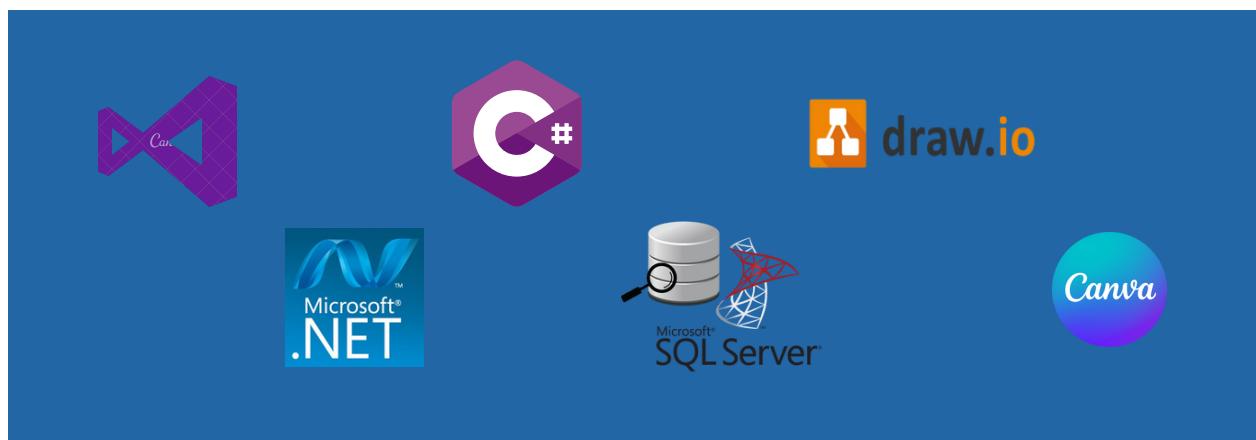




===== Screenshots & Code implementation end ... =====

Tools and Things used for design

07



- **Programming Language - C#**

The programming language used is **C#**, which is commonly used for Windows Forms applications and integrates with various libraries and frameworks.

- **Development Environment**

The project is likely developed using Visual Studio, a popular integrated development environment (**IDE**) for C# and **.NET** development. Visual Studio provides a user-friendly interface for building Windows Forms applications and offers debugging and design tools.

- **Windows Forms**

The user interface (**UI**) for the project is built using **Windows Forms**. Windows Forms is a graphical user interface framework provided by **Microsoft** for developing desktop applications in C#.

- **Canva**

Canva is a user-friendly online graphic design tool that helps people create a wide range of visual content easily, even without prior design experience. It is used to create **project reports**.

- **SQL Server Database**

The project connects to a **SQL Server database** using **System.Data.SqlClient**. This is evident in the code where SQL Server connections and commands are used for **data storage and retrieval**.

- **Database**

The project appears to interact with a database to store and retrieve information related to projects, employees, labor, resources, and progress. The exact **database management system (DBMS)** is **SQL Server**.

- **Draw.io**

Draw.io is a web-based diagramming tool that allows users to create **diagrams** and **visual representations** of ideas and concepts.



Initial plan vs Actual plan

Initial plan

In the initial plan for the project management system for building construction, that a user could log in and get details about the project.

Further primary objective was to create a functional system with a focus on simplicity.

Initially, there was an intention to have just four forms for each of the main user categories, dashboard, employee, labor, and project.

Actual plan

Initially, the intention was to have only four forms for each of the main user categories, dashboard, employee, labor, and project, but it was not limited to four forms but a wider range was made.

The app allows you to add a project, employee, or resource and get their details, and also add a pro with graphs to see the progress and details of all projects. It can provide an accurate understanding of the details contained therein.

08

WORK CONTRIBUTION & CHALENGERS

Work Contribution

NAME

C.P.K.Wijeratne

H.G.H. Eshan

N.P.K.D.R.S.Gunarathna

D.H.G.Lahiru

J.M.N.C.Jayamanne

CONTRIBUTION

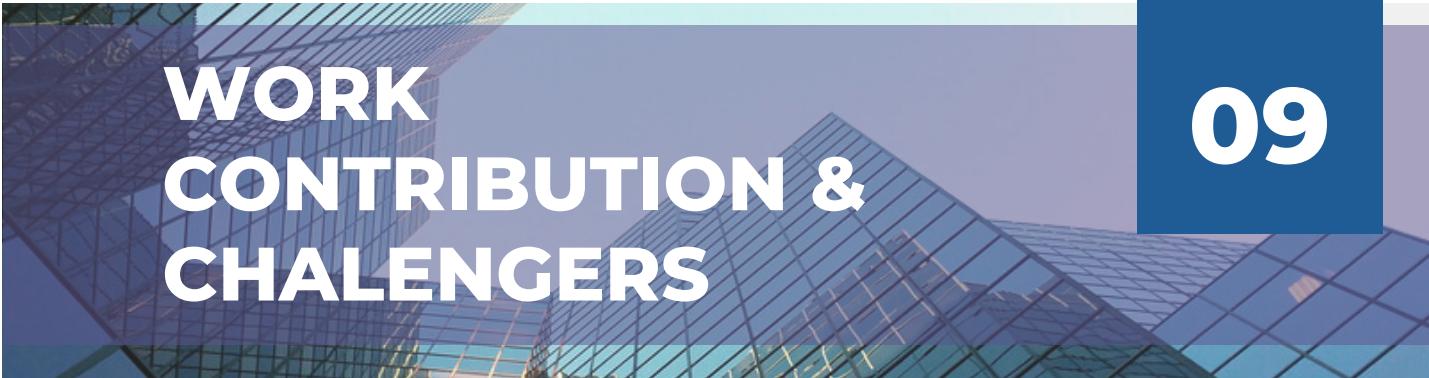
Dashboard & Employee

Progress & Login

Labor

Project

Resource



WORK CONTRIBUTION & CHALLENGERS

09

Challenges

- **Time Management:**

Balancing individual tasks with team responsibilities was challenging. Meeting deadlines and managing time efficiently is critical.

- **Online Collaboration:**

Adapting to and effectively using online collaboration tools can be a learning curve for some group members.

- **Communication Gaps:**

Misunderstandings and lack of clarity can occur due to differing schedules, leading to communication gaps.

- **Motivation and Accountability:**

Keeping all group members motivated and accountable, especially when working remotely, poses a challenge.

- **Conflict Resolution:**

Addressing disagreements or conflicts within the group requires effective resolution strategies.

Challenges

09

- **Workload Management:**

Balancing project work with individual commitments and responsibilities can lead to stress and time management challenges.

- **Flexibility:**

Adapting to changing schedules and unforeseen circumstances requires flexibility and adaptability.

- **Progress Tracking:**

Tracking project progress, especially when group members work at different times, can be complex.

- **Scheduling Conflicts:**

Coordinating the schedules of four group members is challenging, making it difficult to find suitable meeting times.

- **Task Management:**

Handling multiple tasks requires clear responsibilities and deadlines to prevent overlaps or omissions.

- **Coordination issues:**

Ensuring alignment between the contributions of different members can be tricky.



FUTURE ENHANCEMENTS

.....

- **Artificial Intelligence (AI) and Machine Learning:**

Integration of AI and machine learning algorithms for predictive analytics, task automation, and intelligent decision support. AI can assist in resource allocation, risk assessment, and project forecasting.

- **Advanced Reporting and Analytics:**

More sophisticated reporting and analytics capabilities, including real-time dashboards, customizable KPIs, and data visualization tools for better project insights and decision-making.

FUTURE ENHANCEMENTS

10

- **Blockchain Integration:**

Blockchain technology for enhanced security, transparency, and traceability in project management, particularly in industries like supply chain management and finance.

- **IoT Integration:**

Integration with the Internet of Things (IoT) devices to collect real-time data from project equipment and assets, enabling proactive maintenance and monitoring.

- **Automation of Routine Tasks:**

Automation of repetitive tasks such as status updates, document approvals, and task assignments to free up project managers for more strategic work.

- **Enhanced Mobile Experience:**

Mobile apps with improved functionality and offline capabilities to allow team members to work on projects from anywhere.

FUTURE ENHANCEMENTS

10

- **AI-driven Risk Management:**

AI-powered risk assessment and mitigation tools that can predict and proactively address potential project risks.

- **Security and Privacy:**

Enhanced security measures to protect sensitive project data and compliance with evolving data privacy regulations.

- **Resource Optimization:**

Advanced resource management features for optimizing the allocation of human and material resources based on skill sets and availability.

11

Our Team



Chameera Peshan

PS / 2019 / 265

wijerat-ps19265@stu.kln.ac.lk

+94 76 007 8842



Harshana Eshan

PS / 2019 / 137

eshanhg-ps19137@stu.kln.ac.lk

+94 71 604 8560

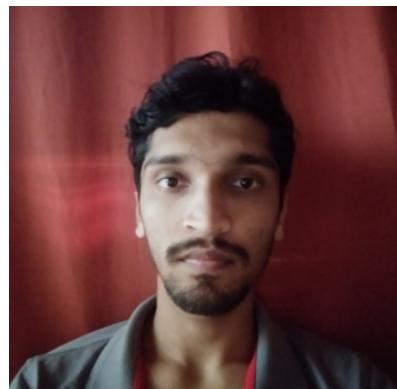


Randila Shehari

PS / 2019 / 225

gunarat-ps19225@stu.kln.ac.lk

+94 71 696 4666

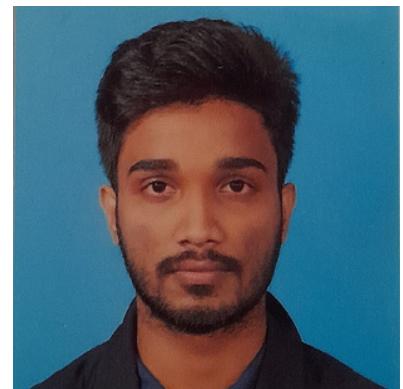


D.H.G.Lahiru

PS / 2019 / 022

lahirud-ps19022@stu.kln.ac.lk

+94 76 927 9527



J.M.N.C.Jayamanne

PS / 2019 / 244

jayaman-ps19244@stu.kln.ac.lk

+94 71 568 6673



