

# **Final Report**

## **CEC SYSTEM**

### **CEYLON ELECTRICITY**

### **CALCULATION SYSTEM**

## **EEY4189 – SOFTWARE DESIGN IN GROUP**

**Cluster number - 21**

**Group number - 21.4**

**Project Name - CEB Tracking system**

**Supervisor name –Ms. Ahali Suthaharan**

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## **1. Introduction and Background.**

Electricity consumption is a significant concern worldwide, with the need for efficient energy usage and conservation becoming increasingly important. This project aims to develop a web application that allows users to track their electricity consumption rates, calculate daily and monthly consumption, generate accurate billing amounts, and provide warnings for high energy usage. By providing users with insights into their energy consumption patterns, this application promotes informed decision-making and encourages responsible energy usage.

the traditional method of tracking electricity usage and generating bills fails to provide reliable and actionable information and also it is often lacking transparency. with the technology improvement it is an essential need for an innovative and user-friendly system, that fulfil accurate calculate meter reads, calculating and billing of electricity system replace to the already existing system.

Mainly we are expecting to implement a web-based system, that address these challenges by enrolling modern methods of calculations and displaying technologies to empower users with the relevant and accurate comprehensive information about their electricity usage. The system will enable users to monitor their electricity consumption patterns, receive real time updates, monthly analyzed reports, warnings about high electricity usage and tips to minimizes the usage limits

## 2. Problem Statement and Project Objectives.

The problem addressed by this project is the lack of a user-friendly and comprehensive platform for tracking electricity consumption rates, generating accurate bills, and promoting energy conservation. The objectives of the project are as follows:

- **Enable users to input meter readings for tracking their electricity consumption.** :the user-friendly interface will allow users to input the points regarding to their meter readings. The system will ensure the flexibility to enter the points of readings manually. Also, it will ensure that users can control the data input process and tracking the electricity consumption.

**meter reading guidelines** – user need to input electricity consumption units daily to the system, for that user can going to their home's electricity meter board at end of the day or specific time of each day and see how much points they use per day and input that points to the system.

- **Calculate daily and monthly consumption rates based on the meter readings.** : based on the users input meter points and readings, the system can calculate daily and monthly electricity rates according to the algorithms that we implement in the system. price for the points, time of day and various patterns will consider implementing that result.

- **Generate accurate billing amounts considering user-specific pricing plans.** : based on the daily usage and calculated consumption data, the system will generate accurate billing amount. This will provide efficiency and reliable billing and calculation information with the accurate pricing arrangement.

- **Implement a warning system to notify users of high energy usage.** : the system will provide warnings and notifications to users when the limit of electricity usage exceeds. These warnings and notifications will help for users to adopt electricity-efficient practices and reduce the waste and reduce the bill amount.

- **Develop an intuitive user interface for easy interaction and data entry.** : hence the system is extremely new experience for the users, we will focus to implement the interface with simplicity features that easy to access and use , it will help users to navigate through the system effortlessly.

### 3. Introduction to Similar Type of Systems.

There are various existing systems that offer functionalities similar to the proposed web application for electricity consumption tracking and management. Energy monitoring and management systems, such as Wattson and EnergyHub, provide real-time monitoring, energy consumption visualization, and personalized recommendations for energy-saving practices[Wattson, EnergyHub]. Utility billing and management systems, like Oracle Utilities Customer Care and Billing and Landis+Gyr Command Center, focus on accurate billing, meter reading management, and tariff calculation [Oracle Utilities Customer Care, Landis+Gyr Command Center]. Home energy management systems, such as Nest Learning Thermostat and EnergyHub Mercury, provide insights into energy usage, integration with smart devices, and centralized control over energy consumption [Nest Learning Thermostat, EnergyHub Mercury].

These existing systems serve as valuable references, highlighting the importance of tracking energy consumption, promoting energy conservation, and optimizing energy efficiency. By studying their features and limitations, we can develop a comprehensive web application that includes functionalities for tracking consumption rates, generating accurate bills, and issuing warnings for high energy usage. The proposed application aims to provide a user-friendly interface that empowers users to make informed decisions about their energy consumption.

[1] Wattson: Wattson offers real-time monitoring and energy consumption visualization, making it a valuable reference for our proposed web application.

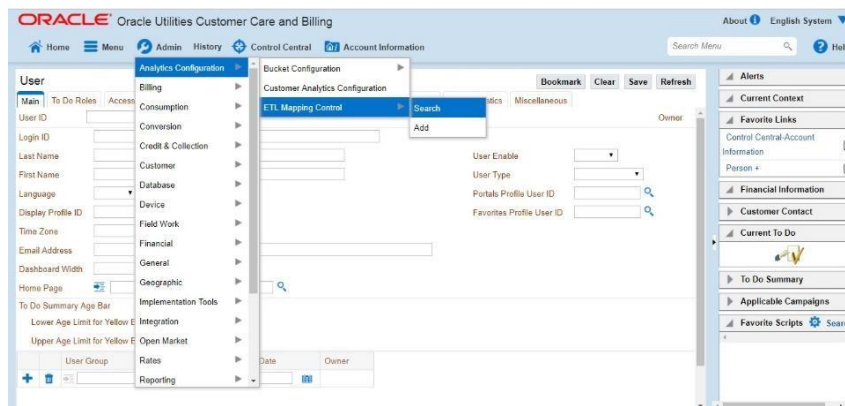
[2] EnergyHub: EnergyHub provides real-time monitoring, personalized recommendations for energy-saving practices, and integration with smart devices, serving as an important reference for our web application.

[3] Oracle Utilities Customer Care: Oracle Utilities Customer Care and Billing focuses on accurate billing, meter reading management, and tariff calculation, which provides valuable insights for developing our web application's billing and management functionalities.

[4] Landis+Gyr Command Center: Landis+Gyr Command Center specializes in utility billing and management, highlighting the importance of accurate billing and meter reading management for our proposed web application.

[5] Nest Learning Thermostat: Nest Learning Thermostat offers insights into energy usage, integration with smart devices, and centralized control over energy consumption, serving as a reference for developing similar features in our web application.

[6] EnergyHub Mercury : EnergyHub Mercury, similar to EnergyHub, provides valuable insights into energy usage and serves as a reference for integrating energy management features into our web application.

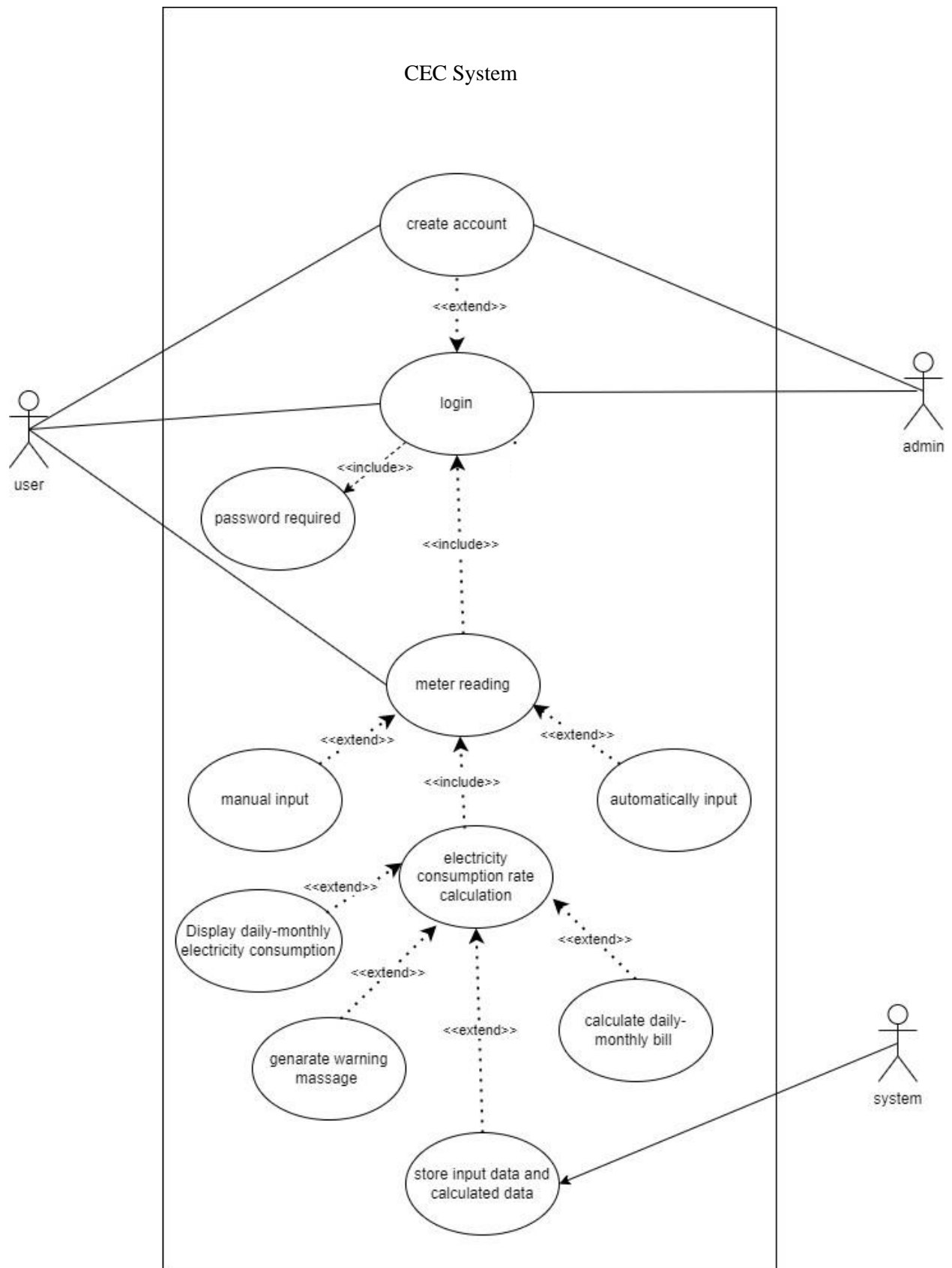


#### **4.Project Solution (Including use case diagram).**

Our proposed solution is a web application that allows users to track electricity consumption rates, calculate daily and monthly consumption, generate accurate bills, and receive warnings for high energy usage. The application will consist of the following major components:

- **User Registration and Authentication:** Users can create accounts and securely log in to access the application's features.
- **Meter Reading Input:** Users can manually input meter readings or integrate with smart meter systems for automatic updates.
- **Consumption Calculation:** The application will calculate daily, and monthly consumption rates based on the meter readings.
- **Billing and Invoicing:** Accurate bills will be generated considering the consumption rates and user-specific pricing plans.
- **Warning System:** Users will be alerted through notifications and messages for exceeding predefined energy consumption thresholds.
- **User Dashboard and Reports:** A user-friendly dashboard will display consumption trends, historical data, and consumption summaries.

## Use Case Diagram.





## **5. Technology Planning to Use.**

### **Backend:**

- Programming Language: PHP
- Database: MySQL
- Database Design Tool: MySQL Workbench, phpMyAdmin

### **Frontend:**

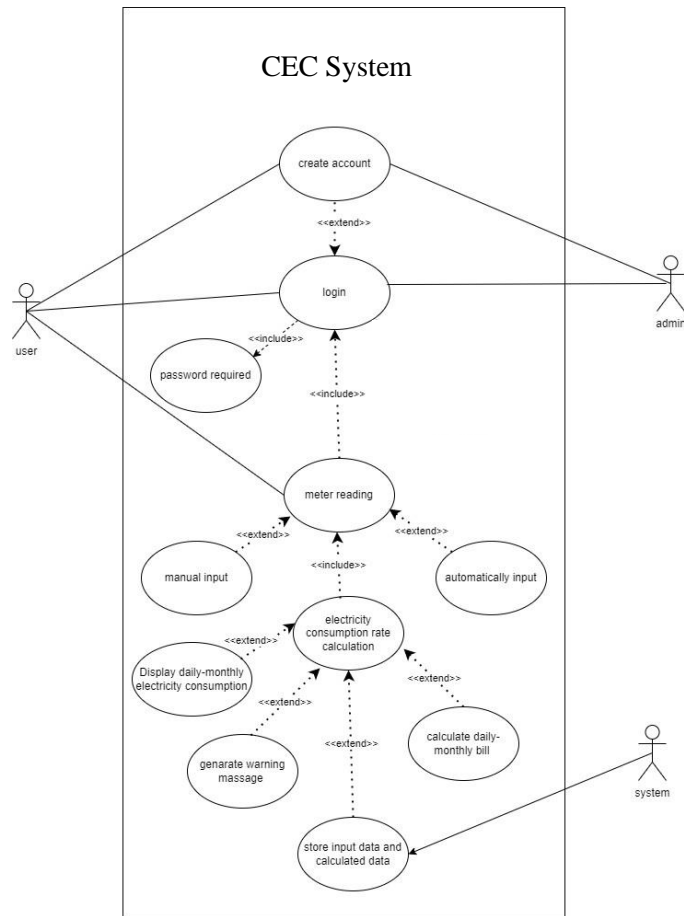
- Languages: HTML5, CSS3, JavaScript
- UI Design Tools: Figma
- Data Visualization: Chart.js

## 6. Reference-

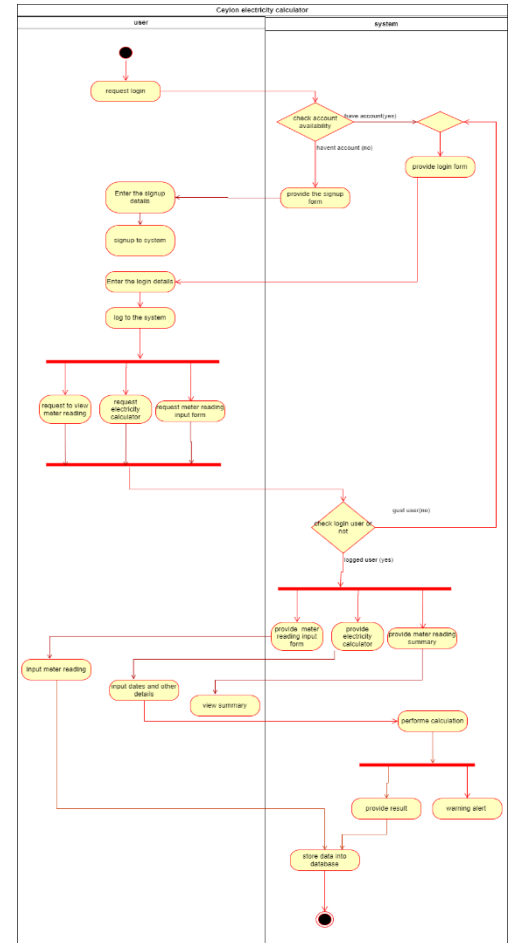
- [1] Wattson - <https://www.diykyoto.com/>
- [2] EnergyHub - <https://www.energyhub.com/>
- [3] Oracle Utilities Customer Care and Billing –  
<https://www.oracle.com/industries/utilities/customer-care-billing/>
- [4] Landis+Gyr Command Center –
- [5] Nest Learning Thermostat - [https://store.google.com/us/product/nest\\_learning\\_thermostat](https://store.google.com/us/product/nest_learning_thermostat)
- [6] EnergyHub Mercury - <https://www.energyhub.com/mercury/>
- [7] CEBCare - <https://cebcare.ceb.lk/>

## 7. Design document

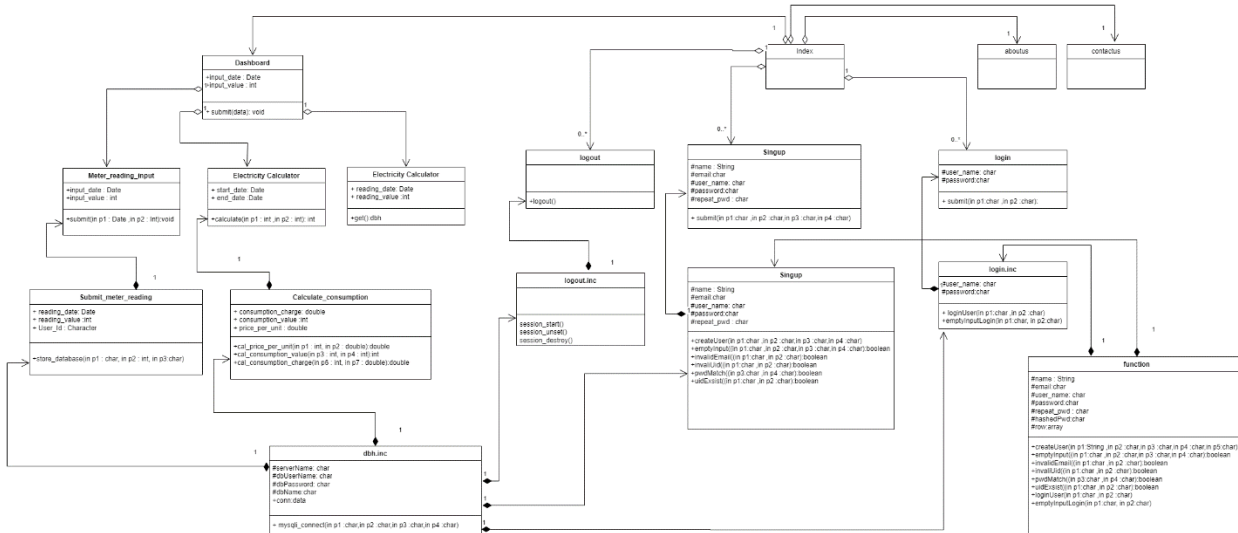
## Use case diagram



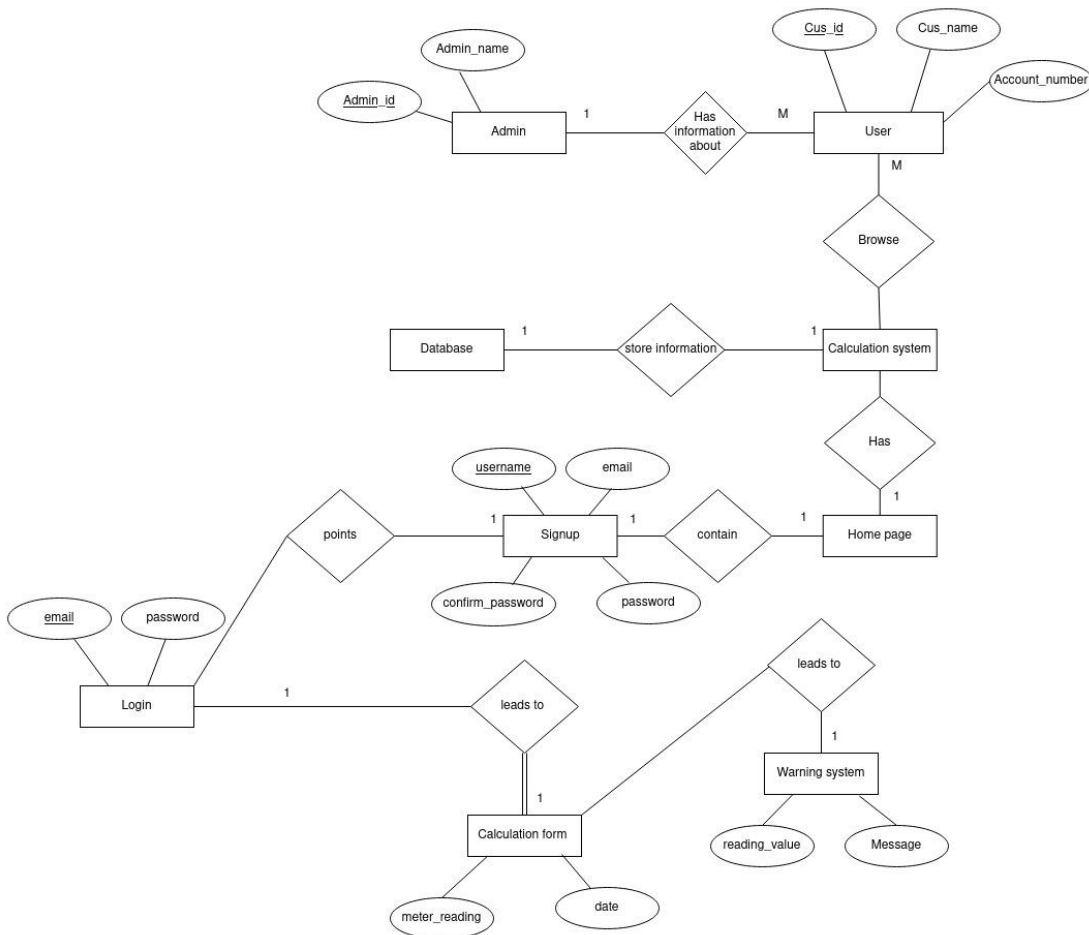
## activity diagram



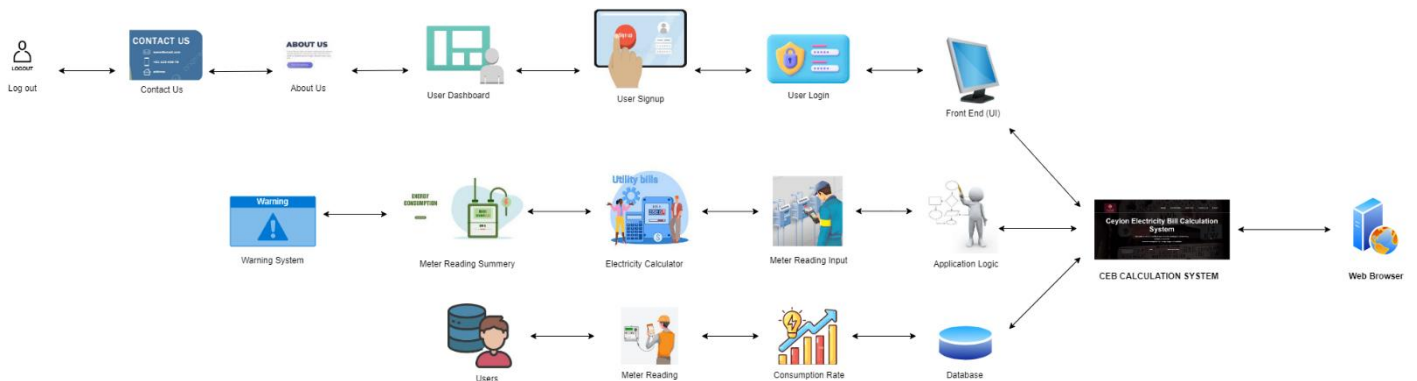
## class diagram



## ER diagram



## Overall Architectural diagram



## Google drive link of all diagrams-

[https://drive.google.com/drive/folders/14FezUFSVO1mupnK73McQ20FPNCxNhrKO?usp=drive\\_link](https://drive.google.com/drive/folders/14FezUFSVO1mupnK73McQ20FPNCxNhrKO?usp=drive_link)

## 8. Test case document and Test results

### Test Case document

<b>Project Name</b>	Ceylon Electricity Calculation System
<b>Document References</b>	
<b>Test Objective</b>	Testing the functionality

Test Execution Summary						
Functionality / Status	Pass	Fail	On Hold	Not Executed	Not Applicable	Total
Total Test Cases	0	0	0	69	0	69
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>69</b>	<b>0</b>	<b>69</b>

Design Revision History				
Version	Date of Revision	Author	Reviewed by	Comments
Initial version created	7-Oct-2023	Group of Ceylon Electricity Calculation System		
Update the document	17-Nov-2023	Group of Ceylon Electricity Calculation System		

<https://docs.google.com/spreadsheets/d/1Udwy6ktElq8rnaX13JPTZr1wzBFAowcN/edit?usp=sharing&ouid=104508058601594117432&rtpof=true&sd=true>

**Test results Document –****Revision and Execution History**

<b>Project Name</b>	Ceylon Electricity Calculation System
<b>Document References</b>	
<b>Test Objective</b>	Testing the functionality

<b>Test Execution Summary</b>						
Functionality / Status	Pass	Fail	On Hold	Not Executed	Not Applicable	Total
Total Test Cases	69	0	0	0	0	69
<b>Total</b>	<b>69</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>69</b>

<b>Design Revision History</b>				
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[https://docs.google.com/spreadsheets/d/1Uy4xqe6B\\_qPT0BxcZubJVjNJ3Z03RDBf/edit?usp=sharing&ouid=104508058601594117432&rtpof=true&sd=true](https://docs.google.com/spreadsheets/d/1Uy4xqe6B_qPT0BxcZubJVjNJ3Z03RDBf/edit?usp=sharing&ouid=104508058601594117432&rtpof=true&sd=true)

## Project limitation and conclusion

### Project Limitations:

- **Scalability:** The system might face scalability issues when handling a large number of users or a substantial increase in data volume. It might require further optimization to handle scalability concerns.
- **Real-time Data:** The system may not be capable of handling real-time data, leading to potential delays in reflecting the most current information regarding electricity consumption.
- **Accuracy of Data Entry:** Relies on accurate manual meter readings entered by users. Any errors in inputting readings can lead to inaccurate calculations.
- **Dependency on User Participation:** The effectiveness of the system relies on user participation in providing meter readings regularly. Inconsistent or incomplete data input can affect the accuracy of consumption calculations.
- **Security Concerns:** The application might be vulnerable to security threats if not implemented with robust security measures. Data breaches or unauthorized access could compromise user data.

### Conclusion:

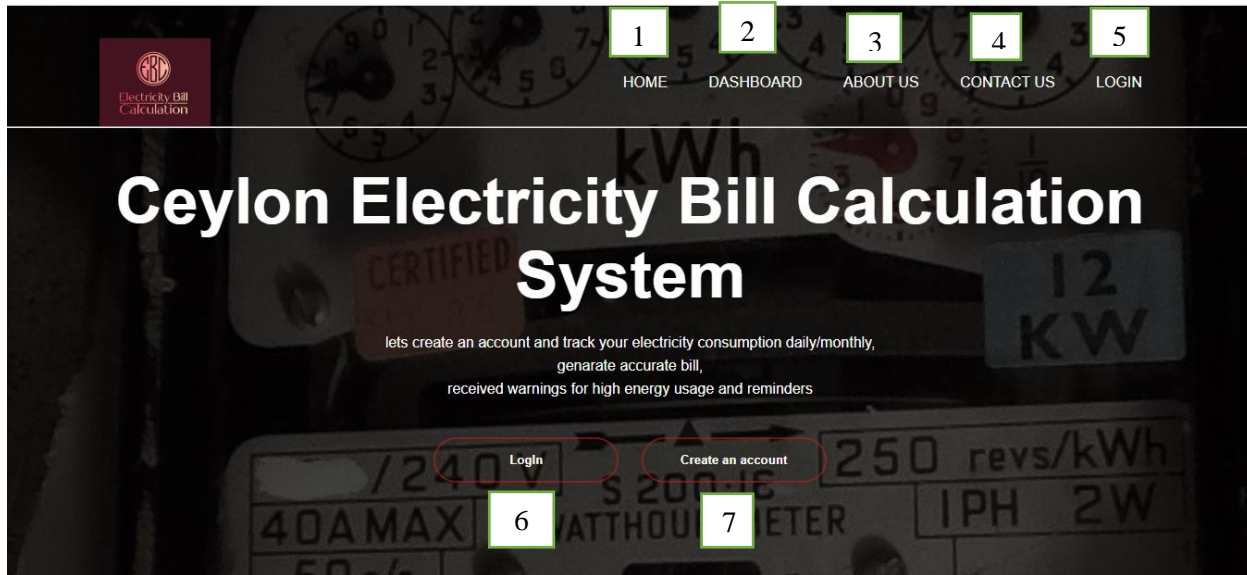
In conclusion, the development of the Electricity Consumption Tracking System presents a significant step towards empowering users to monitor and manage their electricity consumption effectively. The project aimed to provide a user-friendly interface to input readings, calculate consumption rates, and offer insights into energy usage patterns.

The system successfully accomplishes the core objectives by allowing users to track their consumption, calculate charges, and receive warnings for high energy usage. It provides an accessible platform for users to understand their energy utilization better.

However, despite its functionalities, the system has limitations, including scalability concerns, dependency on accurate user input, and potential security vulnerabilities. Addressing these limitations and considering future enhancements will be crucial for the system's growth and effectiveness

## Project demonstration

### HOME PAGE



- 1 -Home Icon** -This is a clickable icon and user should navigate to home page.
- 2 – Dashboard Icon** - This is a clickable icon and user should navigate to dashboard page.
- 3 – About us Icon** - This is a clickable icon and user should navigate to About us page.
- 4 – Contact Us Icon** - This is a clickable icon and user should navigate to Contact us page.
- 5- Login Icon** - This is a clickable icon and user should navigate to Login page.
- 6 -Login Button** - This is a clickable button and user should navigate to Login page.
- 7 – Create an account** - This is a clickable button and user should navigate to signup page..



## Login page

**Ceylon Electricity Bill Calculation System**

Username 8  
Your Email/Username..

Password 9  
Your password..

10 Login

Create a new account [click here](#) 11

**8 – Username** – This is a text input field it should allow user to input a username for login to the system

**9 – Password** - This is a text input field it should allow user to input a password for login to the system

**10 – Login** - This is a clickable button; it should execute the login functionality and allow user to log into the system with ensuring validation of login details

**11 – Click here** - This is a clickable button and if user haven't account it should navigate user to signup page.

## Signup page

**12 -Name** - This is a text data input filed it should allow user to input the name for register to the system.

**13 – Email** - This is a text data input filed it should allow user to input the email for register to the system.

**14 – Username** - This is a text data input filed it should allow user to input the Username for register to the system.

**15 – Password** - This is a text data input filed it should allow user to input the password for register to the system.

**16 – Repeat Password** - This is a text data input filed it should allow user to input repeat password for register to the system.

**17 -Register** - This is a clickable button; it should execute the signup functionality and allow user to register the system with ensuring validation of signup details.

**18 - Click here** - This is a clickable button and if user already have account it should user to login page.

## Dashboard page

**CEYLON ELECTRICITY BILL CALCULATION SYSTEM**

Please input your meter readings to the system

Reading Date:  19

Reading value:  20

21 SUBMIT

for save your energy

22 ELECTRICITY CONSUMPTION CALCULATOR

24 METER READING GUIDELINES

23 METER READING INPUT

25 METER READING SUMMARY

**19-Reading Date** – This is text data input field it allows user to select a date for input the meter reading process .

**20 -Reading Value** - This is text data input field it allows user to input a value for input the meter reading process .

**21 – SUMIT** – This is clickable button, and it allows user to submit meter readings to system database system should store the user entered records into database.

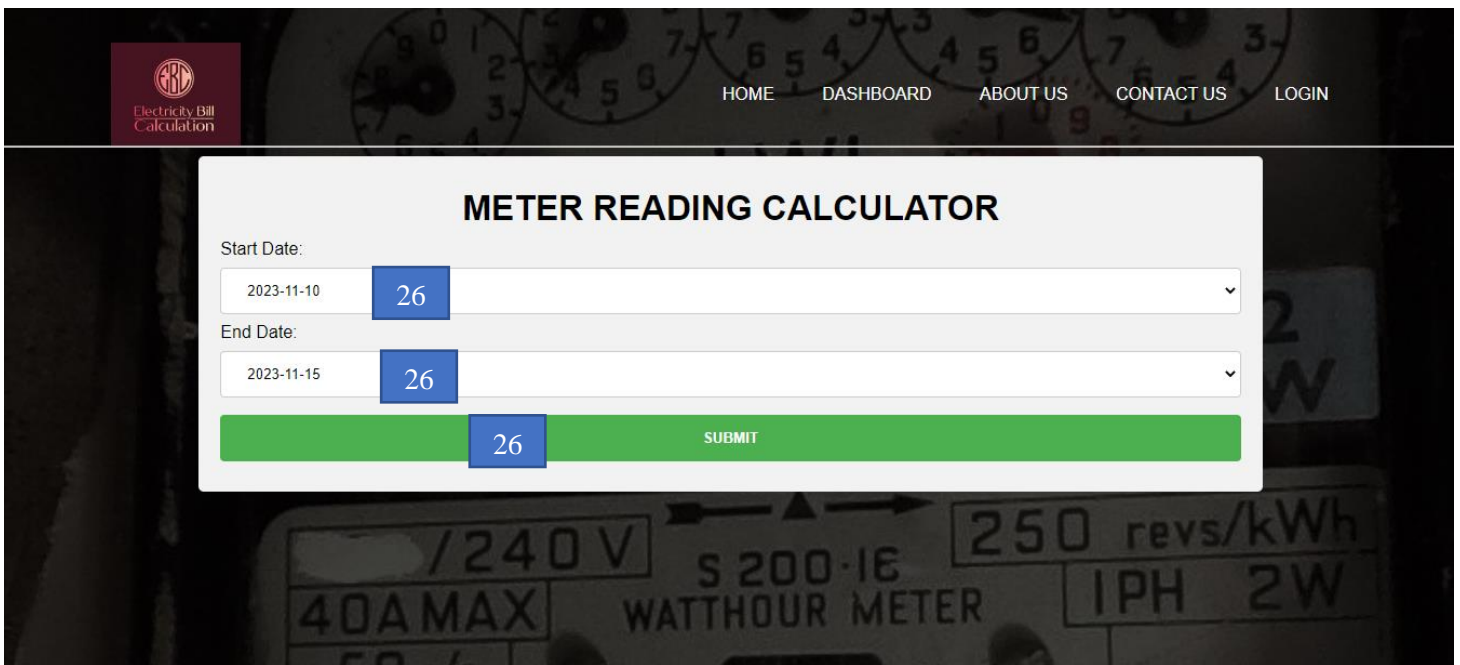
**22- ELECTRICITY CONSUMPTION CALCULATOR** – This is a Clickable button, and it navigates user to Electricity Consumption Calculator Page.

**23- METER READING INPUT** - This is a Clickable button, and it navigates user to Meter reading input(same dashboard) Page.

**24 – METER READING GUIDELINES** - This is a Clickable button, and it navigates user to Meter reading guidelines Page.

**25 – METER READING SUMMARY** - This is a Clickable button, and it navigates user to Meter reading summary Page.

## ELECTRICITY CONSUMPTION CALCULATOR Page



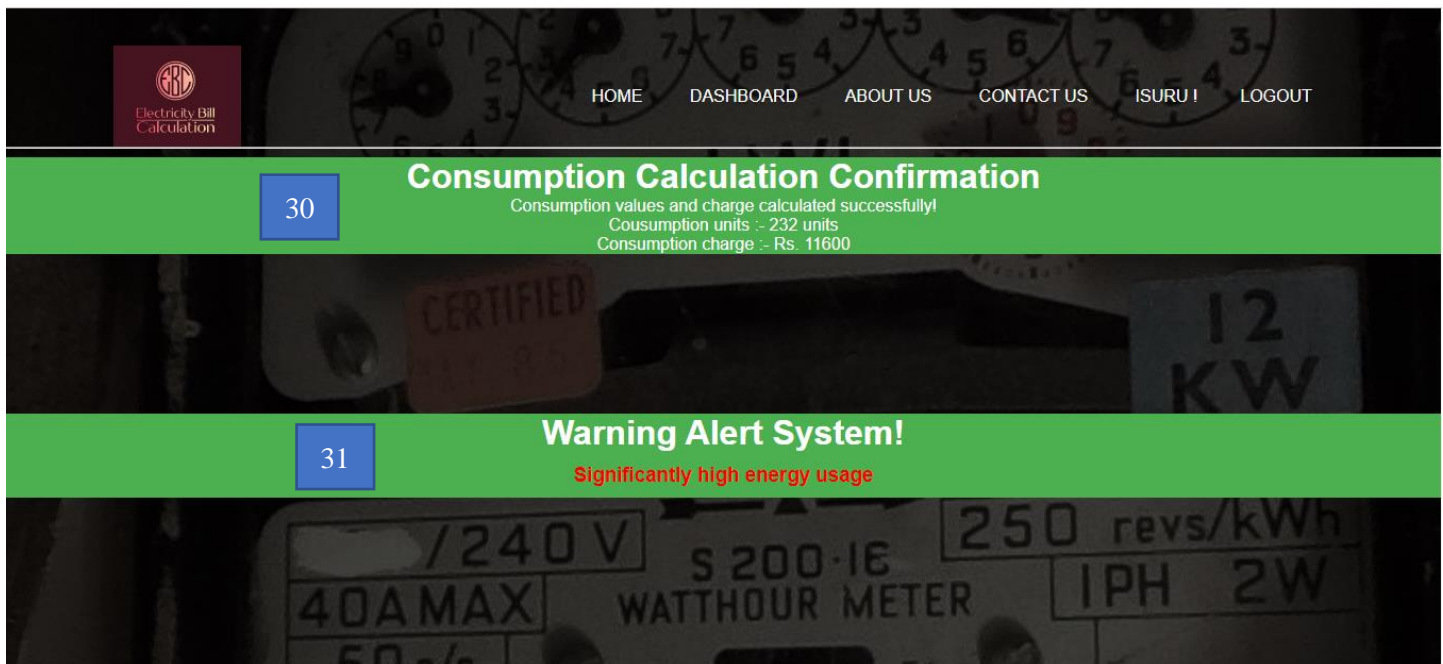
The screenshot shows a web application for electricity bill calculation. The header includes a logo for 'Electricity Bill Calculation' and navigation links: HOME, DASHBOARD, ABOUT US, CONTACT US, and LOGIN. The main content area features a 'METER READING CALCULATOR' form. The form has two date input fields: 'Start Date' and 'End Date'. Both fields have a date picker showing '2023-11-10' and '2023-11-15' respectively, and a dropdown menu with the value '26'. Below these fields is a green 'SUBMIT' button. The background of the page is a dark image of an electricity meter.

**26- Start Date-** This is text data input field it allows user to select Start date for Calculation process. user can select a date and the value corresponding to that date will be selected from database to calculate the consumption rate and corresponding charge.

**27 – End Date –** This is text data input field it allows user to select End date for Calculation process. user can select a date and the value corresponding to that date will be selected from database to calculate the consumption rate and corresponding charge.

**29 – SUBMIT –** This is a clickable button, and it should submit the Start date, End date for select the corresponding meter reading values for perform calculation. it should navigate user to confirmation page after perform calculation.

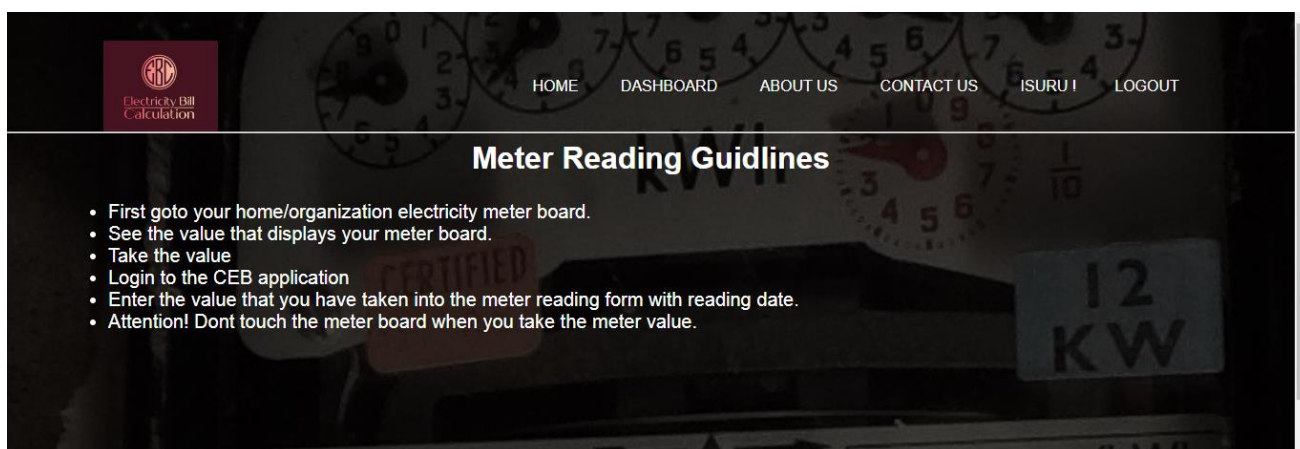
## Confirmation page



**30 -Consumption Calculation Confirmation** – This is the text field that displays Consumption units and Consumption charge according to user's usage.

**31- Warning Alert system** - This is the text field that warning message according to user's usage.

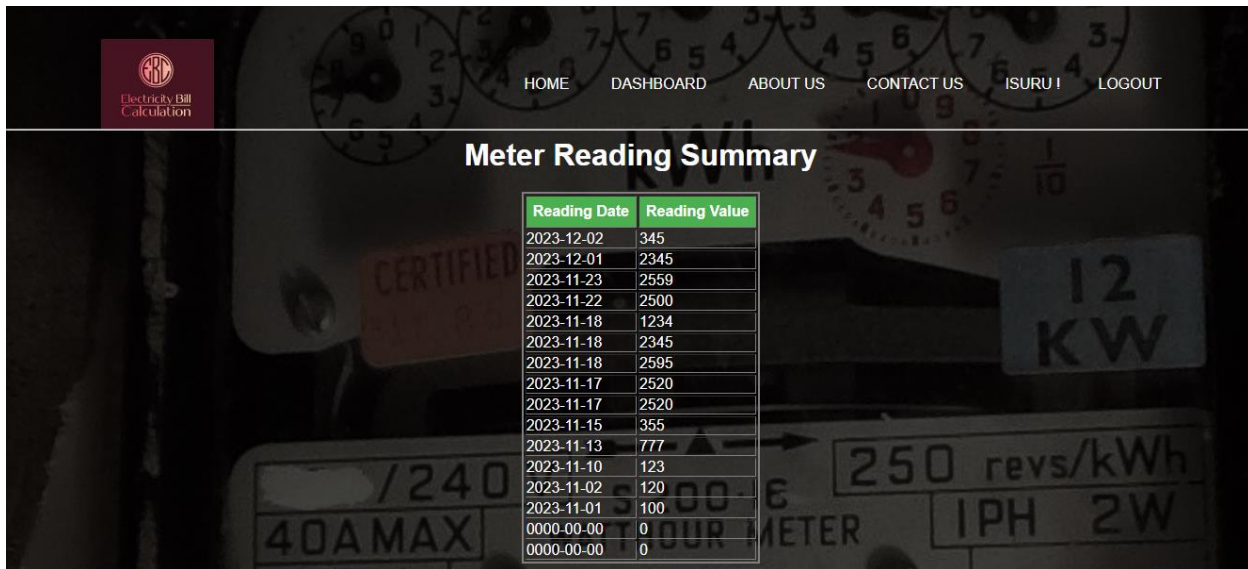
## Meter reading Guidelines page



This page should provide user to guidelines for meter reading process.



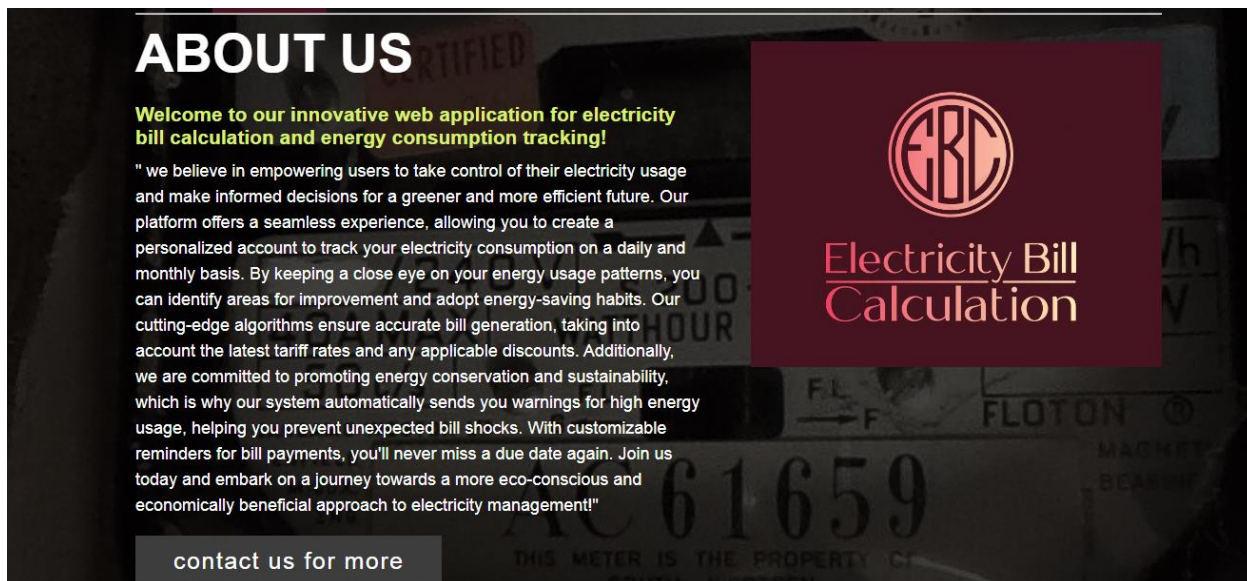
## Meter reading summary page



Reading Date	Reading Value
2023-12-02	345
2023-12-01	2345
2023-11-23	2559
2023-11-22	2500
2023-11-18	1234
2023-11-18	2345
2023-11-18	2595
2023-11-17	2520
2023-11-17	2520
2023-11-15	355
2023-11-13	777
2023-11-10	123
2023-11-02	120
2023-11-01	100
0000-00-00	0
0000-00-00	0

This page should provide the meter reading summary for user based on login user's username.

## About us page



# ABOUT US

**Welcome to our innovative web application for electricity bill calculation and energy consumption tracking!**

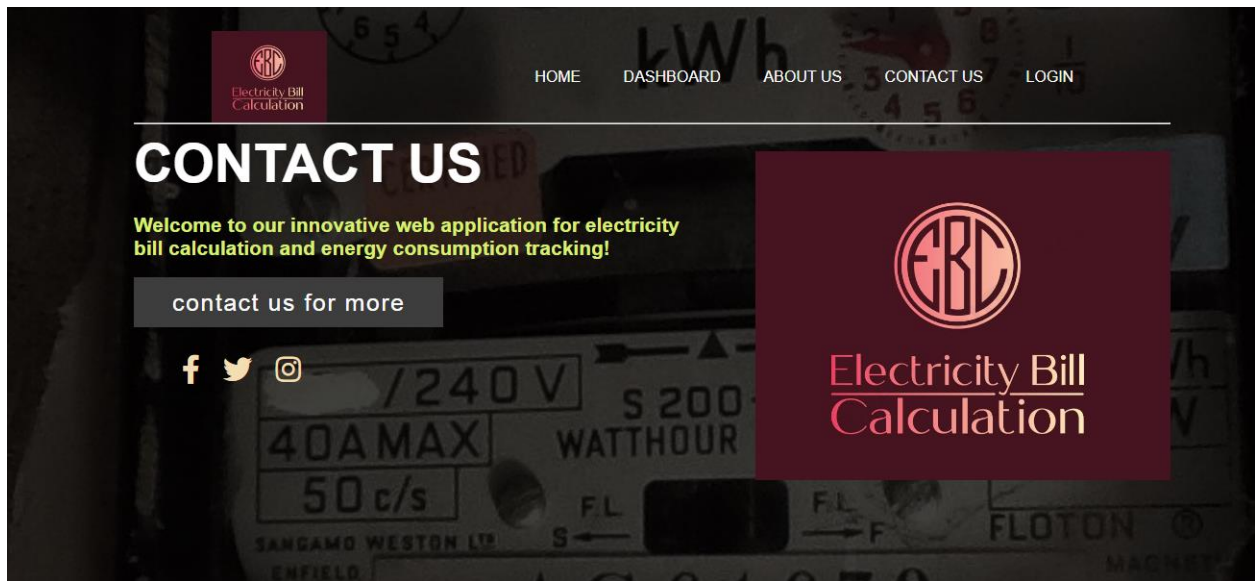
" we believe in empowering users to take control of their electricity usage and make informed decisions for a greener and more efficient future. Our platform offers a seamless experience, allowing you to create a personalized account to track your electricity consumption on a daily and monthly basis. By keeping a close eye on your energy usage patterns, you can identify areas for improvement and adopt energy-saving habits. Our cutting-edge algorithms ensure accurate bill generation, taking into account the latest tariff rates and any applicable discounts. Additionally, we are committed to promoting energy conservation and sustainability, which is why our system automatically sends you warnings for high energy usage, helping you prevent unexpected bill shocks. With customizable reminders for bill payments, you'll never miss a due date again. Join us today and embark on a journey towards a more eco-conscious and economically beneficial approach to electricity management!"

**Electricity Bill Calculation**

[contact us for more](#)

This is about us page and this page shows user to the application details.

## Contact Us page



This is contact us page this page shows user to the contact details of the application.

## Appendix

SRS Document –

# Detailed Software Requirements Specification for CEC SYSTEM

**Cluster number - 21**

**Group number - 21.4**

**Project Name - CEC system**

**Supervisor name – Ms. Ahali Suthaharan**

**Group members –**

**R.M.I.N.Weerakoon – 421420224**

**K.S.Dissanayaka – 521428593**

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## Document Revisions

Date	Revision	Description	Author
15/07/2023	0.1	Initial version	Ishan
19/03/2023	0.2	Edited version	kushan /Kanishka
25/03/2023	1.0	Final version	Ishan/ Kushan/Kanishka/shashini

## Document Approval

All-Star Software Solution and Ms kushani Bandara (group supervisor) have reviewed this document and hereby agree that the contents herein are accurate. Any changes to this document must be communicated in writing and signed off by both parties.

Signature	Signature
Date : 25 / 07 /2023	Date : 25 / 07 /2023
Name : Ms.Ahali Suthaharan	Name : Ishan Weerakoon
Customer : Group supervisor	Company : All-Star Software solution (pvt) LTD

## 1. INTRODUCTION

### 1.1 Purpose

This document lists requirements for the Electricity Consumption Rate Calculator web application. The purpose of this document is to identify the system requirements and obtain sign-off on all requirements before moving into the design phase. The engineering team will use this document as the basis for the system design.

After sign-off, requested changes to requirements will be documented, including the effect on the

project costs, scope, and timelines, and presented to the customer for approval.

These requirements were gathered during extended discussions with the stakeholders and from documents provided by the customer.

## **1.2 Summary**

The Electricity Consumption Rate Calculator is a web application that allows Sri Lankan homeowners to track and manage their electricity usage effectively. Users can input their daily meter readings, calculate daily and monthly consumption rates, generate accurate billing amounts based on user-specific pricing plans, and receive notifications for high energy usage.

## **1.3 Company Overview**

All stars software solutions (pvt) Ltd was setup to complete the group project of EEY4189 Software Design in group subject Bachelor of Software Engineering course at Open University.

CEB Tracking system is the first project going to implement by the company

## **1.4 Project Overview**

The project aims to develop a user-friendly web application for calculating electricity consumption rates for Sri Lankan houses. The application will empower users with insights into their electricity usage patterns and encourage energy-efficient practices. Also, this project allow user to realize their electricity consumption and reduce the electricity bill amount through manage their electricity consumptions

## **1.5 Scope**

The web application will encompass the following functions:

- Enable users to input meter readings for tracking their electricity consumption.
- Calculate daily and monthly consumption rates based on the meter readings.
- Generate accurate billing amounts considering user-specific pricing plans.
- Implement a warning system to notify users of high energy usage.
- Develop an intuitive user interface for easy interaction and data entry.

## 1.6 Assumptions

- user can read the meter as following meter reading guidelines
- users need to input electricity consumption units daily to the system, for that user can going to their home's electricity meter board at end of the day or specific time of each day and see how much points they use per day and input that points to the system.
- Users have basic computer literacy and access to the internet.
- The electricity pricing plans and tariffs will be provided by the electricity provider.

## 1.7 Definitions, Acronyms, and Terminology

kWh	Kilowatt-hour, a unit of energy commonly used for electricity consumption.
Admin	Administration
DBMS	Data Base Management Systems
DFD	Data Flow Diagram
N/A	Not Applicable
UI	User Interface
CEC	Ceylon Electricity Calculation

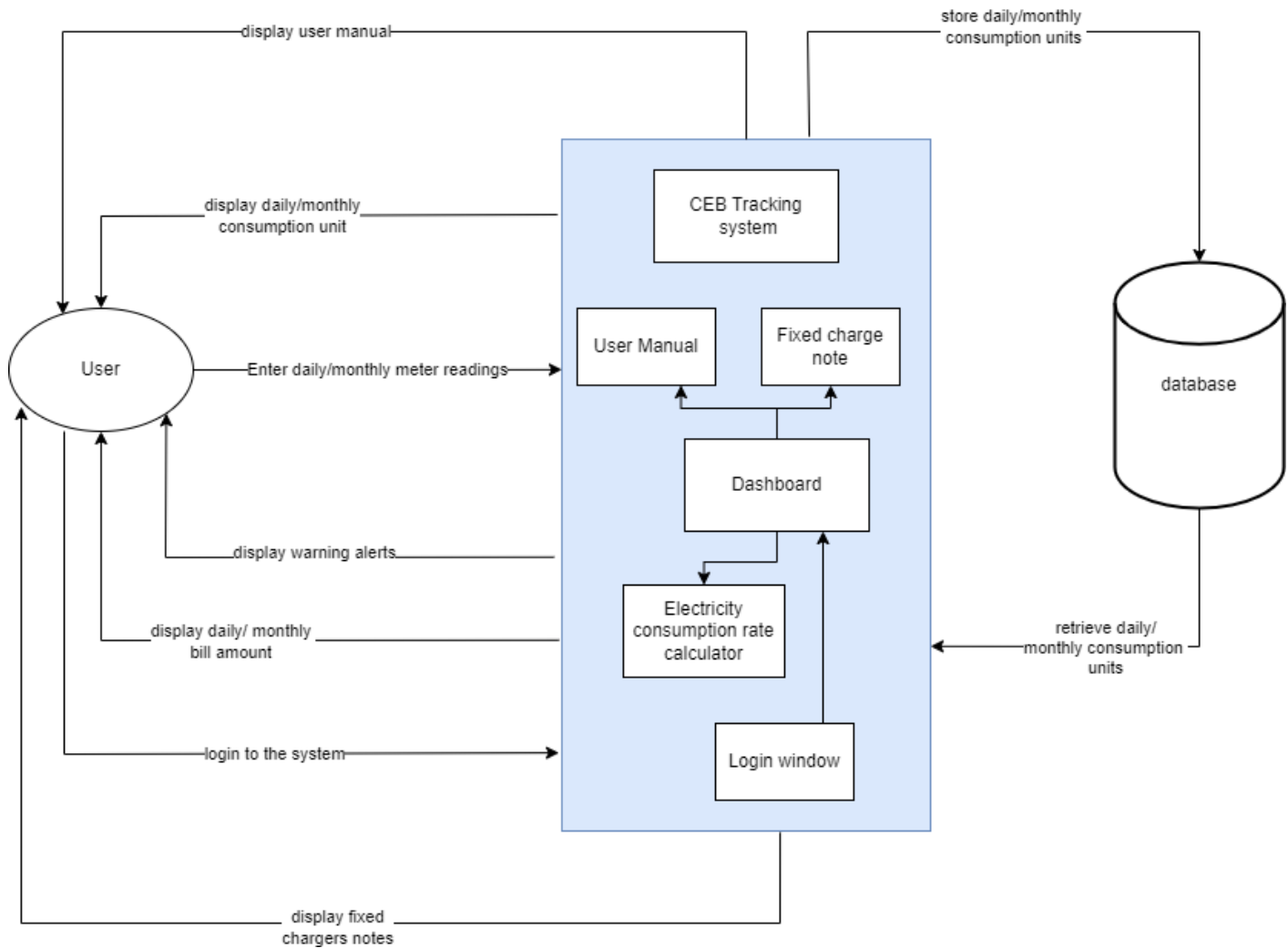
## 1.8 References (Optional)

### 1.8.1. Document provided by company

- Manually generated reports
- Price per electricity unit provided by CEC
- Fixed charges notes according to electricity unit categorization provided by CEC
- System requirement specification detail report
- User manual of the system.

## 2. PROJECT SCOPE AND IMPACT

### DFD diagram



### 2.1 Scope Inclusions:

- Enable users to input meter readings: The application will allow users to manually input their electricity consumption points daily and track their energy usage.
- Calculate daily and monthly consumption rates: The system will perform calculations based on the user's meter readings to determine daily and monthly electricity consumption rates.

- Generate accurate billing amounts: The application will generate accurate billing amounts based on the calculated consumption data and user-specific pricing plans.
- Implement a warning system for high energy usage: The system will provide notifications to users when their energy usage exceeds predefined limits to promote energy-efficient practices.
- Develop an intuitive user interface: The application will have a user-friendly interface for easy interaction and data entry.

## **2.2 Scope Exclusions:**

- Real-time data from smart meters: The application will not include real-time data retrieval from smart electricity meters.
- Billing integration with payment gateways: The system will not integrate with external payment gateways for actual bill payments.
- Energy consumption forecasts: The application will not provide energy consumption forecasts or predictions.

## **2.3 Impact on other systems:**

The electricity consumption rate calculation application may have impacts on other systems and vice versa:

### **2.3.1 Affected by Other Systems:**

- Smart Electricity Meters: The application may receive consumption data from smart electricity meters if they are integrated into the system.
- Billing System: The application may send billing data to an external billing system for payment processing.

### **2.3.2 Affects on Other Systems:**

- User Notification System: The application may require modifications to the user notification system to deliver energy usage warnings to users.
- Payment Gateway Integration: If the application is integrated with external payment gateways in the future, those gateways may need adjustments to accommodate billing data.

## **3. FUNCTIONAL REQUIREMENTS**

### **3.1.1 Functions**

#### **Function 1: Meter Reading Input**

##### Description

The application will allow users to input their daily electricity consumption units into the system manually.

##### Inputs

- Date: The date of the meter reading input.
- Consumption Units: The electricity consumption units recorded from the meter.

##### Outputs

- store the data into database

#### **Function 2: Consumption Rate Calculation**

##### Description

The system will calculate daily, and monthly electricity consumption rates based on the user's meter readings.

##### Inputs

- Daily Consumption Units: Electricity consumption units recorded for each day.
- Monthly Consumption Units: Total electricity consumption units for the month.

##### Outputs

- Daily Consumption Rate: Calculated electricity consumption rate for each day.
- Monthly Consumption Rate: Calculated electricity consumption rate for the entire month

### **Function 3: Billing Amount Generation**

#### **Description**

The system will generate accurate billing amounts based on the user's daily and consumption rates

#### **Inputs**

- Consumption Rates: Daily and monthly electricity consumption rates.

#### **Outputs**

- Billing Amount: The accurate billing amount for the user's electricity consumption.

### **Function 4: Warning System**

#### **Description**

The application will implement a warning system to notify users when their electricity usage exceeds a certain limit.

#### **Inputs**

- Daily Consumption Rate: Calculated daily electricity consumption rate.

#### **Outputs**

- High Energy Usage Notification: A warning/notification to the user when their electricity usage exceeds the defined limit.

### **3.1.2 User Profiles, Roles and Privileges**

#### **User Profiles and Typical Users:**

- a. Regular Users: Regular users are residential electricity consumers who use the application to input their daily meter readings, track their electricity consumption, and view billing information.
- b. Administrator/User Manager: The administrator or user manager is responsible for managing user accounts, assigning roles and privileges, and handling any user-related issues.



### **User Roles and Privileges:**

#### **a. Regular User Role:**

- Privileges: Regular users can input their meter readings, view their daily and monthly consumption rates, receive notifications about high energy usage, and access their billing amounts.

#### **b. Administrator/User Manager Role:**

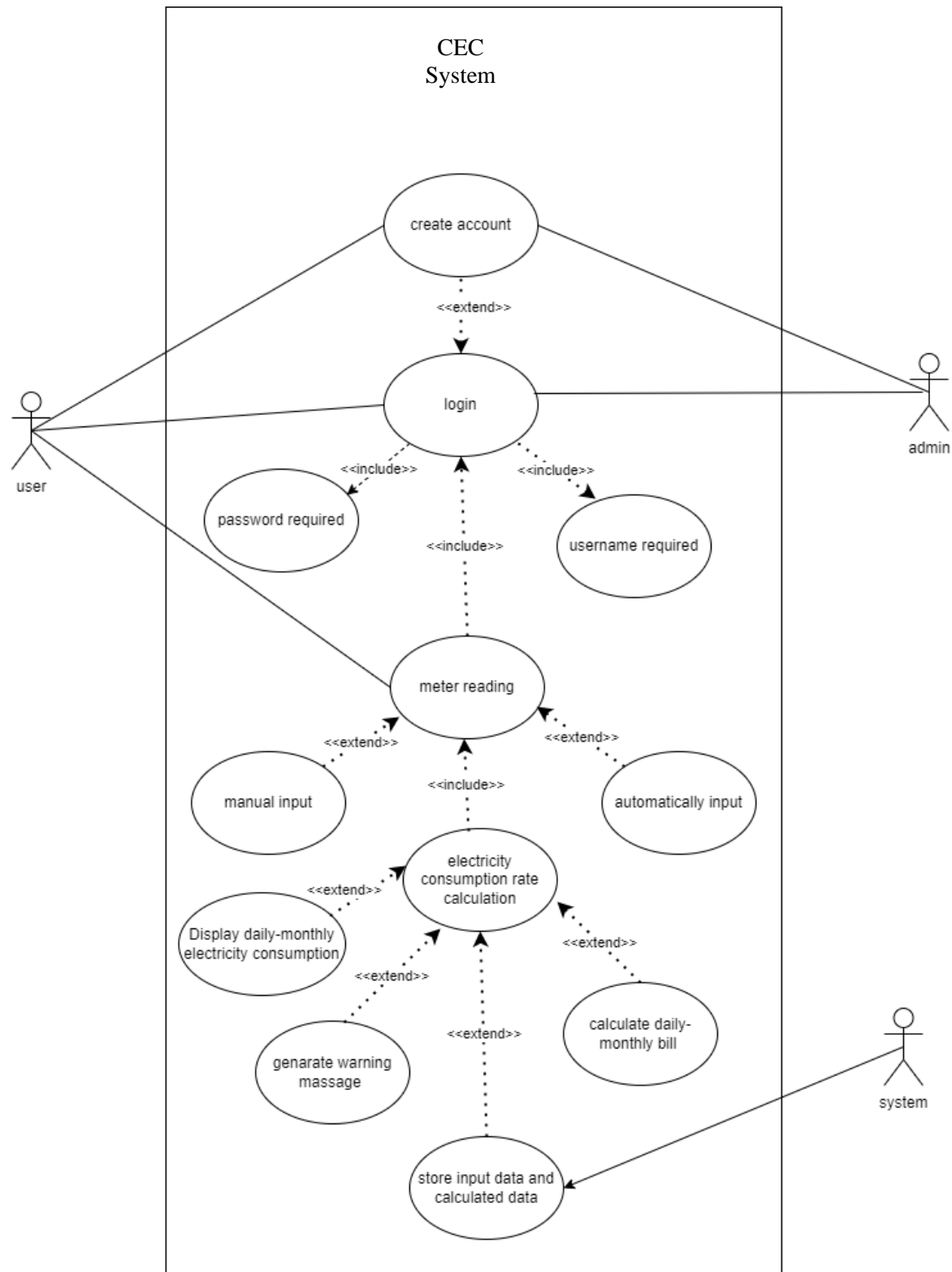
- Privileges: The administrator or user manager has elevated privileges, including the ability to add new users, modify user profiles, reset passwords, and deactivate user accounts if necessary.

### **Login Credentials:**

- Users will have unique login credentials (username and password) to access the application and their personalized data.

By defining clear user profiles, roles, and privileges, this Application can ensure proper access control and data security while providing a personalized experience to its users.

## Use case diagram for functional Requirements



## 4. NON-FUNCTIONAL REQUIREMENTS

### 4.1.1 Performance and Load Requirements

Current User Load	500 users
Expected Growth	20% increase in user load per year
Number of Concurrent Users	100 users
Transaction Size	Average transaction size is 50 KB
Maximum Average Transaction Time Acceptable	2 seconds

### 4.1.2. Compatibility Requirements

HTML Versions to be Supported	HTML5
Browser Versions to be Supported	Google Chrome, Mozilla Firefox, Microsoft Edge
Database Versions to be Supported	MySQL 8.0, PostgreSQL 12.0
Communication Protocol	HTTPS

### 4.1.3. External Interface Requirements

#### 4.1.3.1 User Interfaces:

- The application will have a user-friendly web interface with intuitive navigation and data entry forms.

#### **4.1.3.2. Software Interfaces:**

- The application will use web APIs to display the content of the application.

#### **4.1.4 Security and Authentication Requirements**

##### **4.1.4.1. Data Storage Security:**

- User data will be encrypted at rest using AES-256 encryption.

##### **4.1.4.2. Data Communication Security:**

- All data transmission will be encrypted using SSL/TLS protocols.

#### **4.1.5 Quality Assurance Requirements**

##### **4.1.5.1 QA Test Scope:**

The Quality Assurance (QA) test scope for the CEB Tracking system application includes various levels of testing to ensure the reliability, accuracy, and performance of the software. The QA team will focus on testing all aspects of the application to identify and address potential issues. The following levels of testing will be included:

##### **1. Unit Testing:**

- Test individual units or components of the application in isolation.
- Validate the functionality of each unit and ensure they work as expected.
- Identify and fix any defects at the unit level.

##### **2. Integration Testing:**

- Test the integration of different components and modules of the application.
- Verify that the interactions between modules are smooth and seamless.
- Check data flow between components and identify integration issues.

##### **3. Functional Testing:**

- Validate the functional requirements specified in the SRS document.
  - Test the core features of the application, such as meter reading input, consumption rate calculation, billing amount generation, and warning system functionality.
  - Verify that the application performs accurately and as expected.
4. User Interface (UI) Testing:
- Check the user interface for consistency, clarity, and ease of use.
  - Verify that the UI elements are responsive and function correctly.
  - Ensure that the application adheres to UI design standards.
5. Performance Testing:
- Assess the application's performance under various load conditions.
  - Measure response times for critical functions and verify they meet acceptable limits.
  - Test the application's ability to handle a large number of concurrent users.
6. Security Testing:
- Validate the application's security mechanisms to protect data storage and communication.
  - Identify potential vulnerabilities and ensure data is encrypted and transmitted securely.
  - Verify that user authentication and authorization mechanisms are robust.
7. Usability Testing:
- Evaluate the application's usability from an end-user perspective.
  - Gather feedback from users to assess the application's ease of use and user-friendliness.
  - Identify areas for improvement to enhance user experience.
8. Compatibility Testing:
- Test the application on different browsers, operating systems, and devices.

- Verify that the application functions correctly across various platforms.
- Ensure compatibility with different screen resolutions.

9. Regression Testing:

- Re-test previously validated functionality after any changes or updates to the application.
- Ensure that new features or bug fixes do not impact existing functionalities.

10. End-to-End Testing:

- Conduct tests to simulate real-life scenarios of users inputting meter readings, calculating consumption rates, and receiving billing amounts and warnings.
- Verify that the entire flow of the application works seamlessly.

we will create test cases, conduct testing, report defects, and work closely with the development team to ensure that all identified issues are addressed. The ultimate goal of QA testing is to deliver a high-quality, reliable, and user-friendly electricity consumption rate calculation application

**4.1.5.2 QA Environment:**

- Software Testing Tools: Industry-standard tools like Selenium, JUnit, and JIRA will be used for automated testing, unit testing, and issue tracking.
- Hardware and OS: Dedicated testing servers with configurations similar to production, supporting Windows and Linux, will be utilized.
- Test Data: Comprehensive test data, including user profiles and various scenarios, will be generated for testing.
- Testing Environments: Separate development, staging, and production environments will be used for controlled testing.
- Browser and Device Compatibility: Testing will cover multiple web browsers and devices to ensure compatibility.

- Data Communication: Secure data communication protocols like SSL will be tested for data integrity.
- User Documentation: Detailed test cases and plans will be prepared for consistent testing.
- Reporting and Bug Tracking: Comprehensive test reports will be generated, and issues will be tracked using JIRA

#### **4.1.5.3 QA Data:**

To conduct effective testing of the electricity consumption rate calculation application, we requires specific data entities to simulate real-world scenarios and edge cases. The following describes the key data entities required for testing:

##### **1. Meter Reading Data:**

- Sample Meter Readings: A set of sample meter readings with different values representing electricity consumption for various users and time periods.
- Edge Cases: Meter readings at minimum and maximum limits to test the system's handling of extreme values.
- Invalid Readings: Test data with invalid or out-of-range readings to validate the system's input validation and error handling.

##### **3. User Profile Data:**

- User Profiles: Test data for different user profiles, including basic user information.
- User Roles and Privileges: Data to test user access levels and privileges within the application.

##### **5. Test Database:**

- Populated Database: A test database with sample data to perform various tests, including CRUD operations, data integrity checks, and reporting.

##### **7. Test Scenarios:**

- Test Scenarios: Predefined test scenarios that cover different aspects of the application, such as different user interactions, billing calculations, and warnings for high energy usage.

By having the above QA data, the testing team can perform thorough testing to verify the application's functionality, performance, and accuracy in calculating electricity consumption rates and generating accurate billing amount

#### **4.1.6 Development Requirements**

##### **4.1.6.1 Development Environment:**

To develop the electricity consumption rate calculation application, our team requires a suitable environment that includes the necessary software, hardware, and tools. Below is a description of the development environment:

##### **1. Software Requirements:**

- Integrated Development Environment (IDE): we use visual studio code.
- Programming Languages: we use PHP , JavaScript as programming language
- Database Management System: we use MySQL as database management for storing and managing user data and meter readings.
- Version Control : we use GIT as version control

##### **2. Hardware Requirements:**

- Development Machine: We use our laptops as development machines

##### **3. Tools and Utilities:**

- Code Linters and Formatters: we use Tools like ESLint, Prettier, or Black to enforce code formatting and maintain coding standards.
- Continuous Integration (CI) Tools: we use GitHub Actions to automate the testing and deployment process.
- Frontend Design Tools: we use Figma and draw.io to design the wireframes user interface.

##### **4. Development Environment Setup:**



- Install the required software and tools on the development machines.
- Configure the IDE with relevant plugins and extensions for better productivity.
- Set up the database management system and establish the connection with the application.
- Create a local development server to test the application during development.
- Initialize a version control repository to track and manage code changes.

By having a well-defined development environment, our team can efficiently work on the application, collaborate effectively, and ensure a smooth development process for the electricity consumption rate calculation application.

#### **4.1.6.2 Development Data:**

##### **1. Key Data Entities:**

- **User Profile:** This entity will store information about users, including their names and password.
- **Meter Reading:** This entity will record the meter readings submitted by users daily, including the date, time, and electricity consumption units.
- **Billing Information:** This entity will store billing details, including the user's billing cycle, total consumption, and calculated billing amount based on the pricing plan.

##### **2. Populated Databases:**

- **Initial User Data:** During development and testing, a sample dataset of user profiles with mock data can be created to simulate user interactions and meter readings.
- **Sample Meter Readings:** Similarly, a set of sample meter readings can be populated in the database to test the calculation of daily and monthly consumption rates.

By having the above development data entities, our team can create a realistic testing environment for the application. The sample data will help verify the functionality, data validation, and accuracy of the calculations before the application is deployed with real user data. Additionally, using mock

data allows the team to test different scenarios and edge cases effectively to ensure the application's robustness.

#### **4.1.6.3. Coding standards**

File and Folder Naming:

- Use descriptive and meaningful names for files and folders.
- Separate words with underscores (\_) for better readability.
- Follow a consistent naming convention for files, such as lowercase or camelCase.

Variable Names:

- Use meaningful and self-explanatory names for variables.
- Follow camelCase for variable names.

Function Names:

- Use descriptive names that indicate the function's purpose.
- Follow lowercase with underscores for function names.

Indentation and Formatting:

- Use 4 spaces for indentation (avoid tabs).
- Maintain consistent and readable code formatting

Comments and Documentation:

- Include comments to explain complex code or logic.
- Use docstrings to document functions, classes, and modules.

Error Handling:

- Implement proper error handling for exceptions and edge cases.
- Use meaningful error messages to provide clear feedback to users.

#### **4.1.6.4 Implementation packaging requirements**

Project Structure:

- Organize the application code into logical modules and packages.

- Follow a modular approach to group related functionality together

#### Naming Conventions for Packages:

- Use meaningful names for packages that reflect their functionality.
- Follow lowercase with underscores for package names.

#### Grouping Related Functionality:

- Group related controllers, models, and templates into their respective packages.
- For example, place all meter reading-related functionality in the **meter\_reading package**.

#### Versioning:

- Use version numbers for the application if there are multiple releases or iterations.
- For example, if the application has different versions, include version numbers in the package names

### 4.1.7 Deployment Requirements

#### 4.1.7.1 Installation Packaging Requirements:

The system is a web application and no need to install, and use can simply login and use the application on the web

#### 4.1.7.2 Deployment Requirements:

##### 1. Server Locations:

- we use the local sever machine for run this web application

##### 2. Hosting Environment:

- we use php xampp for hosting environment

##### 3. Operating System and Machine Types:

- The application will support multiple operating systems, including Windows and Linux, to cater to various user preferences.

- The system requirements for the servers should be based on the expected load and performance requirements.

#### 4. Multiple Versions:

- Version management will be handled using version control systems (e.g., Git) to manage codebase changes and updates.

#### 5. Access Control:

- Different types of users will have different access levels to the system based on their roles (e.g., admin, regular user).
- Authentication and authorization mechanisms will be implemented to control user access to sensitive data and functionality.

#### 6. Web Interface:

- The application will provide a web-based user interface accessible through standard web browsers.
- Compatibility with major browsers (e.g., Chrome, Firefox, Safari, Edge) will be ensured.

#### 7. Monitoring and Error Handling:

- Monitoring tools will be set up to track application performance, resource utilization, and error logs.
- Automated error reporting and alerting systems will be implemented to promptly address any issues.

### **4.1.7.3. Documentation Requirements**

#### 1. Technical Documentation:

- Software Requirements Specification – Documentation we use to organize all type of Requirements.

- API Documentation: Documentation of all APIs used in the application, including endpoints, request/response formats, and authentication methods.
- Database Schema: Detailed documentation of the database structure and relationships.
- Code Comments: In-code comments to explain complex algorithms or logic.

## 2. User Documentation:

- User Manual: A comprehensive guide for end-users explaining how to use the application, input meter readings, view consumption rates, and understand billing amounts.
- FAQ (Frequently Asked Questions): A document addressing common queries and concerns of users.
- How-to Guides: Step-by-step guides for various tasks within the application.

## 3. Deployment Documentation:

- System Requirements: Hardware and software requirements for running the application.
- Configuration Guide: Details on configuring the application for specific environments.

## 4. Project Documentation:

- we use the project management tool called Trello board

## 5. Legal Documentation:

- Privacy Policy: we use this document outlining the application's data handling and user privacy practices.
- Terms of Service: Document stating the terms and conditions of using the application.

- **Licensing Information:** If applicable, documentation of third-party libraries and their licenses.

All documentation should be clear, concise, and well-organized to ensure ease of understanding and usability for both technical and non-technical audiences. Regular updates to documentation should be maintained throughout the development and deployment process.

#### **4.1.8 Special Documentation Requirements**

##### **1. Legal Disclaimers:**

- **Accuracy Disclaimer:** A disclaimer clarifying that the application provides estimated consumption rates and billing amounts and may not reflect the exact values from the utility provider.
- **Data Accuracy:** A statement ensuring that the application will take reasonable measures to maintain the accuracy of user data but cannot guarantee 100% accuracy.

##### **2. Warranties:**

- **Limited Warranty:** A limited warranty stating that the application will function as described in the documentation and that any defects will be addressed by the development team within a specified period.

##### **3. Copyright Notices:**

- **Copyright Statement:** A notice asserting the application's copyright and ownership rights of the software and its components.

##### **4. Word Mark, Trademark, or Logo Compliance:**

- Trademark Usage: Guidelines on the proper use of trademarks or logos associated with the application to ensure compliance with branding standards.

5. Privacy Policy:

- Documentation of the application's data privacy practices, including how user data is collected, stored, and used.

6. Data Security Measures:

- A description of the security measures implemented to protect user data from unauthorized access or breaches.

7. Compliance with Applicable Laws and Regulations:

- A statement ensuring that the application complies with all relevant laws, regulations, and industry standards related to electricity consumption tracking and billing.

#### **4.1.9 Applicable Standards**

1. Legal and Regulatory Standards:

- Sri Lanka Electricity Act: Compliance with the regulations outlined in the Electricity Act of Sri Lanka, including data privacy and consumer protection requirements.
- Sri Lanka Consumer Affairs Authority Regulations: Adherence to the regulations set by the Consumer Affairs Authority of Sri Lanka, especially in terms of billing accuracy and consumer rights.

2. Interoperability Standards:

- TCP/IP Protocol Suite: Adherence to TCP/IP communication protocols for seamless data exchange between the application and external systems.
- Web Services (SOAP, REST): Implementing web services using SOAP or REST protocols for integration with other systems.

3. Internationalization Standards:

- Unicode (UTF-8): Using Unicode encoding (UTF-8) to support multilingual characters and internationalization in the user interface.
- Internationalization and Localization Requirements: Ensuring the application can adapt to different languages, date formats, and regional settings.

4. Operating System Compliance:

- Windows Compatibility: Ensuring compatibility with popular Windows operating system versions, such as Windows 10, Windows 11, etc.
- UNIX Compatibility: Ensuring compatibility with various UNIX-based operating systems like Linux and macOS.

5. Metering Standards:

- IEC 62053-21: Compliance with this standard for electricity meter accuracy classes and general requirements, relevant for validating the accuracy of meter readings and calculations.

6. Energy Efficiency Standards:

- Energy Efficiency Guidelines: Following energy efficiency guidelines to provide users with energy-saving tips and notifications to promote efficient energy consumption.



#### **4.1.10 On-line User Documentation and Help System Requirements**

##### **1. User Documentation:**

- **User Manual:** Develop a comprehensive on-line user manual that provides detailed instructions on how to use the application. The manual should cover all key functionalities, from entering meter readings to understanding billing amounts.
- **How-to Guides:** Include specific how-to guides for different user tasks, such as setting up user profiles, , and generating consumption reports.
- **Meter reading Guide :** provide the guidelines for meter readings.
- **Fixed charge notes :** provide electricity fixed charge amounts details to the user.

##### **2. Help About Notices:**

- **Version Information:** Include a "Help About" section that displays the application's version number, release date, and copyright information.
- **Contact Information:** Provide contact details, such as an email address or helpline number, for users to seek support or make inquiries.

#### **4.1.11 Usability Requirements**

##### **1. User-Friendly Interface:**

- **Simple and Intuitive Design:** The application's user interface should have a clean and straightforward design, making it easy for users to understand and navigate.
- **Consistent Layout:** Maintain consistency in the layout and placement of elements throughout the application to establish familiarity and reduce cognitive load.

##### **2. Responsive Design:**

- **Browser Compatibility:** Ensure that the application is compatible with popular web browsers, such as Google Chrome, Mozilla Firefox, Microsoft Edge, and Safari.

3. Efficient Data Entry:

- Input Validation: Implement input validation to guide users and prevent errors during meter reading input.
- Error Handling: Provide clear and concise error messages when users input incorrect data to help them correct mistakes easily.

4. Accessibility:

- Compliance with Accessibility Standards: Design the user interface to meet accessibility standards, including WCAG (Web Content Accessibility Guidelines), to ensure that users with disabilities can access and use the application.

5. Visual Clarity:

- Font Size and Contrast: Use legible font sizes and appropriate color contrasts to enhance readability and reduce strain on the user's eyes.
- Iconography: Utilize intuitive and universally recognizable icons to assist users in understanding various actions and features.

6. Navigation:

- Logical Flow: Organize the user interface with a logical flow that allows users to move smoothly from one task to another.
- Clear Navigation Bar: Include a user-friendly navigation bar that offers easy access to different sections and features of the application.

7. User Assistance:

- Tooltips: Use tooltips to provide additional context and explanations for complex features or terms..

8. Performance:

- Quick Response Times: Ensure that the application responds promptly to user actions, reducing wait times and enhancing user satisfaction.

- Efficient Loading: Optimize the application's loading speed to minimize waiting times during data retrieval and processing.

9. User Testing:

- Usability Testing: Conduct regular usability testing with real users to identify pain points, gather feedback, and make necessary improvements to the user interface and overall user experience.

#### **4.1.12 other nonfunctional Requirements**

##### **4.12.1 Performance**

The application should respond quickly to user interactions and handle multiple concurrent users efficiently.

##### **4.12.2 Security**

The application should implement appropriate security measures to protect user data and prevent unauthorized access.

##### **4.12.3 Reliability**

The application should be reliable and available for users whenever they access it.

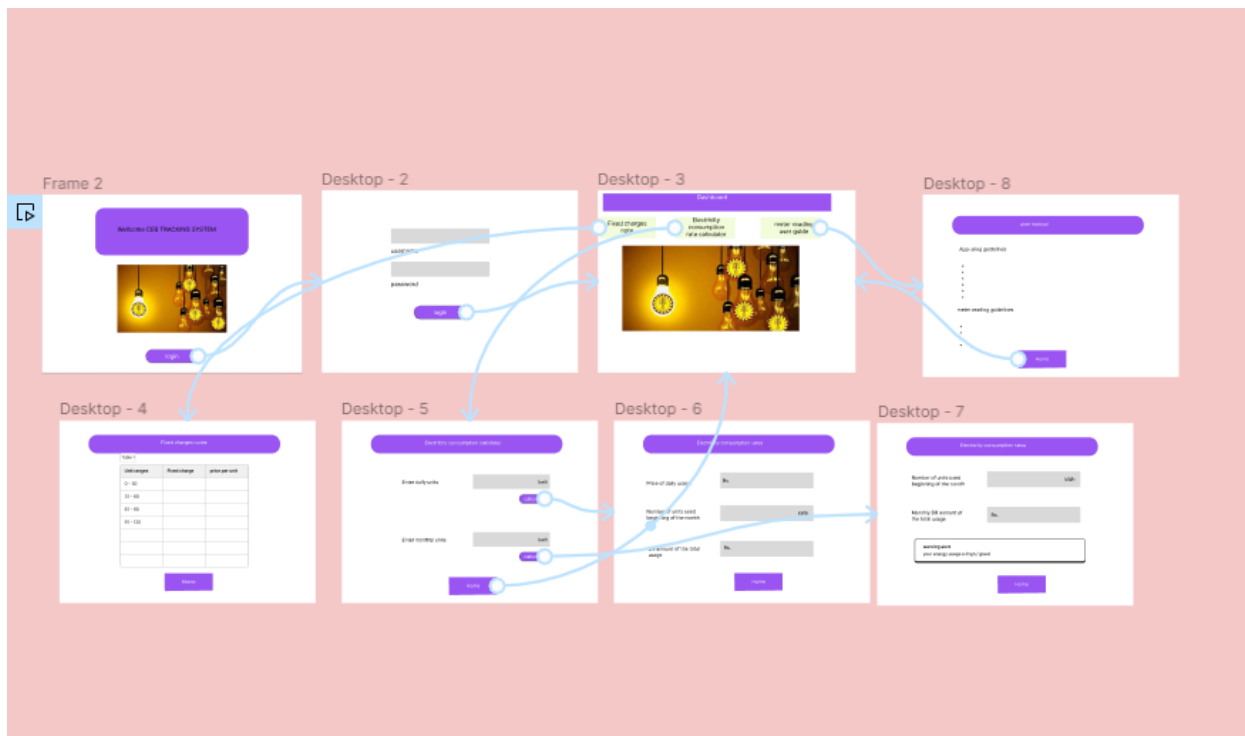
##### **4.12.4 Usability**

The user interface should be designed with simplicity and ease of use in mind, allowing users to interact effortlessly.

## 5. Wireframe of user interfaces

### link of wireframe

<https://www.figma.com/proto/IO56kn5JZv6A3Crc0j2qcg/CEB-TRACKING-SYSTEM?type=design&node-id=49-457&t=ecrUMjEAoSjwCcd6-1&scaling=min-zoom&page-id=0%3A1&starting-point-node-id=49%3A457&mode=design>



## 6. FUTURE REQUIREMENTS (Optional)

Future requirements may include implementing mobile applications for remote meter readings or integrating with smart home systems.

## 7. APPENDIX

### 1. Glossary:

- This section contains a list of technical terms, acronyms, and abbreviations used throughout the SRS document to ensure a common understanding among all stakeholders.

### 2. Context Diagram:

- A visual representation of the system's scope and its interaction with external entities, such as users, the electricity meter, and billing systems.

### 3. Wireframes and UI Mockups:

- Sample wireframes and UI mockups illustrating the proposed user interface design and layout.

### 4. Use Cases:

- Detailed use case descriptions for various functionalities of the application, showcasing user interactions and expected system behavior.

### 5. Test Cases and Test Plans:

- Comprehensive test cases and test plans used during the quality assurance and testing phase to verify the application's functionality and performance.

### 6. Legal and Compliance Information:

- Documentation related to legal disclaimers, copyright notices, and any compliance issues specific to the application, as required.

### 7. Data flow Diagram:

- An architectural overview of the application, illustrating its components, modules, and their interactions.

### 8. User Training Materials:

- Training materials or user guides to help end-users understand and effectively use the Electricity Consumption Calculator Application.

9. Risk Analysis and Mitigation Plan:

- An assessment of potential risks associated with the development and deployment of the application, along with strategies to mitigate these risks.

10. Future Enhancements and Features:

- A list of potential future enhancements and features that may be considered for inclusion in subsequent versions of the application.

***END OF THE SRS DOCUMENT***

.....  
Supervisor signature  
(Ms. Ahali Suthaharan)

.....  
Date

### **Monthly retrospective**

We have conduct three monthly retrospective meeting and we discuss about followings.

- Currently status of the application after each month.
- Discuss about the tasks we have completed during each month.
- Review the tasks we have completed and got the idea about succuss of the task and identify the areas need to improve.
- Identify the challenges we have to face and discuss solutions to mitigate them.
- Developing the collaboration among team members

### **GIT Account**

Link of GIT Account – <https://github.com/kanishkasd/GroupProject>

### **Project governance tool**

Link of Project governance tool – <https://trello.com/b/deiGOo7h/milestone-5>

### **CMMI meeting minutes Document –**

## CMMI MEETING MINUTES

### CEC SYSTEM





## 01. Front end design

Meeting Information			
<b>Meeting Date/Time</b>	September 06,2023 @6.00 p.m.		
<b>Participants</b>	Ishan, Kanishka , Kushan, Shashini		
<b>Estimated Time</b>	2 hours	<b>Actual Time</b>	2 hours and 30 minutes
<b>Special Notes</b>	Build up a responsive design and user-friendly interface		
<b>Call/Location Information</b>	Virtual meeting via zoom		
<b>Supported Documents</b>	UI style guide.docx, YouTube tutorial		

### Agenda:

- Review of wireframes (20 minutes) – discuss feedback, concerns.
- UI style guide discussion- address the questions, issues. maintain consistency across the application.
- Design implementation- discuss strategies for better responsiveness, assign tasks.
- Timeline update- update and review current status, identify any challenges and potential delays.
- Testing plan and QA – discuss the testing and reliable approach for frontend, assign responsibilities for testing and maintain phases.

### Notes/Clarifications:

- Ishan presented the wireframes and key user interactions.
- Kanishka provided the UI guide insight, color schemes and typography.
- All members agreed to prioritize enhanced the responsiveness for build better user experience.
- Shashini updated the team on the project timeline, whether the frontend development is on track.
- Kushan outlined the testing and QA plans which is focus on manual and automating testing.

**Meeting Minutes:**

The meeting commenced at 6.00 pm with participants joining the session via zoom. Ishan led the meeting by presenting the wireframes and all members collaborating with the discussion. Kanishka addressed queries regarding UI style and enduring unified design approach.

The team decided to give more prioritize to responsiveness and design implementations, tasks were assigned to team members to further implementations.

Shashini provided a brief update about the project timeline, so we can ensure that frontend development is progressing as planned.

The testing phases and QA was outlined by Kushan, focus on better testing to ensure a seamless user experience.

**Action Items:**

Action item	Decision made by
Incorporate feedback from the team on wireframes.	Ishan
Update and implementation UI style based on team's suggestions.	Kanishka
Update timeline	Shashini
Testing and QA parts	Kushan
Assigned task related to design implementations	All members

## 2. backend design

Meeting Information			
<b>Meeting Date/Time</b>	September 25,2023 @7.00 p.m.		
<b>Participants</b>	Ishan, Kushan, Kanishka, Shashini		
<b>Estimated Time</b>	1 hours	<b>Actual Time</b>	2 hours and 10 minutes
<b>Special Notes</b>	System scalability and database schema optimization		
<b>Call/Location Information</b>	Virtual meeting via zoom		
<b>Supported Documents</b>	API Documentation.pdf, YouTube tutorial		

### Agenda:

- 1.database schema review – discuss the proposed solutions or optimizations
- 2.API documentation review – discuss potential improvements or additions.
- 3.system architecture overview – discuss high level system design and the suggestions.
- 4.scalability planning - discuss the system scalability, assign tasks related to testing
- 5.project integration – discuss key integration points with the frontend, ensure the seamless communication between frontend and backend.

### Notes/Clarifications:

Ishan presented the update database schema and highlight the improvements of performance.

Kanishka discussed the API documentation, explain the emphasized in formations of frontend.

Shashini provided an overview of the system architecture.

Kushan agreed to conduct scalability testing to ensure that system can handle increased loads.

### Meeting Minutes:

The meeting commenced at 7.00 pm with participants joining the session via zoom. Ishan started the meeting by presenting the updated database schema, promoting a collaborative review and discussion among the team members, Kanishka addressed the queries according to API document which was seamless integration with the frontend.

Shashini provides an overview of the system architecture with the focus of scalability concerns.

The team discussed strategies for scalability and agreed to do several testing to ensure that system is on well condition.

It had to exceed the estimated time by 1 hour and 10 minutes. to further review and discussion, team agreed to reconvene within a week with a normal meeting to track the progress of backend development

and integration with the frontend.

**Action Items:**

Action item	Decision made by
Proposed changes for database schema optimization	Ishan
Update API documentation based on the team's feedback.	Kanishka
Agreed to conduct through scalability testing to ensure the system under various conditions.	All members

### 3. Design document

Meeting Information			
Meeting Date/Time	October 20,2023 @7.30 p.m.		
Participants	Ishan, Kushan, Kanishka, Shashini		
Estimated Time	2 hours	Actual Time	1 hours and 50 minutes
Special Notes	Review of design documents, ensuring clarity and alignment with project goal.		
Call/Location Information	Virtual meeting via zoom		
Supported Documents	Class diagram.pdf, ER Diagram, test cases, use case Diagram		

**Agenda:**

- 1.review of use case diagram – confirm user requirements, discuss any potential updates
- 2.analysis of class diagrams– check the systems functionality, address any questions.
- 3.system architecture overview – discuss high level system design and the suggestions.
- 4.examination of ER diagram – confirm database schema alignment, discuss optimizations and changes.
- 5.test case presentation– review test scenarios and expected outcomes, discuss the adjustments.
- 6.overview of overall architecture – present the high level system architecture, analyses and discuss further integration points or dependencies

**Notes/Clarifications:**

Ishan emphasized the main and importance of clear documentation to facilitate communication among team members.

Kanishka highlighted the key areas of class diagram that essential for consistency in coding practice.

Shashini and Kushan presented test cases, coverage of various scenarios.

All members discussed further to optimization for the ER diagram to enhance database performance. The overall block diagram was presented by Ishan, outlining the system architecture.

### Meeting Minutes:

The meeting commenced at 7.30 pm with participants joining the session via zoom. All members engaged in the comprehensive review of design document. Ishan and Kanishka led the discussion based on the use case diagram ensuring alignment with user requirements. Ishan provided insight into the class diagram, mentioned the importance of adhering to code standards.

Shashini and Kushan presented the test cases thoroughness of testing scenario. Ishan and Kanishka reviewed the activity diagram and addressing the system process workflow.

All members discussed and examined the ER diagram with optimizing the database schema for improved the performance.

### Action Items:

Action item	Decision made by
Update use case diagram based on the teams inputs.	Ishan
Address concerns regarding coding standards in the class diagram.	Kanishka, Ishan
Revise and enhance test cases as per the teams discussion	All members
Facilitate efficient communication among team members and concise a clear documentation.	All members

## 4. Project Demonstration

Meeting Information			
<b>Meeting Date/Time</b>	November 01,2023 @6.30 p.m.		
<b>Participants</b>	Ishan, Kushan, Kanishka, Shashini		
<b>Estimated Time</b>	2 hours	<b>Actual Time</b>	2 hours and 20 minutes
<b>Special Notes</b>	Demonstration of key project features based on feedback		
<b>Call/Location Information</b>	Virtual meeting via zoom		
<b>Supported Documents</b>	Test results summary document, feedback Forms		

### Agenda:

- 1.setting an introduction- project overview explain, introduction of the project team.
- 2.feature demonstration – demonstration of key features. Addressing the questions and issues
- 3.user feedback session– sample participants collection of feedback.
4. quality assurance– overview of testing process and results, discussed the identified issues and suggestions.
5. future development plans- discussed upcoming features, planning on next development phases.

### Notes/Clarifications:

The main document script includes detailed steps for demonstrations, with covering all key features.

Focusing on user experience, improved all functionalities and suggest implementations.

Ishan highlighted the importance of addressing QA related issues that collaborating with user experience.

### Meeting Minutes:

The meeting commenced at 6.30 pm with participants joining the session via zoom. Ishan provided an overview of the project and led the demonstration of key project features with Kanishka that showing the UI/UX design aspects.

Kushan presented the quality assurance report, summarizing testing process and results.

Shashini led the discussion with identified issues and their resolutions which ensure delivering a high-quality system. Future development plans were also discussed which help foundation for the next phase of project development.

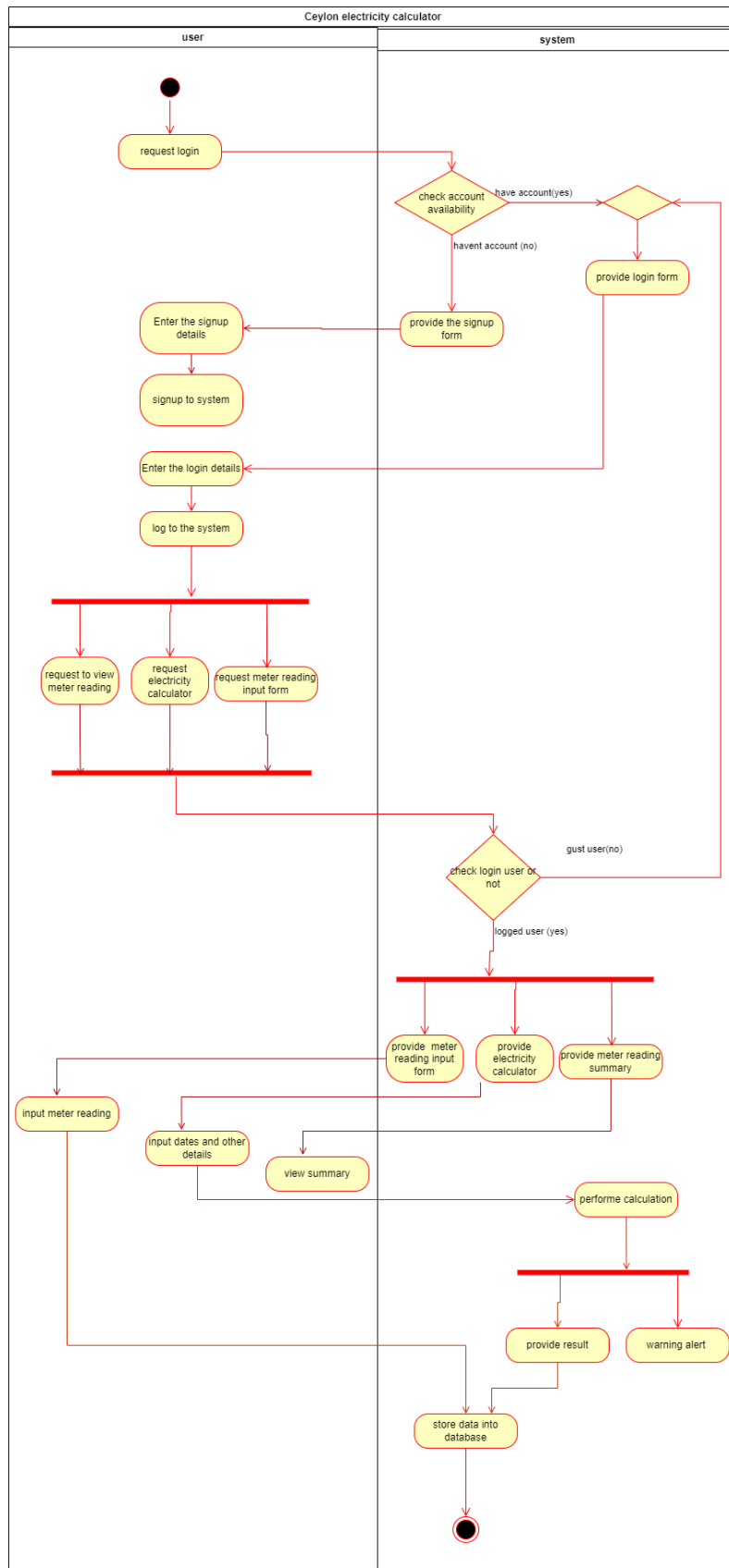
**Action Items:**

Action item	Decision made by
Address questions and concerns raised during the project feature demonstration.	Ishan
Analyze features and potential improvements using feedbacks	Ishan , Kanishka, Shashini
Address identified issues from the quality assurance report	Kushan
Reolution of identified QA issues ,with maintaining quality of the system.	All members

***END  
OF THE CMMI MEETING MINUTES DOCUMENT!***

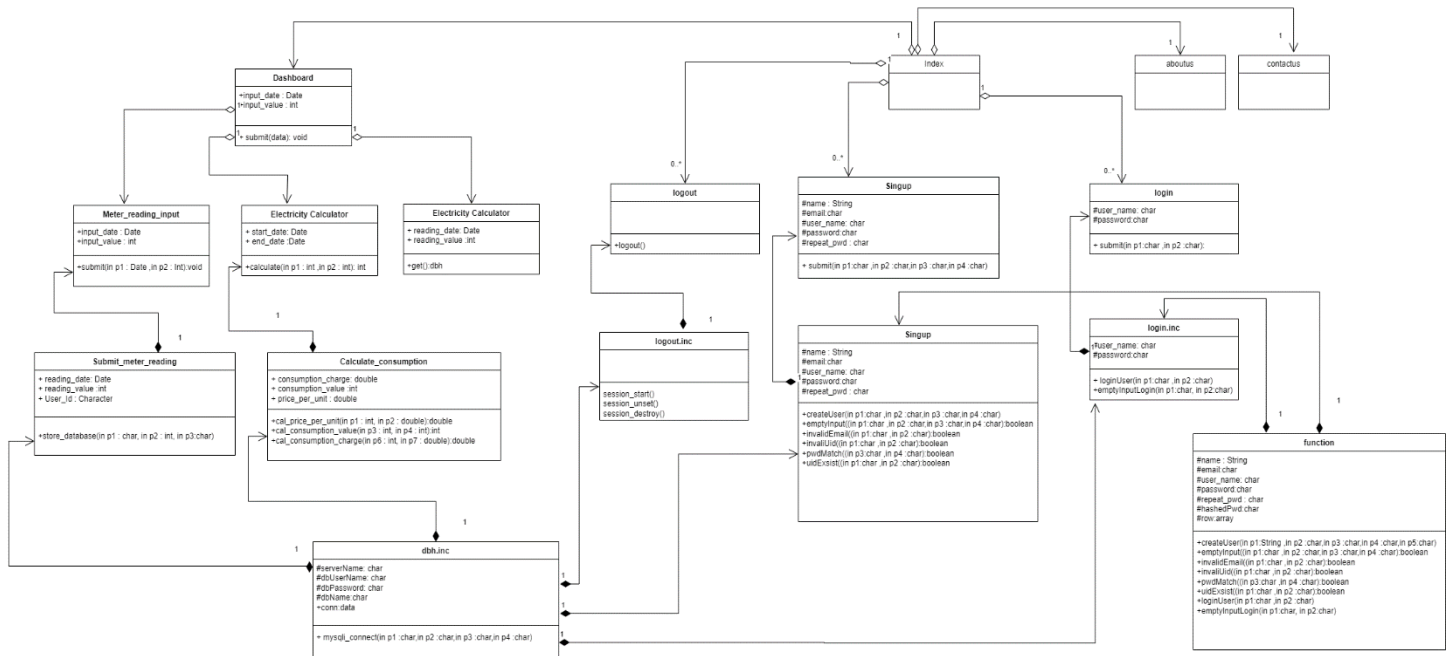
## design document

### Activity diagram

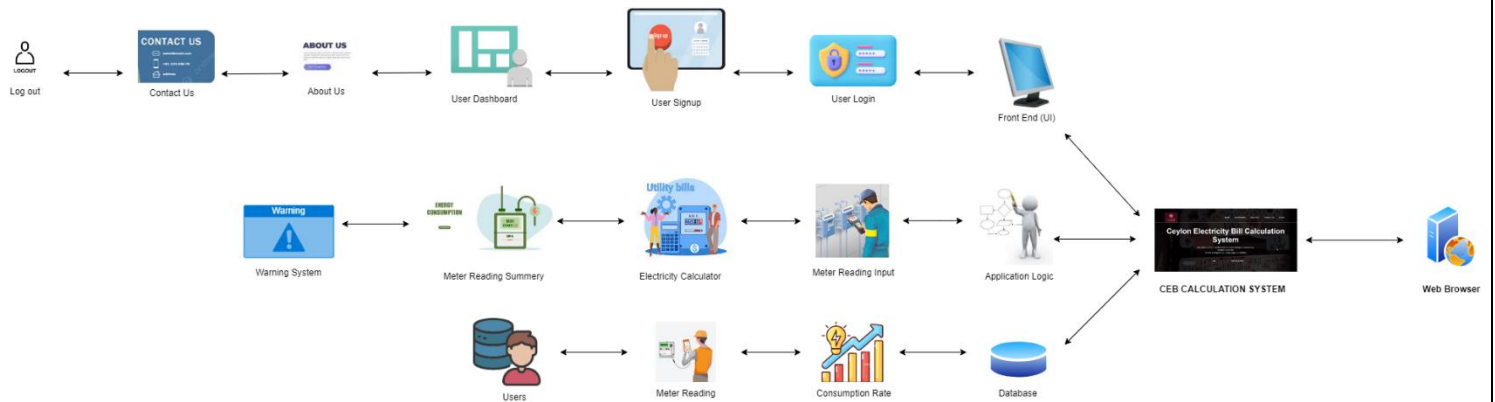




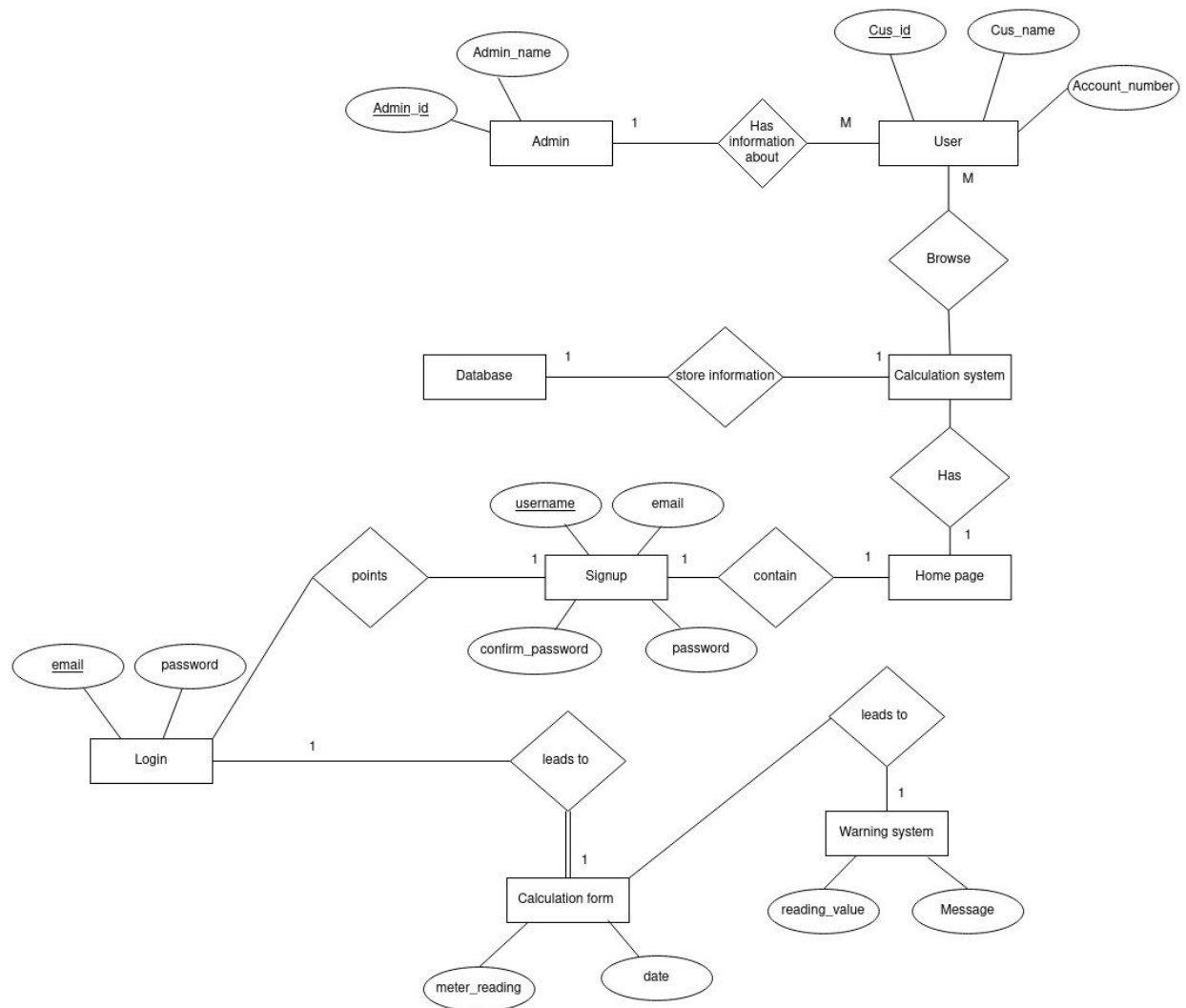
## Class diagram



## Overall architectural diagram



## ER diagram



***END OF THE FINAL REPORT***

***THANK YOU!***

*Ahali*

.....  
Supervisor signature  
(Ms. Ahali Suthaharan)

.....30/11/2023.....

Date