**CEBU INSTITUTE OF TECHNOLOGY**

**UNIVERSITY**

COLLEGE OF COMPUTER STUDIES

Software Requirements Specifications

for

**Electricity Consumption Billing**

John Luis D. Pepito

John Patrick G. Pepito

Claive Justin J. Barrientos

Change History

Table of Contents

Change History 2

Table of Contents 3

1. Introduction 4

1.1. Purpose 4

1.2. Scope 4

1.3. Definitions, Acronyms and Abbreviations 4

1.4. References 4

2. Overall Description 5

2.1. Product perspective 5

2.2. User characteristics 5

2.4. Constraints 5

2.5. Assumptions and dependencies 6

3. Specific Requirements 7

3.1. External interface requirements 7

3.1.1. Hardware interfaces 7

3.1.2. Software interfaces 7

3.1.3. Communications interfaces 7

3.2. Functional requirements 7

Module 1 7

Module 2 8

3.4 Non-functional requirements 8

Performance 8

Security 8

Reliability 8

# Introduction

## Purpose

The purpose of this SRS document is to define the functional and non-functional requirements of the Electric Consumption Billing (ECB) system. It serves as a reference for developers, testers, and stakeholders to ensure the system meets the defined expectations.

The intended audience includes:

* **Developers** – To understand system functionalities and technical requirements.
* **Testers** – To validate system functionalities against requirements.
* **Project Managers** – To track the system's development progress.
* **Utility Companies** – To understand the system’s capabilities and features.
* **End Users (Customers & Administrators)** – To be aware of the system's features and usability.

## Scope

The Electric Consumption Billing (ECB) system is a **cross-platform** application designed for small to medium-sized utilities. It enables efficient management of customer data, electricity consumption readings, billing calculations, and payments.

The system provides:

* **Customer Profile Management** – Users can view and update their details.
* **Consumption Data Entry** – Administrators can input and modify consumption data.
* **Billing Calculation & Invoice Generation** – Automated bill computation and invoice creation.
* **Secure Authentication** – Web-based admin login and biometric login for mobile users.
* **Payment Processing** – Online bill payments and transaction tracking.
* **Notifications & Alerts** – Automated alerts for due payments, consumption thresholds, and reminders.
* **Consumption History & Forecasting** – Graphical consumption history and future usage predictions.
* **Customer Support & Feedback** – Users can submit inquiries and feedback.

## Definitions, Acronyms and Abbreviations

 **ECB** – Electric Consumption Billing System

 **UI** – User Interface

 **API** – Application Programming Interface

 **OTP** – One-Time Password

 **SSL** – Secure Sockets Layer (encryption protocol)

## References

 **Philippine Statistics Authority**

* **Title**: Cebu's Population Reached More Than 2.4 Million Persons (Results from the 2007 Census of Population)
* **Date**: February 16, 2010
* **Publishing Organization**: psa.gov.ph
* **Source**: <https://psa.gov.ph/statistics/population-and-housing/node/770>

 **Spring Boot Documentation**

* **Title**: Spring Boot Reference Guide
* **Version**: Latest Stable Release
* **Publishing Organization**: Spring.io
* **Source**: <https://docs.spring.io/spring-boot/docs/current/reference/html/>

 **Android Biometric Authentication API**

* **Title**: Android Biometric Authentication Guide
* **Publishing Organization**: Google Developers
* **Source**: <https://developer.android.com/training/sign-in/biometric-auth>

 **Material-UI Documentation (for UI Components in Web & Mobile)**

* **Title**: Material-UI React Components Documentation
* **Publishing Organization**: MUI
* **Source**: <https://mui.com/>

 **MySQL Documentation (for Database Design & Integration)**

* **Title**: MySQL Reference Manual
* **Version**: Latest Stable Release
* **Publishing Organization**: Oracle Corporation
* **Source**: <https://dev.mysql.com/doc/>

 **RESTful API Design Standards**

* **Title**: REST API Design Best Practices
* **Publishing Organization**: Microsoft Developer Network (MSDN)
* **Source**: <https://learn.microsoft.com/en-us/azure/architecture/best-practices/api-design>

 **Payment Gateway Integration Documentation**

* **Title**: Payment Gateway API Integration Guide
* **Publishing Organization**: PayPal / Stripe / PayMongo
* **Source**: https://developer.paypal.com/docs/api/overview/ (for PayPal)
* **Source**: <https://stripe.com/docs/api> (for Stripe)

 **Data Security & Encryption Standards**

* **Title**: OWASP Cryptographic Storage Cheat Sheet
* **Publishing Organization**: Open Web Application Security Project (OWASP)
* **Source**: <https://cheatsheetseries.owasp.org/cheatsheets/Cryptographic_Storage_Cheat_Sheet.html>

 **Software Development Lifecycle (SDLC) Guidelines**

* **Title**: Agile Software Development Best Practices
* **Publishing Organization**: Scrum Alliance
* **Source**: <https://www.scrum.org/>

# Overall Description

*The Electric Consumption Billing (ECB) system is a cross-platform application designed to cater to the needs of small to medium-sized utilities. It provides a comprehensive solution for managing customer data, electricity consumption readings, billing calculations, and payments. The system features a robust web-based interface built with Spring Boot and an intuitive mobile application leveraging biometric login functionality for enhanced security.*

## Product perspective

The ECB system is a **standalone** software that integrates with external payment systems and database management systems. It features:

* A **web-based admin portal** built using **Spring Boot**.
* A **mobile application** with biometric authentication.

#### **System Components:**

**Module 1: User Authentication**

* + Transaction 1.1: Customer Login (Web & Mobile)
  + Transaction 1.2: Admin Login (Web)

**Module 2: Customer Profile Management**

* + Transaction 2.1: View Profile
  + Transaction 2.2: Edit Profile

**Module 3: Consumption Data Entry**

* + Transaction 3.1: Input Electricity Consumption
  + Transaction 3.2: Modify Consumption Data

**Module 4: Billing Calculation & Invoice Generation**

* + Transaction 4.1: Automatic Bill Calculation
  + Transaction 4.2: Generate Invoice

**Module 5: Payment Processing**

* + Transaction 5.1: Online Payment
  + Transaction 5.2: Payment Confirmation

## User characteristics

#### **1. Customers**

* View and manage their accounts.
* Pay bills and track consumption history.
* Receive notifications for billing and due payments.

#### **2. Administrators**

* Manage customer profiles.
* Input electricity consumption data.
* Handle billing, invoicing, and reports.

## Constraints

* Must comply with local data privacy laws.
* The mobile app requires Android 8.0+ .
* Internet connection required for real-time updates.
* Payment system must integrate with third-party payment gateways.
* The database must support at least 200,000 concurrent users.

## Assumptions and dependencies

* The system assumes that electricity readings are accurate before input.
* The application depends on external payment APIs.
* The biometric login feature requires devices with fingerprint scanners.

# Specific Requirements

## External interface requirements

### 3.1.1. Hardware interfaces

 Web application requires **Windows servers** with at least **8GB RAM & 4-core CPU**.

 Mobile app requires **Android devices** with biometric authentication support.

### 3.1.2. Software interfaces

 Backend: **Spring Boot, MySQL**.

 Frontend: **React (Web), React Native (Mobile), HTML & CSS**.

 Payment Integration: **PayMongo/Gcash**.

### 3.1.3. Communications interfaces

 Uses **REST API** for backend communication.

 Secure connection via **HTTPS (SSL/TLS encryption)**.

## Functional requirements

### User Authentication (Web & Mobile)

#### The system must provide secure login functionality customers with added support for third-party authentication.

#### 1.1 Customer Login (Web & Mobile)

##### Use Case Diagram

##### Use Case Description

##### Activity Diagram

##### Wireframe

#### 1.2 Transaction Name

##### Use Case Diagram

##### Use Case Description

##### Activity Diagram

##### Wireframe

##### . . .

### Administrator Authentication (Web)

#### Exclusively accessible through the web interface, ensuring secure and centralized management of customer profiles, billing data, and reporting.

#### 1.1 Admin Login (Web)

##### Use Case Diagram

##### Use Case Description

##### Activity Diagram

##### Wireframe

#### 1.2 Transaction Name

##### Use Case Diagram

##### Use Case Description

##### Activity Diagram

##### Wireframe

##### . . .

### Customer Profile Management (Web)

#### The system should allow administrators to manage customer profiles, and customers to view their profiles.

#### 2.1 View Profile

##### Use Case Diagram

##### Use Case Description

##### Activity Diagram

##### Wireframe

#### 2.2 Edit Profile

##### Use Case Diagram

##### Use Case Description

##### Activity Diagram

##### Wireframe

##### . . .

### Consumption Data Entry (Web)

#### The system must allow administrators to enter and update electricity consumption data for each customer.

#### 3.1 Input Electricity Consumption

##### Use Case Diagram

##### Use Case Description

##### Activity Diagram

##### Wireframe

#### 3.2 Modify Consumption Data

##### Use Case Diagram

##### Use Case Description

##### Activity Diagram

##### Wireframe

##### . . .

### Biometrics Login (Mobile)

#### Provide biometric authentication for mobile users.

#### 3.1 Biometric Authentication (Fingerprint/Face ID Login)

##### Use Case Diagram

##### Use Case Description

##### Activity Diagram

##### Wireframe

#### 3.2 Biometric Authentication Failure & Fallback to Password Login

##### Use Case Diagram

##### Use Case Description

##### Activity Diagram

##### Wireframe

##### . . .

### Billing Calculation (Web & Mobile)

#### The system must automatically calculate the billing amount based on the entered consumption data

#### 4.1 Automatic Bill Calculation

##### Use Case Diagram

##### Use Case Description

##### Activity Diagram

##### Wireframe

#### 4.2 Tax Computation & Final Bill Summary

##### Use Case Diagram

##### Use Case Description

##### Activity Diagram

##### Wireframe

##### . . .

### Invoice Generation (Web & Mobile)

#### The system must automatically generate an invoice based on calculated bill.

#### 5.1 Generate Invoice

##### Use Case Diagram

##### Use Case Description

##### Activity Diagram

##### Wireframe

#### 5.2 Send Invoice via Email/SMS Notification

##### Use Case Diagram

##### Use Case Description

##### Activity Diagram

##### Wireframe

##### . . .

### Payment Processing (Web & Mobile)

#### The system should allow customers to view their bills and make payments online.

#### 6.1 Online Payment

##### Use Case Diagram

##### Use Case Description

##### Activity Diagram

##### Wireframe

#### 6.2 Payment Confirmation

##### Use Case Diagram

##### Use Case Description

##### Activity Diagram

##### Wireframe

##### . . .

### Notifications and Alerts (Web & Mobile)

The system should send automated notifications and alerts to customers for events such as payment due dates, consumption thresholds, or any system-generated reminders.

**7.1 Payment Due Notification**

• Use Case Diagram

• Use Case Description

• Activity Diagram

• Wireframe

**7.2 Consumption Threshold Alert**

• Use Case Diagram

• Use Case Description

• Activity Diagram

• Wireframe

### ****Consumption Data History (Web & Mobile)****

The system must allow users (both customers and administrators) to view a history of electricity consumption data over selected periods. This feature should include graphical representation and detailed breakdowns.

**8.1 Consumption History Overview**  
• Use Case Diagram  
• Use Case Description  
• Activity Diagram  
• Wireframe

**8.2 Graphical Data Representation**  
• Use Case Diagram  
• Use Case Description  
• Activity Diagram  
• Wireframe

### ****Customer Feedback and Support (Web & Mobile)****

The system should provide customers with a platform to submit feedback or request support for any issues related to their electricity consumption, billing, or payments.

**9.1 Feedback Submission**  
• Use Case Diagram  
• Use Case Description  
• Activity Diagram  
• Wireframe

**9.2 Support Ticket System**  
• Use Case Diagram  
• Use Case Description  
• Activity Diagram  
• Wireframe

### ****Usage Forecasting (Web & Mobile)****

The system should provide customers with forecasts of future electricity consumption and expected billing based on past data trends and usage patterns.

10.1 **Forecast Generation**

* *Use Case Diagram*
* *Use Case Description*
* *Activity Diagram*
* *Wireframe*

10.**2 Forecast Comparison**

* *Use Case Diagram*
* *Use Case Description*
* *Activity Diagram*
* *Wireframe*

## Non-functional requirements

### Performance

Supports **200,000+ customer records** with **low latency (<2s response time)**.

### Security

Implements **multi-factor authentication, SSL encryption, and role-based access control**.

### Reliability

Ensures **99.9% uptime** with **automatic failover**.