Software Requirements Specification

for

Utility Payment System

Version 1.0 approved

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Table of Contents

Revision History

Date	Description	Author	Comments
May 2023	Version 1	Group members	Document was reviewed by group members and some features were added.
May 2023	Version 2	Group members	Reviewed by other groups
May 2023	Version 3	Group Members	Final review by group members

List of tables

List of figures

Abbreviations, Acronyms and Definitions

- FR :- Functional Requirement
- ER :-Entity Relationship Diagram
- UC :- Use Case
- GB :- Gigabyte
- TB :- Terabyte
- DB :- Database
- Js :-Javascript

1. Introduction

This SRS document is mainly concerned with a utility payment system. It is about how a customer who is a service user makes a payment for his services like an Electricity Utility, Water Utility and other services provided by any service provider. In the existing system, service providers collect utility information from the service user manually, and The user pays traditionally in cash. This process is not efficient in both time management and cost. So we need an effective system to overcome these problems.

1.1 Purpose

The purpose of this document is to describe the software implementation of utility payment system. The system we'll develop is mainly concerned with digital or electronic payment methods for electricity, water, WIFI, gas and other utilities. This system mainly focuses on reducing the main problems that both the service users and the service provider faces during the traditional or existing system.

1.2 Document Conventions

The document is prepared using Microsoft Office, It uses the 'Times New Roman' font type, a fixed font size of 12pt for the text and 14pt for the Heading. It also uses 1.5pt line spacing and bold for all headings. All pages except the cover page are numbered.

1.3 Intended Audience

The document is for Service users, electric utility officer, water utility officer, IT operator, and service Administrator. The SRS document will contain all information to propose the payment system, the economic and technical issues and the time to overcome them. This document would provide a clear overview of the system as it develops.

1.4 Product Scope

A utility payment system will be developed for both the service user and the service provider to minimize the time and cost lost while using the early system. This system allows the service user to register or sign up, log in to his page, and view detailed utility information including how much is the utility cost, the deadline for the payment and how much additional cost is added for the service that passes the deadline. It also allows them to pay for their utilities using the available payment methods, and view, download or print their payment bill. The users can see their payment history and the system does analysis of their past information and display using bar and line charts.

For the service provider, the system allows to register and login to their dashboard and authenticate their information with password and username. The number of providers registered to the system for one service is limited. The system also allows them to add new customer information including utility cost, payment deadline, and other related data. Also, they have the right to delete and modify existing utility information and display detailed utility information. The system does a statistical analysis of their organization, about the paid and unpaid amounts in a specific interval of time, their profit, and the growth rate of their number of customers.

The system administrator has all the right to remove, add, and update the status of both the service provider and the service users. He checks the privacy and policy rules, update the policy according to the conditions and activate and deactivate accounts.

1.5 References

[1] Lauesen, S, (2003), Task Descriptions as Functional Requirements, IEEE Computer Society,

https://www.visual-paradigm.com/guide/uml-unified-modeling-language/

How to Write a Software Requirements Specification (SRS) | Perforce

2. Overall Description

2.1 Product Perspective

This Utility payment system is a new product which collectively gives a service for the payment of all kinds of utilities like electricity, water, telecommunication and other services. There are other systems for utility payments, but they work only for one of the utility services (electricity, water and telecommunication). This system can minimize all the costs, time and other resources lost while using the traditional and old ways.

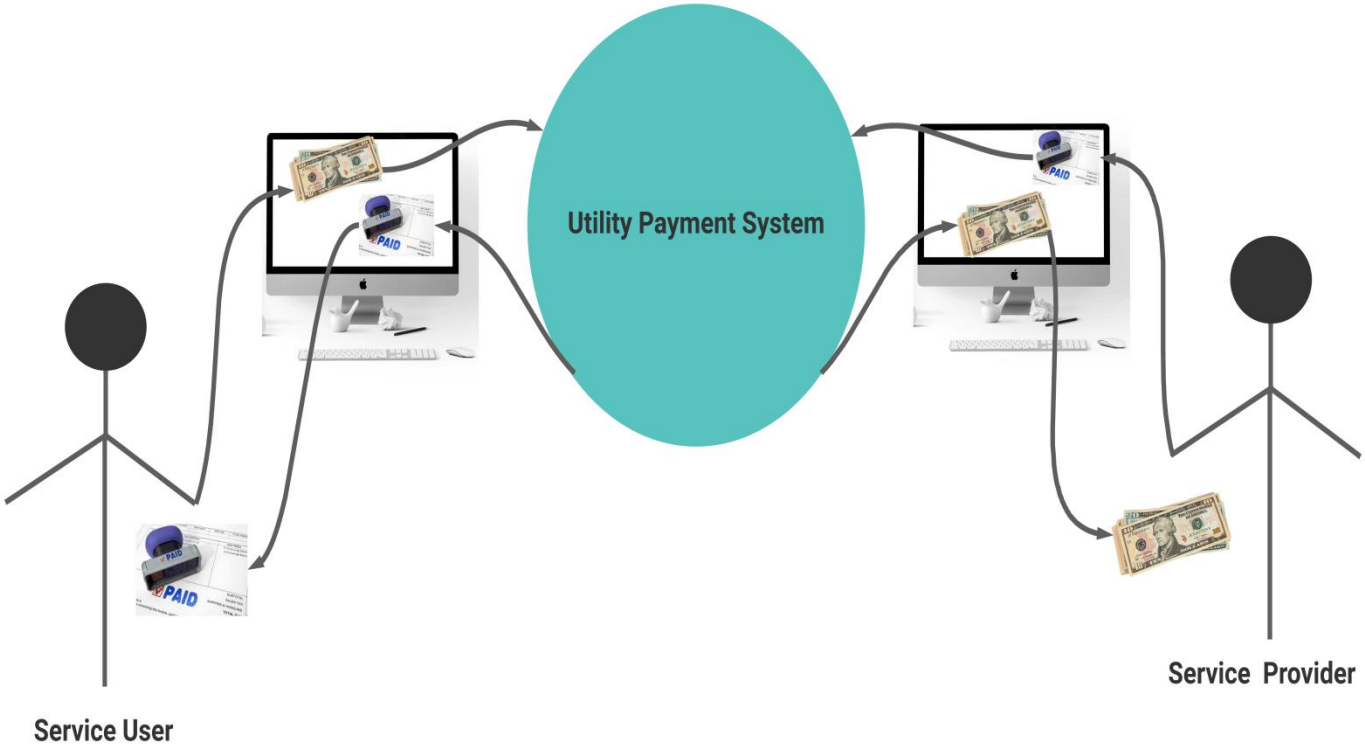

Figure 1 : Diagram to show how system and its users interact

2.2 Product Functions

Our utility payment system will be used by the system administrator, the service users and service providers stockholders. They all have their own logging information and after logged in to the system they perform different tasks.

System Administrator's Task:

- Log in into the system
- Activate/deactivate accounts
- Manage both service users and service providers

Service User's Task:

- Create account
- Log in into the account
- Search for utilities
- View utility information
- Pay for utilities
- View/download/print payment bill
- View past payment information
- Update/modify profile
- Change password

Service Provider's Task:

- Create account
- Login into the system
- Add utility information
- View utility information
- Update utility information
- View data analysis
- Generate payment bill
- Change password

2.3 User Classes and Characteristics

- **System Administrator:** Has full access to the system and he is the highest privileged for the system.

The main functions for system administrator are:

  - Manage all users
  - Manage accounts
  - Check policies and rules and update them

- **Service Providers Officers:** Has the right to access the information of a customers for that specific service. They Are limited in number.

The main functions for Service providers officer are:

  - Manage all their customers(service users)
  - Create account for the service provider
  - Change password
  - Manage payment

2.4 Operating Environment

- **Software Requirements**
  - Window 8 Operating System
  - Visual Studio Code editor
  - Javascript Libraries and frameworks like React Js and Node Js
  - Mongo DB compass
  - Mongo DB server
  - GraphQl servers
- **Hardware Requirements**
  - 8 GB RAM 30GB hard disk space
  - Core i5 and above processor
  - 1TB space for the server

2.5 Design and Implementation Constraints

Utility payment system is payment related system and it is more sensitive to security affaire. So for every user we need a unique username and password and it is essential to authenticate those users to identify who really are. Additionally the system should have a secured deployment server that can provide SSL and other security certificates. The other constraint is only the system administrator has the right to activate and deactivate users account and he uses the systems rule and regulation to give alert, block or deactivate and activate account.

So an easy and clear user documentation is required for both service users and service providers. The user documentation that include the systems policy and rule will be provided in the help page of the system. Also the payment needs integration into the third-party systems. So we have to get their API.

2.6 User Documentation

All the system customers have user documentation or manual as a part of the system. The documentation contains all details about the system and step-by-step procedures about how to use the system's components. It also identifies what are the system's policies and rules, how to apply them and how to report if a problem has happened.

The documentation will be described in a way that every customer of the system can understand.

2.7 Assumptions and Dependencies

- All the system customers need to have unique id and password
- All the system customers have to authenticated with username and password before logged in into the system
- Internet connection must be available for the functionality of the system.
- Users may need have to create account on the third parties system for payment.
- The problem that happened on the third parties system may affect our users.
- Only the higher level access privileged users has the right to delete records

3. External Interface Requirements

3.1 User Interfaces

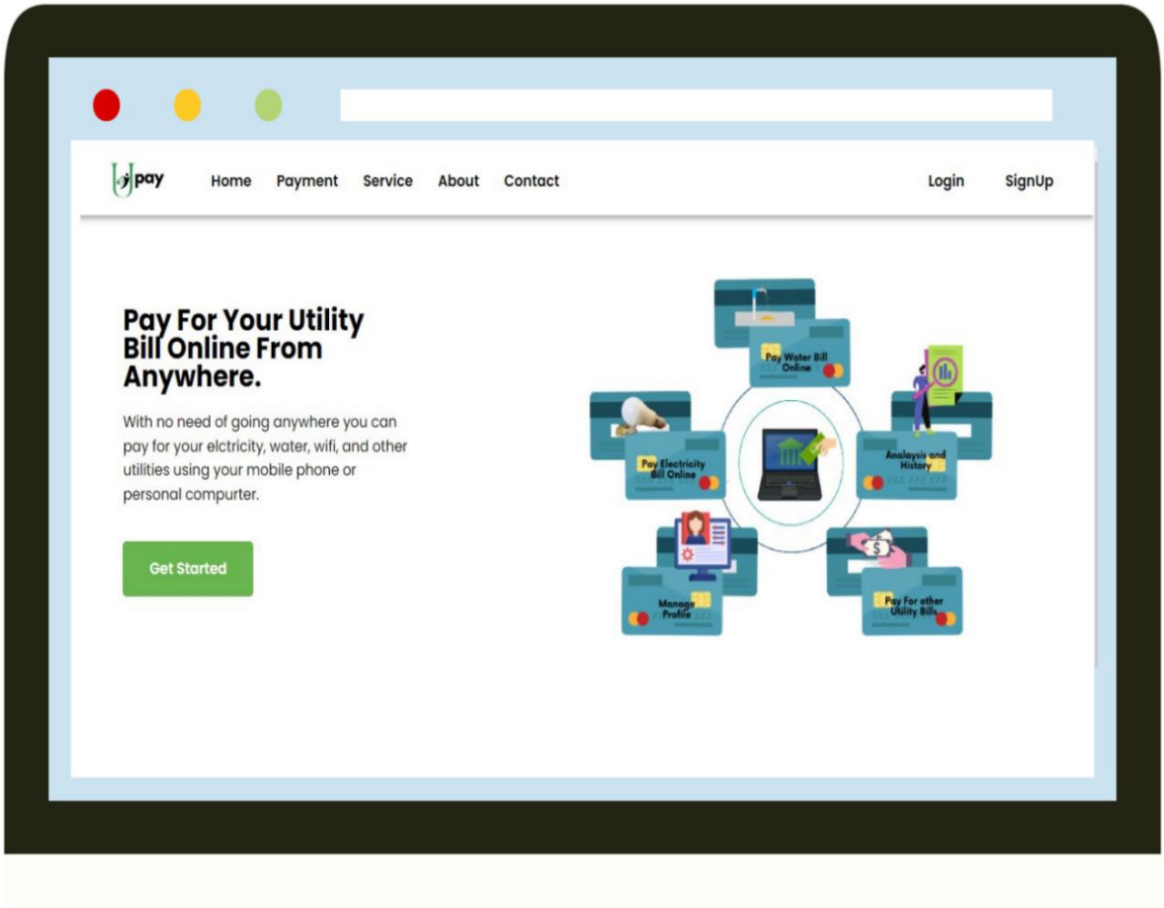

Figure 2 : Home page for Service users(Desktop View)

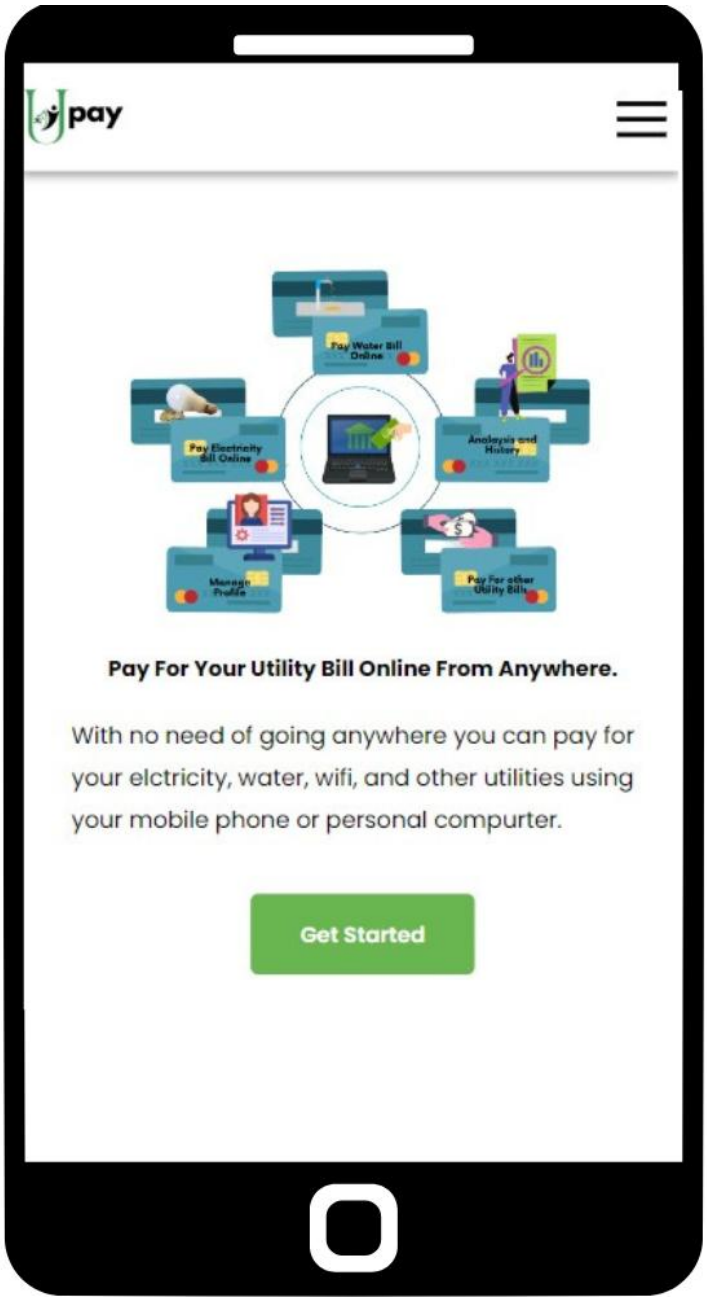

Figure 3 : Home page for Service users(Mobile View)

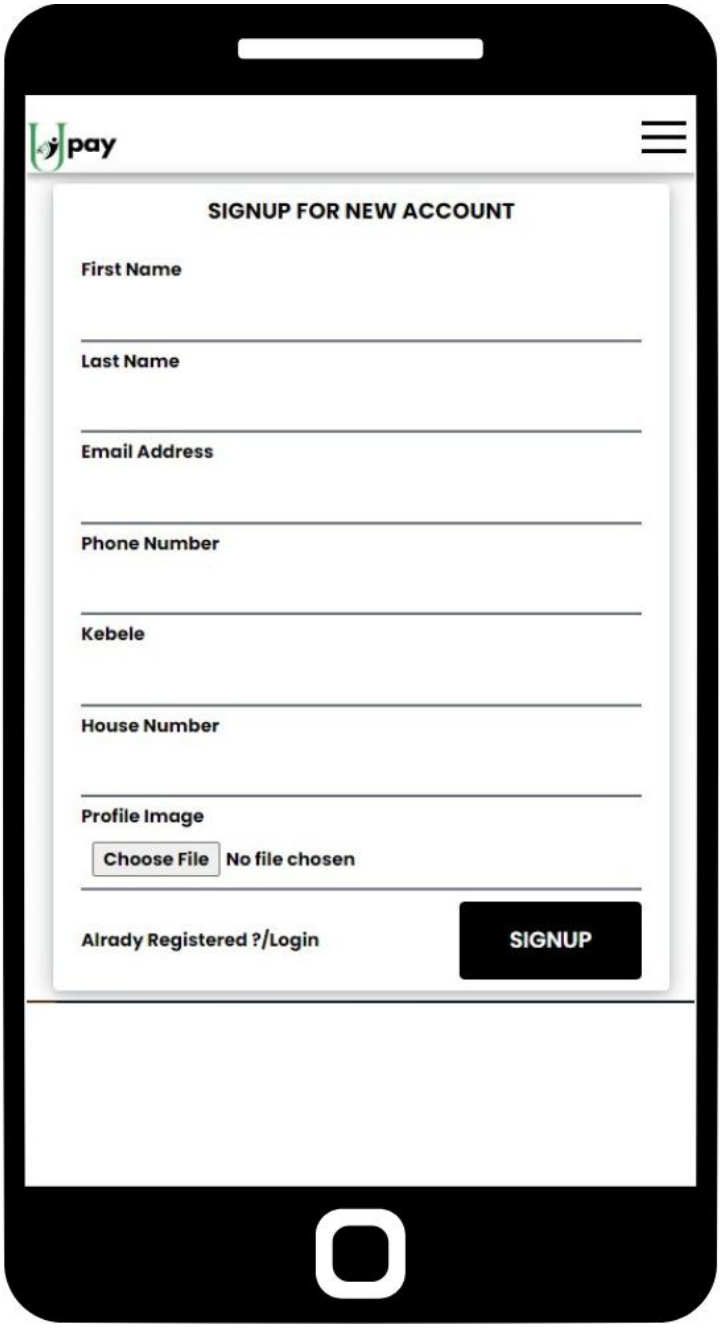

Figure 4 : Sign Up page for Service users

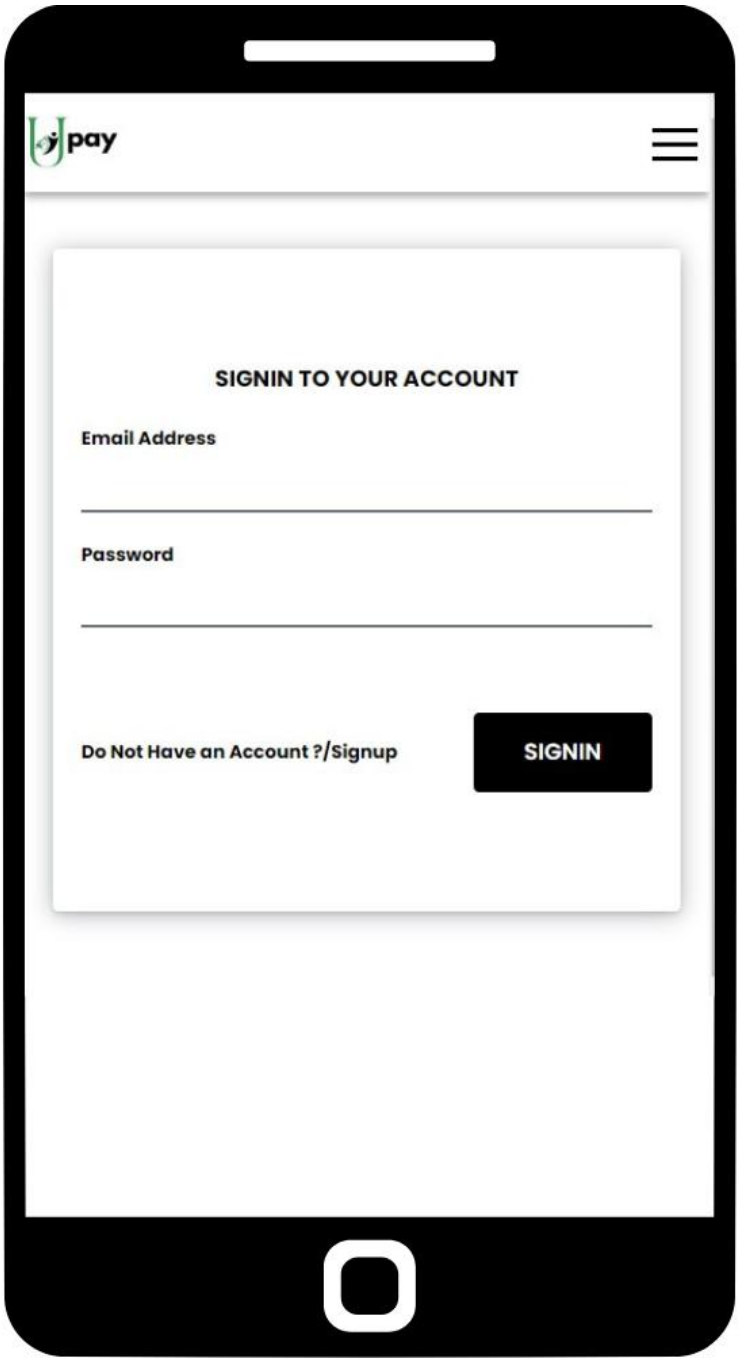

Figure 5: Log In page for Service users

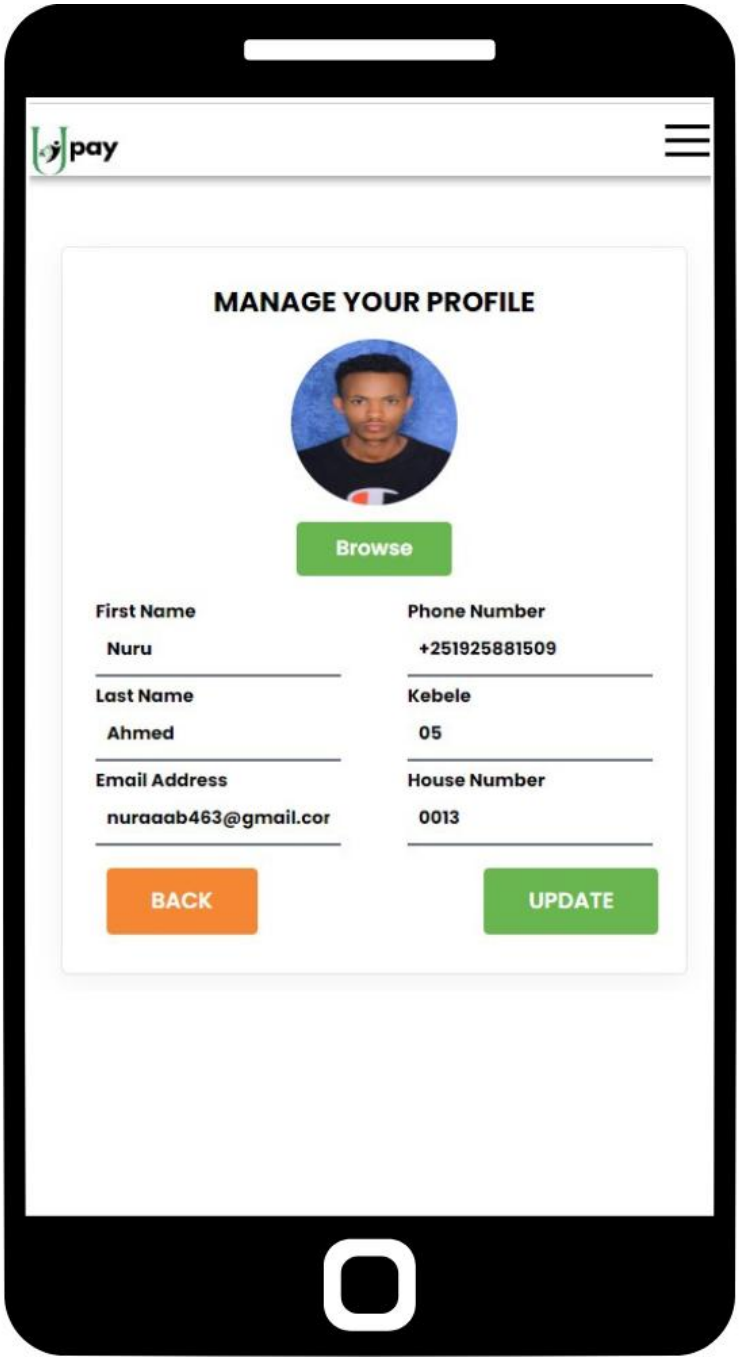

Figure 6 : Service users Manage profile

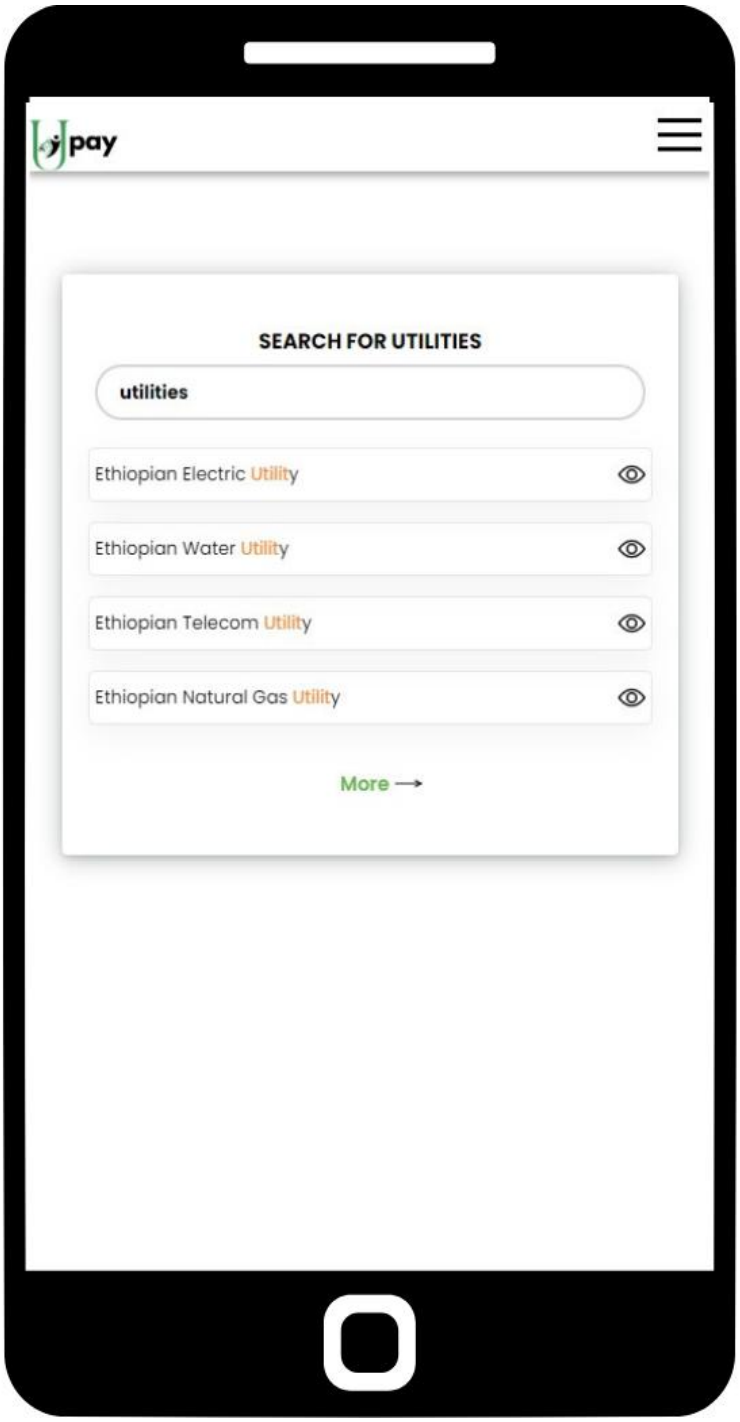

Figure 7: Service users search utilities

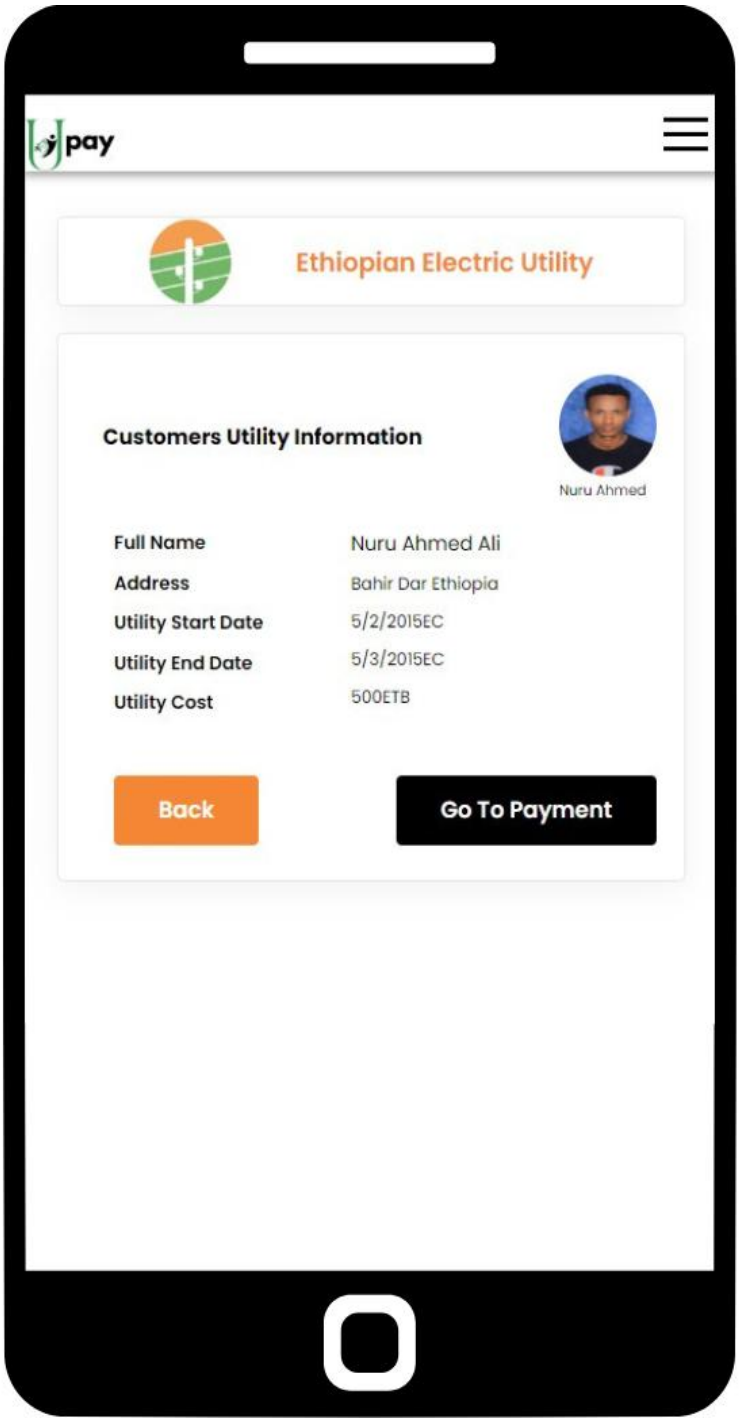

Figure 8: Service users View Utility Information

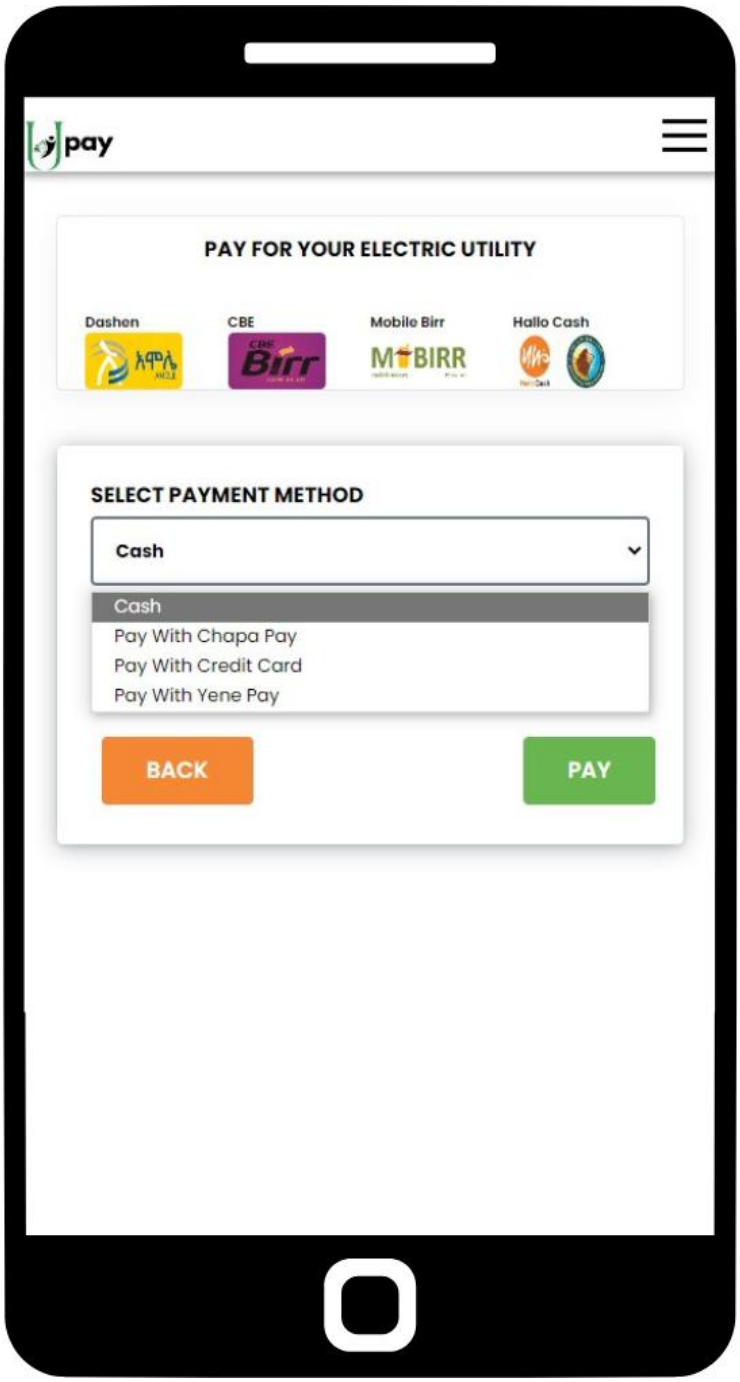

Figure 9 :Service users pay for selected utilities

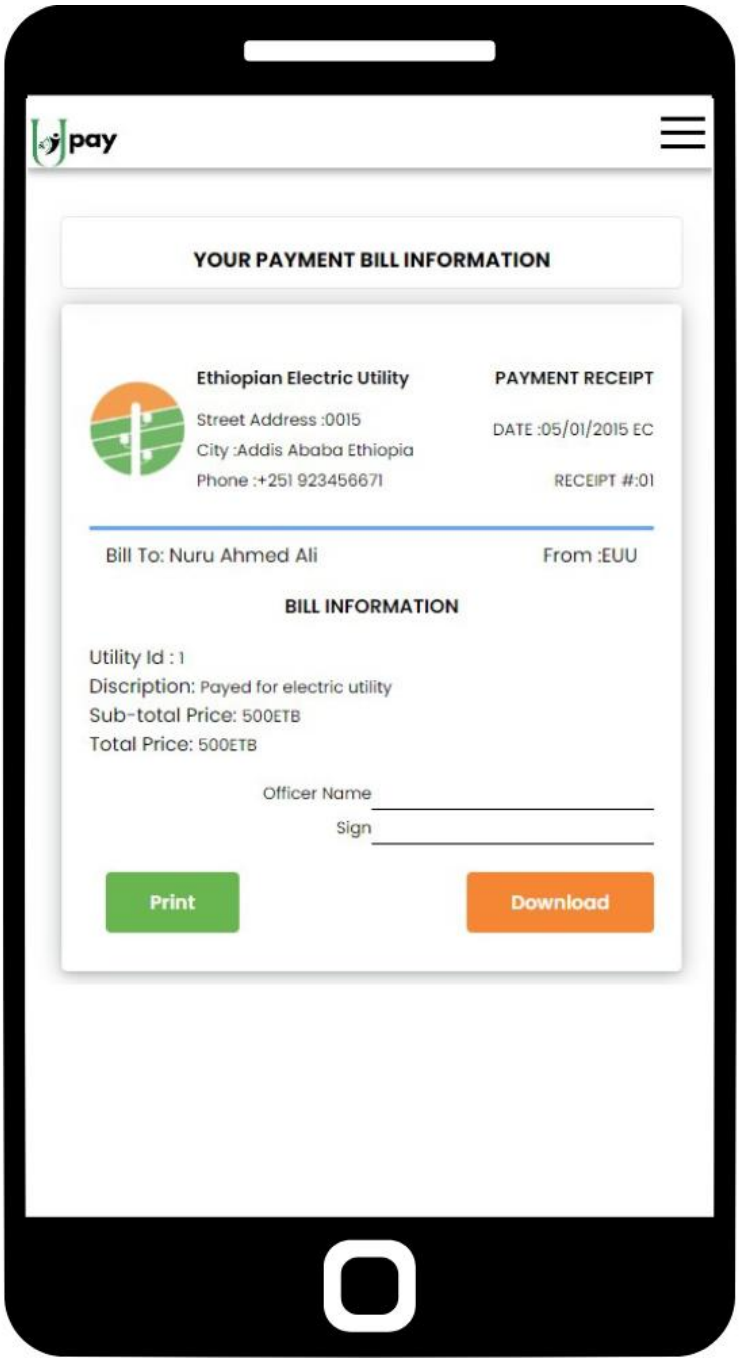

Figure 10:Service users view payment bill

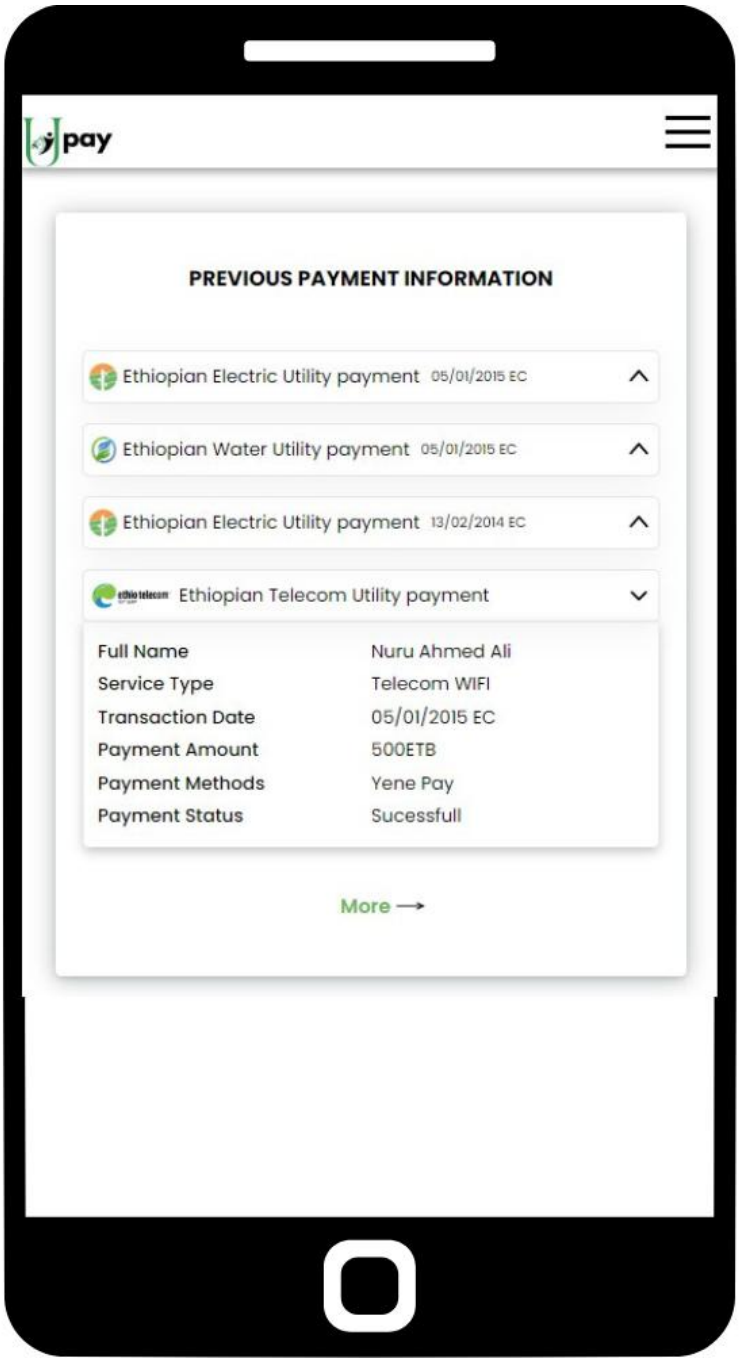

Figure 11:Service users view payment history

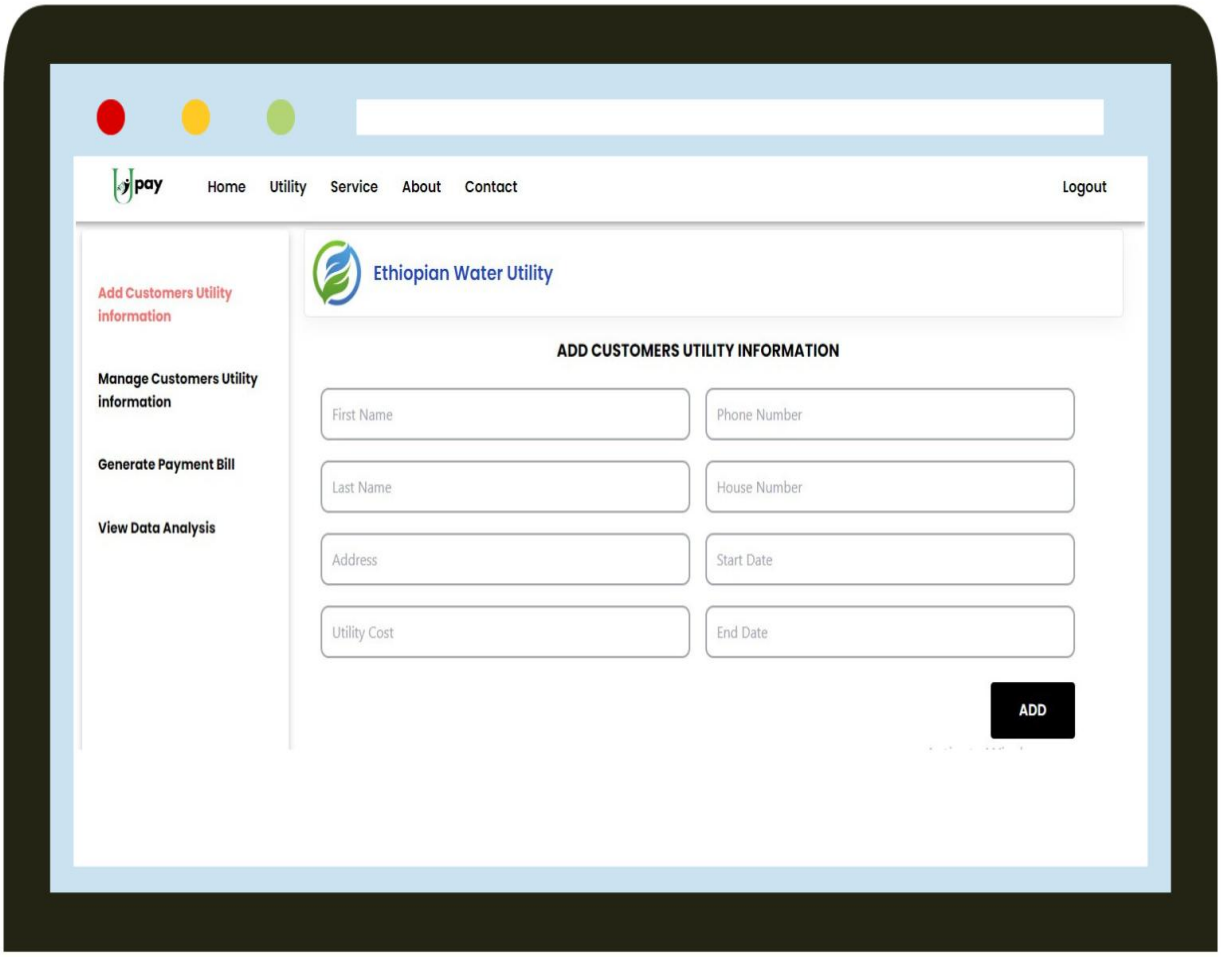

Figure 12:Service providers add customers information

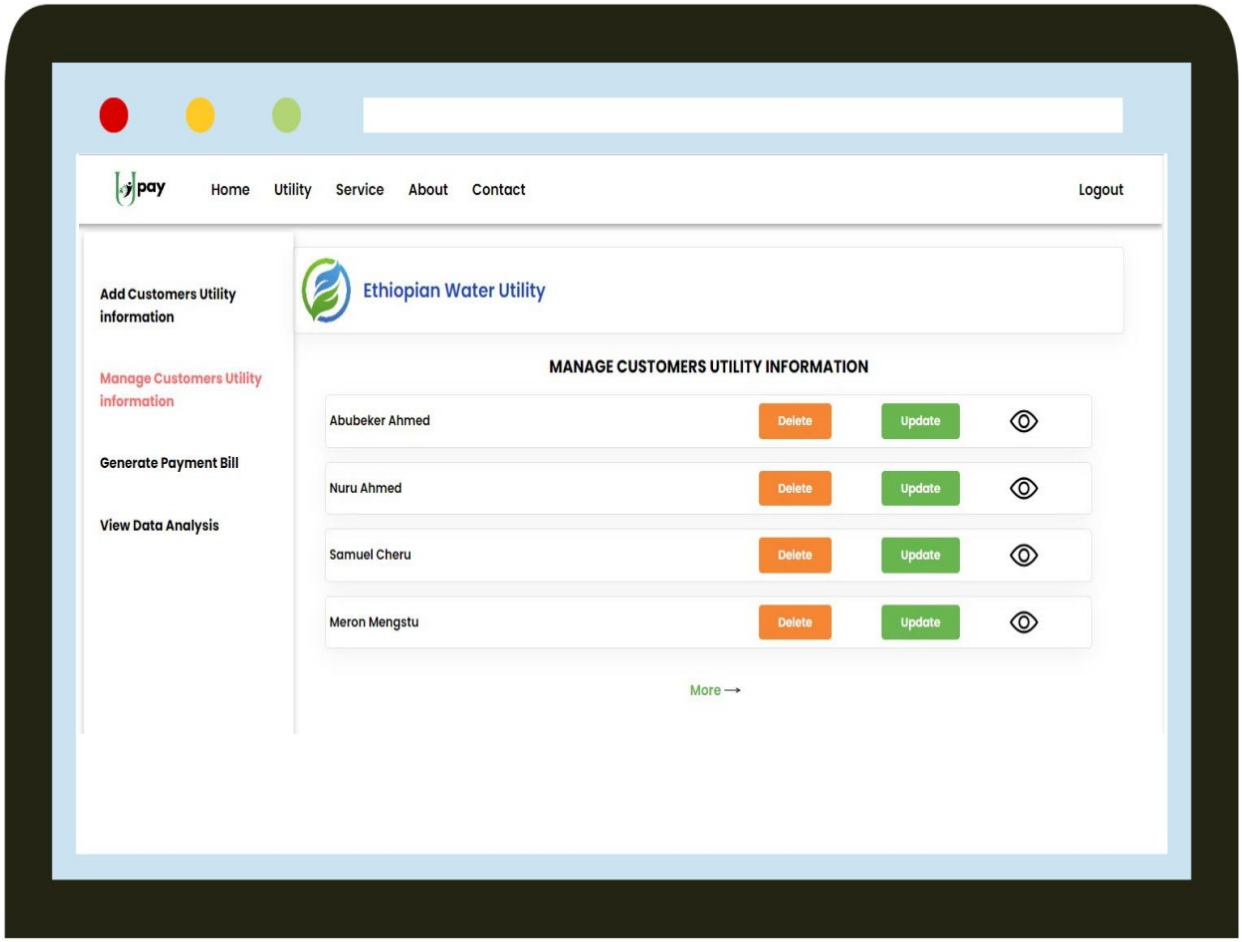

Figure 13:Service providers manage customers information

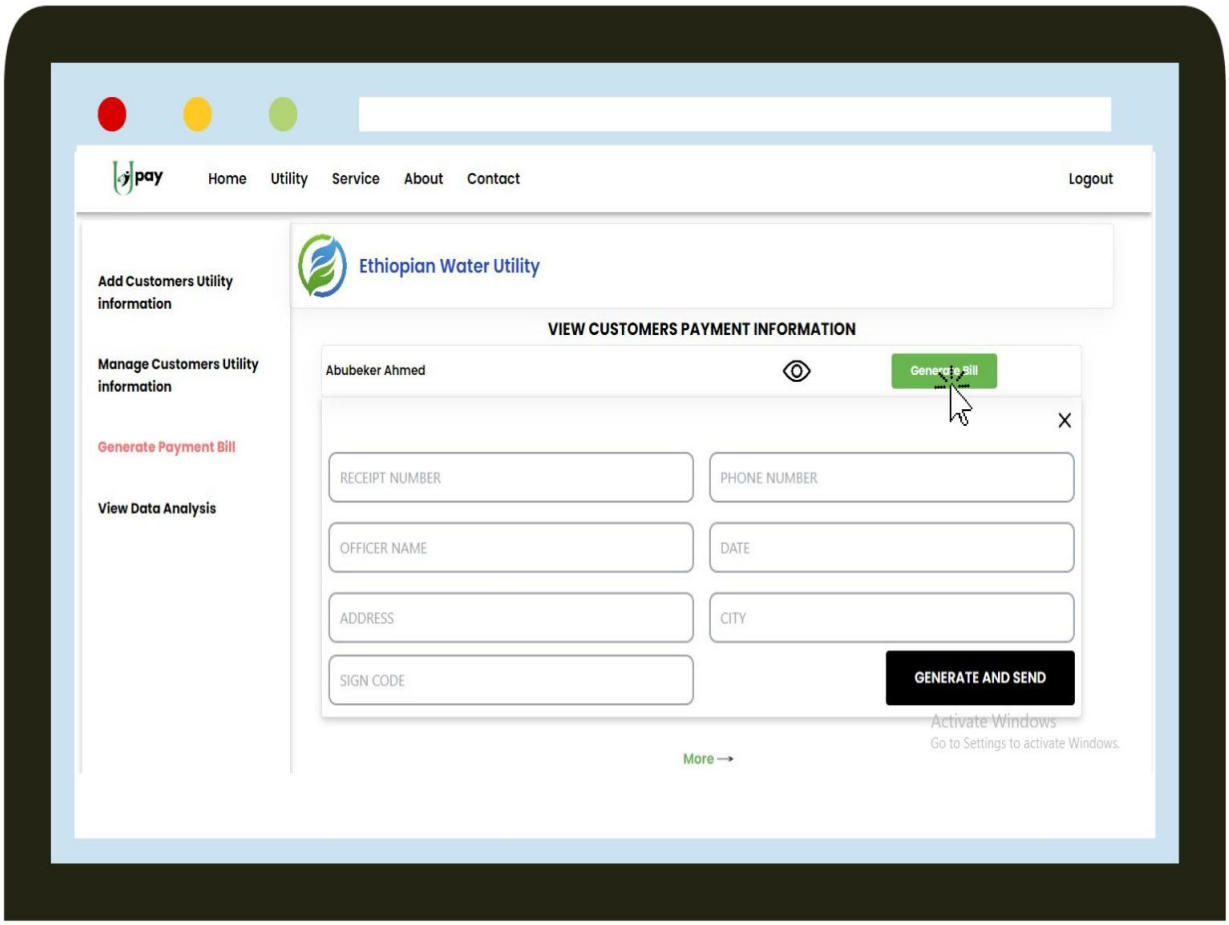

Figure 14:Service providers generate customers bill

3.2 Hardware Interface

The hardware requirement for the service users is a Desktop / Laptop PC or simply a mobile phone that can be connected to the internet, and a laser printer for printing bills. And for the service provider mainly Desktop is required to get into the system. The system will be both Mobile and Desktop responsive. WiFi routers or broadband internet is required for connecting to the internet for both users.

3.3 Software Interfaces

- **Os -** Windows 8 and above

Front-end Development and Design

- **React Js** - a fast and efficient JavaScript library used for developing the front end of any web-based system.
- **Tailwind CSS** - It has so many features that can make the system eye-catching and responsive to all kinds of devices.
- **Figma** - Is mainly used for designing and prototyping the front view of any system or application.
- **Canva** - used for designing logos, thumbnails and other features that can be added to the system.

Back-end Development

- **Node Js** - This is one of the fast, easy and secured JavaScript runtime Environments which can be used to build the back end of any system.
- **MongoDB** - used for database connectivity. It is easy and most secure No SQL database.
- **GraphQl** - used to access data from a database. Unlike Rest API GraphQl API is fast because it fetches only the required information.

3.4 Communications Interface

The system uses the Internet for fetching and transferring data. So a WiFi connection or Ethernet for local area networks is required for its functionality.

4. System Features

4.1 Functional Requirements

4.1.1.FR: - 01 Create account/service users

Id	FR:01
Introduction	The system shall allow the service users to create an account.
Description	The service users can create an account by adding their email and password with other additional information.
Inputs	First name, last name, email address, password, kebele, house number and profile image.
Preprocessing	None
Outputs	Service user's account will be created.
Error Handling	The system shall display error message for every invalid tasks.

Table 1: Functional requirement 01

4.1.2. FR: - 02 Create account/service providers

Id	FR:02
Introduction	The system shall allow the service providers to create an account.
Description	The the service providers can create an account by adding their email and password with other additional information.
Inputs	First name, last name, email address, password, kebele, company name and profession.
Preprocessing	None
Outputs	Service provider's account will be created.
Error Handling	The system shall display error message for every invalid tasks.

Table 2: Functional requirement 02

4.1.3. FR: - 03 Search utility services

Id	FR:03
Introduction	The system shall allow the service users to search for utility services.
Description	The the service users can search the utility service they want to pay from the available results on the system.
Inputs	Utility service name or service provider company name..
Preprocessing	FR:01
Outputs	Utility services will be found.
Error Handling	The system shall display appropriate error message if the service not found or other system problem happens.

Table 3: Functional requirement 03

4.1.4. FR: - 04 View utility information

Id	FR:04
Introduction	The system shall allow the service users to view their utility information.
Description	The service users can view their detailed utility information after their search is completed successfully.
Inputs	None
Preprocessing	FR:03
Outputs	Utility information will be displayed.
Error Handling	The system shall display an appropriate error message if there is no information or another loading error happens.

Table 4: Functional requirement 04

4.1.5. FR: -05 Pay utility cost

Id	FR:05
Introduction	The system shall allow the service users to pay for their utility costs.
Description	The service users can pay for their utility costs by selecting one from the provided payment methods.
Inputs	Payment method.
Preprocessing	FR:04
Outputs	Utility cost will be paid.
Error Handling	The system shall display an appropriate error message for each tasks.

Table 5: Functional requirement 05

4.1.6. FR: -06 View bill information

Id	FR:06
Introduction	The system shall allow the service users to view their utility payment information.
Description	The service users can view their payment information from the payment bill generated by the service provider. Also, they can print or download the bill information.
Inputs	None
Preprocessing	FR:05
Outputs	Payment bills will be viewed/downloaded/printed.
Error Handling	The system shall display an appropriate error message.

Table 6: Functional requirement 06

4.1.7. FR: -07 View past payment information

Id	FR:07
Introduction	The system shall allow the service users to view their past utility payment information.
Description	The service users can view their past payment information like payment date, amount, payment method and other related data.
Inputs	None
Preprocessing	FR:01
Outputs	Payment history will be displayed.
Error Handling	The system shall display an appropriate error message.

Table 7: Functional requirement 07

4.1.8. FR: -08 Update profile

Id	FR:08
Introduction	The system shall allow the service users to update or modify profile information.
Description	The service users can update their sign-up information except for their email and password.
Inputs	First name, last name, phone number, gender, kebele, house number and profile image.
Preprocessing	FR:01
Outputs	Profile information will be updated.
Error Handling	The system shall display an appropriate error message.

Table 8: Functional requirement 08

4.1.9. FR: -09 System administrator login

Id	FR:09
Introduction	The system shall allow the system administrator to login.
Description	The system administrator can login into the utility payment system to manage the whole operation.
Inputs	Username and password.
Preprocessing	None
Outputs	Logged in into the system.
Error Handling	The system shall display an appropriate error message.

Table 9: Functional requirement 09

4.1.10. FR: -10 Add customers utility information

Id	FR:10
Introduction	The system shall allow the service providers to add their customers utility information.
Description	The service providers can add detailed utility information for their customers. This information helps the customer to perform a payment.
Inputs	First name, last name, address, utility cost, phone number, house number, start date, end date.
Preprocessing	FR:02
Outputs	Utility information will be added.
Error Handling	The system shall display an appropriate error message.

Table 10: Functional requirement 10

4.1.11. FR: -11 Update customers utility information

Id	FR:11
Introduction	The system shall allow the service providers to add their customers utility information.
Description	The service providers can add detailed utility information for their customers. This information helps the customer to perform a payment.
Inputs	First name, last name, address, utility cost, phone number, house number, start date, end date.
Preprocessing	FR:02
Outputs	Utility information will be added.
Error Handling	The system shall display an appropriate error message.

Table 11: Functional requirement 11

4.1.12. FR: -12 View customers utility information

Id	FR:12
Introduction	The system shall allow the service providers to view their customers utility information.
Description	The service providers can display and view the utility information of their customers whenever they want.
Inputs	None
Preprocessing	FR:02
Outputs	Utility information will be displayed.
Error Handling	The system shall display an appropriate error message if there is a loading error or other system problem happens.

Table 12: Functional requirement 12

4.1.13. FR: -13 Delete customers utility information

Id	FR:13
Introduction	The system shall allow the service providers to delete their customers utility information.
Description	The service providers can delete the utility information of their customers whenever they think it is unwanted.
Inputs	Id number
Preprocessing	FR:02
Outputs	Utility information will be deleted.
Error Handling	The system shall display an appropriate error message if something happens to the deleting process.

Table 13: Functional requirement 13

4.1.14. FR: -14 View data analysis

Id	FR:14
Introduction	The system shall allow the service providers to view their data analysis.
Description	The service providers can view the data analysis about their payment statistics, their customers and other data done by the system.
Inputs	None
Preprocessing	FR:02
Outputs	The analyzed data will be displayed.
Error Handling	The system shall display an appropriate error message.

Table 14: Functional requirement 14

4.1.15. FR: -15 Generate payment bill

Id	FR:15
Introduction	The system shall allow the service providers to generate a payment bill for their customers.
Description	The service providers can generate payment bill for their customers who accomplish their payment process.
Inputs	Receipt number, company phone number, officer name, street address, date, city and sign code.
Preprocessing	FR:02, FR:05
Outputs	The payment bill will be generated.
Error Handling	The system shall display an appropriate error message.

Table 15: Functional requirement 15

4.1.16. FR: -16 Activate/deactivate account

Id	FR:16
Introduction	The system shall allow the system administrator to activate/deactivate accounts.
Description	The system administrator can activate/deactivate the accounts of both service users and service providers when needed.
Inputs	None
Preprocessing	FR:09
Outputs	The payment bill will be generated.
Error Handling	The system shall display an appropriate error message.

Table 16: Functional requirement 16

4.1.17. FR: -17 Change password/service users

Id	FR:17
Introduction	The system shall allow the service users to change their password.
Description	The service users can change their password if they forget it or even they think it is week.
Inputs	Username and password.
Preprocessing	FR:01
Outputs	The password will be changed.
Error Handling	The system shall display an appropriate error message.

Table 17: Functional requirement 17

4.1 Use Cases

4.1.1 Use case diagram

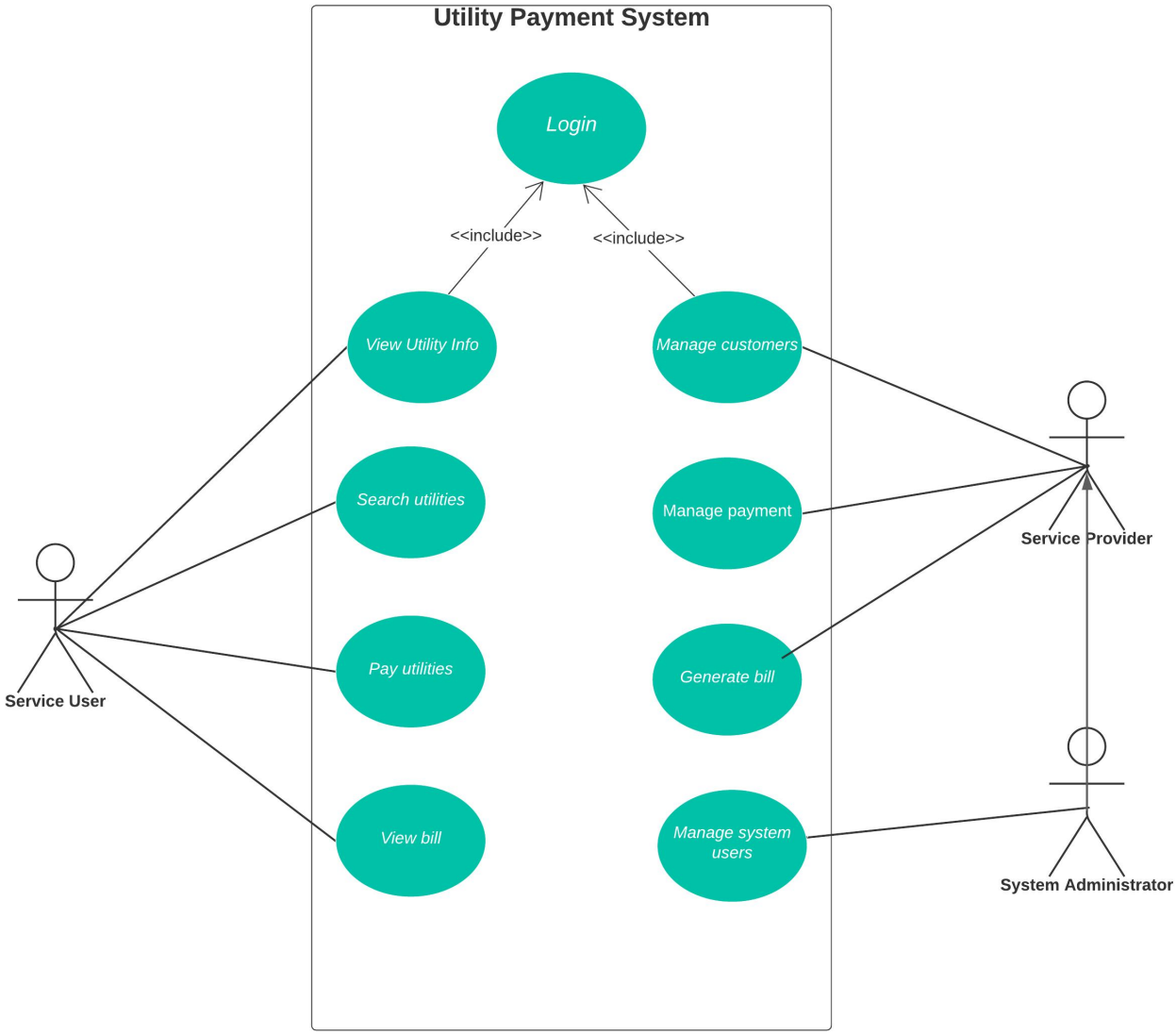

Figure 15: Use-case Diagram

4.1.2 Use cases

4.1.2.1 Use Case #1: Login

Name	UC: 01 Login
Description	Actors logged in into the system.
Actors	System administrator, service users, and service providers
Precondition	Login page successfully loaded.
Main flow of events	1. The user enter login information. 2. The user clicks the sign in button 3. The system checks the entered information are valid or not. 4. The system displays successfully logged in message or Invalid input if the information is not valid.
Extension	1) If username and password are not compatible the system displays 'username and password are not compatible' message 2) Reload the login page,
Post-Condition	A user logged in.

Table 18: Use case 01

4.1.2.2 . Use Case #2: Search for utility

Name	UC: 02 Search utilities
Description	Service users search utilities.
Actors	Service users
Precondition	UC: 01
Main flow of events	1. The service user enter the utility name or providers company name on the search bar. 2. The system automatically takes the information from the search bar and checks if there is related utilities to his id in the database. 3. The system display the available utilities or the error message if there is no related information or loading error happens.
Extension	1) If there is no utilities related to his id the system displays ‘ no available utility’ message 2) If the user is not recognized by the system ‘you are not recognized’ message 3) If there is loading error the system displays ‘loading error’ message
Post-Condition	Utilities will be found.

Table 19: Use case 02

4.1.2.3 Use Case #3: Pay for utilities

Name	UC: 03 Pay for utilities
Description	Service users pay for their utilities.
Actors	Service users
Precondition	UC: 02
Main flow of events	1. The service user clicks the Go To Payment button. 2. The system loads the payment page. 3. The service user selects payment methods and click pay button. 4. The system checks the payment process. 5. The system displays 'Payment successful' message with two buttons(See bill info and back) if the process is successful and error message if payment is not successful.
Extension	1) If the system accepts bad response for the payment request it displays 'the payment is not successful try again' message 2) If there is connection error the system displays 'connection problem' message
Post-Condition	Utilities will be paid.

Table 20: Use case 03

4.1.2.4 . Use Case #4 Add customers utility information

Name	UC: 04 Add customers utility information
Description	Service providers add their customers utility information.
Actors	Service providers
Precondition	UC: 01
Main flow of events	1. The service providers clicks the Add utility information from the list. 2. The service provider enter the information and click the Add button. 3. The system displays 'successfully added' message if the user added and 'user not added' message if not.
Extension	1) If the information is invalid the system displays 'invalid input' message 2) If connection error happens the system displays 'Network error' message.
Post-Condition	Utilities information will be added.

Table 21: Use case 04

4.1.2.5 : Use Case #5 Manage customers utility information

Name	UC: 05 Manage customers utility information
Description	Service providers manage their customers utility information.
Actors	Service providers
Precondition	UC: 01
Main flow of events	1. The service providers search(by id) the service user they want to manage. 2. The service providers clicks one from the View, Update and Delete buttons. 3. The system displays a specific user information if the View button is clicked, it displays the form used to update information if Update button clicked, the Pop up window that request to confirm delete action if Delete button clicked. 4. The system displays 'successfully added/deleted/updated' message if the user added/deleted/updated and 'user not added/deleted/updated' message if not.
Extension	1) If the id is not not found 'user not known' message 2) If connection error happens the system displays 'Network error' message. 3) If the updated information is not valid system displays 'Invalid input' message.
Post-Condition	Utilities information will be managed.

Table 22: Use case 05

4.1.2.6 . Use Case #6 Generate/Send payment bill

Name	UC: 06 Generate/Send payment bill
Description	Service providers generate payment bill for their customers.
Actors	Service providers
Precondition	UC: 03
Main flow of events	1. The service providers search(by id) the service user they want to manage. 2. The service providers clicks Generate Bill button, enter the information on the pop up form and click Generate button. 3. The system takes the information from the form, generate the bill for that specific service user and display the generated bill with the Send button on the new pop up window if there is no error or display the error message. 4. The service providers see the generated bill and if there is no error click the send button. 5. The system sends the bill to that specific service user and display 'bill successfully send' message if the bill is send or 'unable to send' message if error happens.
Extension	1) If the id is not not found 'user not known' message 2) If connection error happens the system displays 'Network error' message. 3) If the entered information is not valid system displays 'Invalid input' message.
Post-Condition	Payment bill will be Generated/Send.

Table 23: Use case 06

4.1.2.7 . Use Case #7 Manage system users account

Name	UC: 07 Manage system users account
Description	System administrator manage all system users.
Actors	System administrator
Precondition	UC: 01
Main flow of events	1. The system administrator navigates to the Manage user page and select the user account. 2. The system administrator clicks the activate/deactivate buttons. 3. The system checks the conditions and activate/deactivate the users account. 4. The system displays 'user account activated/deactivated' message if there is no error and 'account not activated/deactivated' message if error happens.
Extension	1) If the user account respects all the systems policies and the administrator tries to deactivate the account the system displays 'These account is legal do you really want to deactivate?' message with two yes and no button . And if the user account not respects the policies and the administrator tries to activate the system displays 'these account is illegal do you really want to activate?' message with yes and no button
Post-Condition	User account will be Activated/Deactivated

Table 24: Use case 07

4.2 ER Diagram

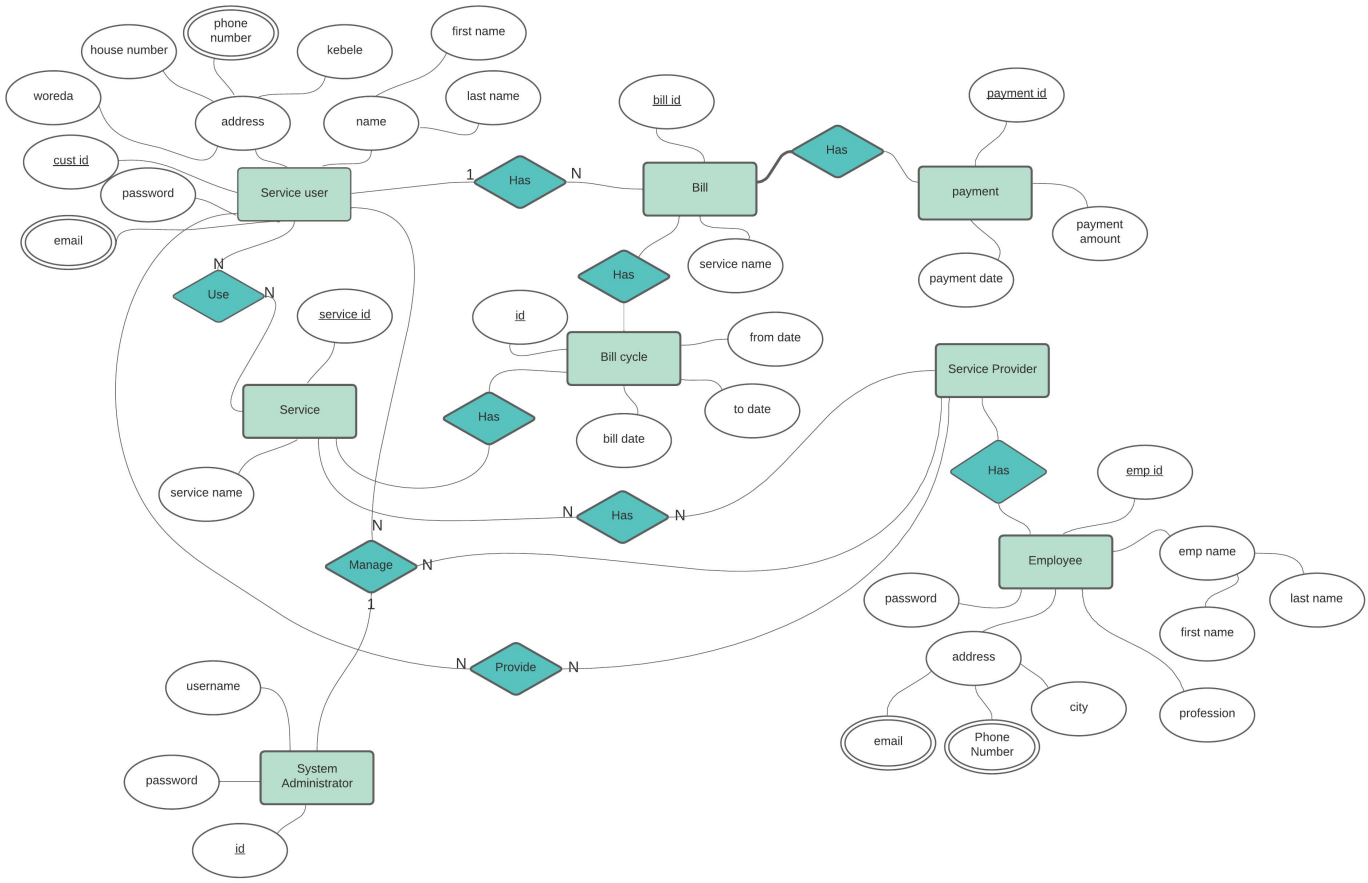

Figure 16: ER diagram

5. Other Nonfunctional Requirements

5.1 Performance Requirements

- Each page must load within 2 seconds.
- Users shall be prompted to provide an electronic signature before loading a new page.
- The log in information shall be verified within five seconds.
- The process must finish in 10 minutes.
- The system must provide service 5000 people at a time.
- User interface screen will response within 5 seconds

5.2 Safety Requirements

For this utility payment system, we will use different safety mechanisms like using a strong password for both the service providers and their customers, backup user's data, encryption and decryption, encoding all user-supplied output and other mechanisms. Failures may occur at any time. Those may cause damage to the whole system or some part of the system. In that situation those safety tools control or minimize damage. For example, if damage happens to the database, the recovery method restores a previous copy of the database.

5.3 Security

System administrators, service providers and service users will be able to login in this utility payment system. Each has unique login tokens, so the system can tell who is currently logged in. Customers will access the database for read operations like to see their utility information, profiles and other payment-related data. no one can edit records or sensitive data except the system administrator. Access to the various subsystems will be protected by a user login that requires a username and password.

5.4 Software Quality Attributes

This system will be developed in such a way, that Administrators, service users and other customers can access the system but their access level is different. The system will give appropriate output for a given input. This system uses much less resources and time to achieve a particular task. The system will have the ability to add new features and handle them, which means it is adaptable to change and will be available all the time. Our system runs on Windows 7

and above. And It includes the concept of adaptability, availability, Stability, Flexibility, Efficiency, Portability, and Correctness.

5.5 Business rules

- The agreement should be done before the software process is started or before designing and implementation are started.
- The warranty for software maintenance would be two years.
- Applying customer discount.
- Want take responsibility of failures due to hardware malfunctioning.
- The customer will pay Additional payments for further maintenance.
- The warranty will be disqualified, if an error is occur due to the customers wrong action.

6. Other Requirements

6.1 Training related requirements

This system has user interface which is user friendly and easy to use. But additionally it includes a help page that trains and gives step by step guide to new customers about how to use the system.

6.2 Change Management

The system users may bring some modifications and problems after deployment. The team analyzes the cost and essentiality of the maintenance. After the analysis, if it is crucial and the cost to make maintenance is not much the team will decide to do maintenance.