ELECTRICITY BILLING SYSTEM

A Project Work

Submitted in the partial fulfillment for the award of the degree of

BACHELOR OF ENGINEERING

IN

ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING

Submitted by:

KAAMYA SARDA

19BCS6098

Under the Supervision of:

PRAMOD VISHWAKARMA

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
APEX INSTITUE OF TECHNOLOGY

CHANDIGARH UNIVERSITY, GHARUAN, MOHALI - 140413,
PUNJAB

MAY 2021

DECLARATION

I, **Kaamya Sarda** student of "**Bachelor of Engineering in Computer Science and Engineering - ARTIFICIAL INTELLIGENCE & MACHINE LEARNING" session: 2019-2023 ,** Department of Computer Science and Engineering, Apex Institute of Technology, Chandigarh University, Punjab, hereby declare that the work presented in this Project Work entitled '**Electricity Billing System'** is the outcome of our own bonafide work and is correct to the best of our knowledge and this work has been undertaken taking care of Engineering Ethics. It contains no material previously published or written by another person nor material which has been accepted for the award of any other degree or diploma of the university or other institute of higher learning, except where due acknowledgment has been made in the text.

Date: May 13, 2021

Place: Chandigarh University

KAAMYA SARDA

19BCS6098

\

ABSTRACT

Electricity consumers are often faced with the problem of inaccuracy and delay in monthly billing due to some drawbacks. Thus, it is essential to have an efficient system for such purposes via electronic platform with consideration to proximity. The proposed system automates the conventional process of paying electricity bill by visiting the Electricity Board which is tiresome and time consuming. It is also designed to automate the electricity bill calculation and payment for user convenience. The system is developed with Java swings as the base programming language which can be used to develop websites, web applications and web services. The Microsoft Structured Query Language (SQL) server is also used for creating back-end database. The system would be having two logins: the administrative and user login. The administrator can view the user's account details and can add the customer's information of consuming units of energy of the current month in their account. The Admin must feed the system with the electricity usage data into respective user's account. The system then calculates the electricity bill for every user and updates the information into their account every month. Users can then view their electricity bill and pay before the month end.

ACKNOWLEDGEMENT

A project is a job of great enormity and it can‟t be accomplished by an individual all by them. Eventually, we are grateful to several individuals whose professional guidance, assistance and encouragement have made it a pleasant endeavour to undertake this project.

It gives us great pleasure in expressing our deep sense of gratitude to our respected Founder Chairman **,** for having provided us with great infrastructure and well-furnished labs.

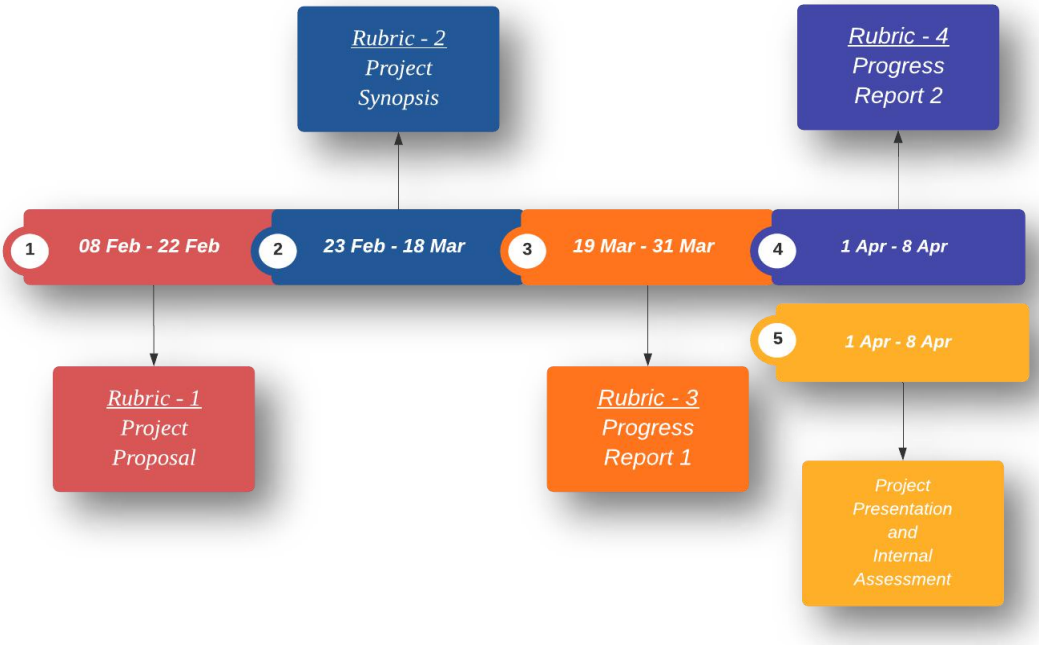
Guidance and deadlines play a very important role in successful completion of the project on time. We also convey our gratitude to our internal project guide, **PRAMOD VISHWAKARMA,** for having constantly guided and the development of the project.

Finally, a note of thanks to the Department of Computer Science Engineering, both teaching and non-teaching staff for their co-operation extended to us. We thank our parents for their constant support and encouragement. Last, but not the least, we would like to thank our peers and friends.

Table of Contents

LIST OF FIGURES

GAANT CHART


Rubric - 2
Project
Synopsis
Rubric - 4
Progress
Report 2
1
08 Feb - 22 Feb
2
23 Feb - 18 Mar
3
19 Mar - 31 Mar
4
1 Apr - 8 Apr
5
1 Apr - 8 Apr
Rubric - 1
Project
Proposal
Rubric - 3
Progress
Report 1
Project
Presentation
and
Internal
Assessment

INTRODUCTION

Problem Definition

Electricity Billing System is a software-based application.

i. This project aims at serving the department of electricity by computerizing the billing system.

ii. It mainly focuses on the calculation of units consumed during the specified time and the money to be charged by the electricity offices.

iii. This computerized system will make the overall billing system easy, accessible, comfortable, and effective for consumers.

To design the billing system more service oriented and simple, the following features have been implemented in the project. The application has high speed of performance with accuracy and efficiency.

The software provides facility of data sharing, it does not require any staff as in the conventional system. Once it is installed on the system only the meter readings are to be given by the admin where customer can view all details, it has the provision of security restriction.

The electricity billing software calculates the units consumed by the customer and makes bills, it requires small storage for installation and functioning.

The system excludes the need of maintaining paper electricity bill, administrator does not have to keep

a manual track of the users, users can pay the amount without visiting the office. Thus, it saves human efforts and resources.

Project Overview/Specifications:

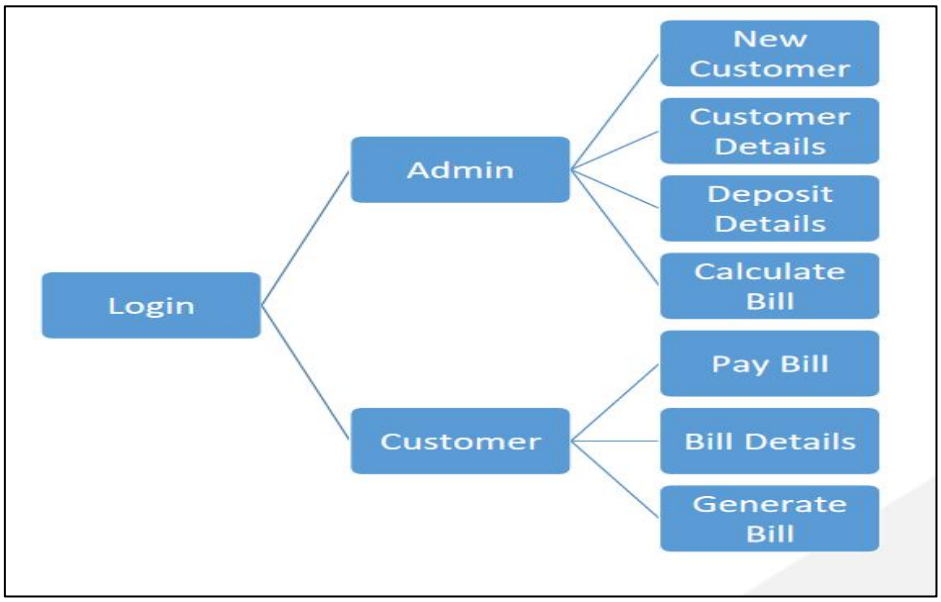


fig1.1(Block Diagram)

The main aim of our project is to satisfy the customer by saving their time by the online payment process, showing bill details, and allowing them to generate their detailed bill. The admin module covers the addition of new customer, keeping record of customers, their deposit details and calculate their bill.

Modules

Login:

This module allows customer and admin to login using their credentials. If the entered credentials are correct, then the login will be successful otherwise need to be signup with the meter_no which is given by admin.

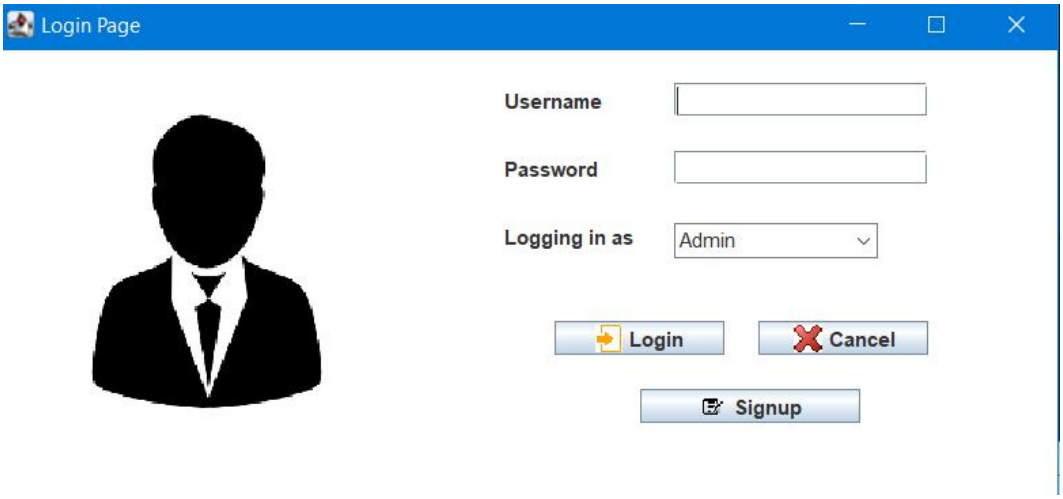


fig1.2(Login)

Sign Up :

The customer can sign-up and create their account for bill payment using meter no.

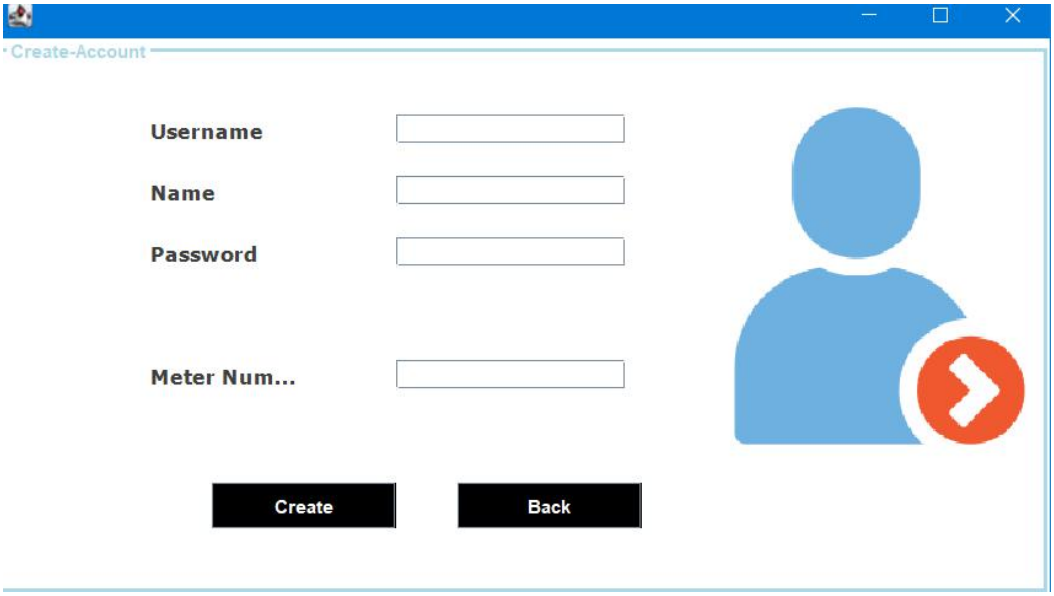


fig1.3(Sign-Up)

New Customer:

This module allows admin to add new customer .

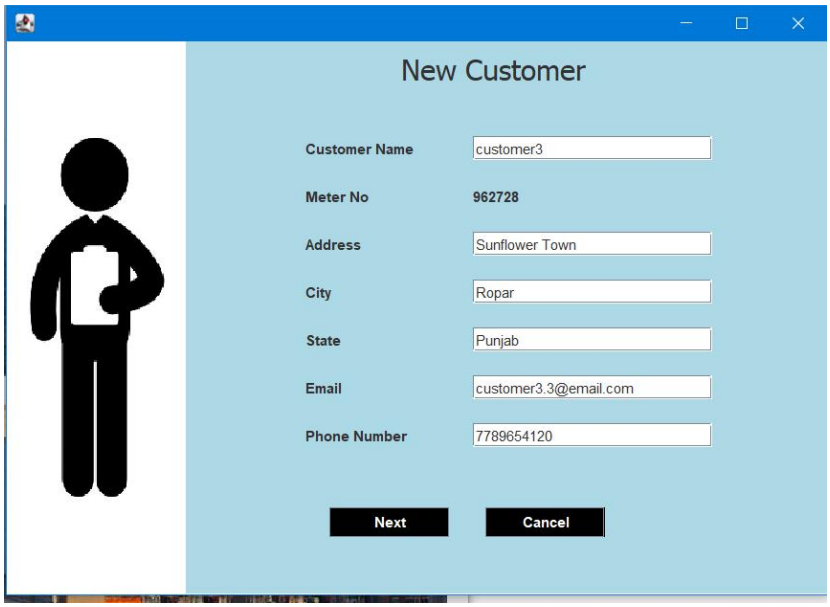


fig1.4(New Customer)

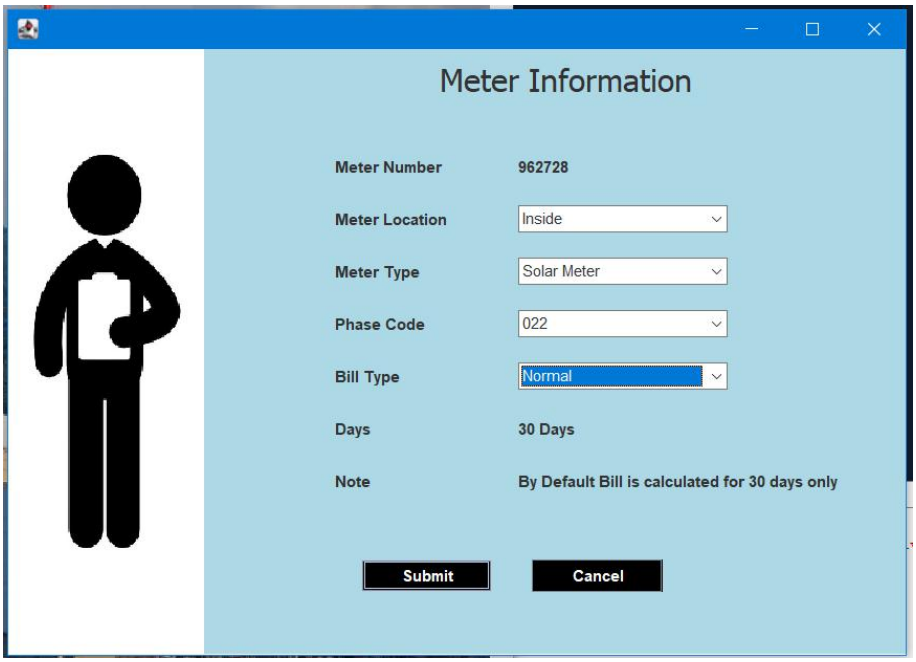


fig1.5(Meter Details)

Customer Details:

This module shows details of the customer to admin.

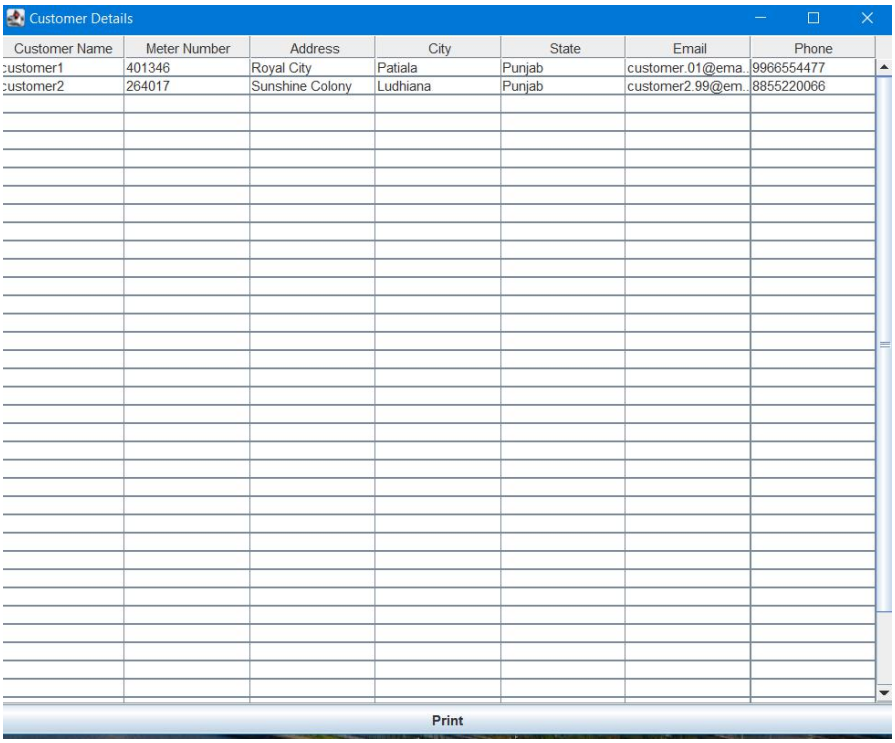


fig1.6(Customer Details)

Deposit Details:

This module shows the the paid/unpaid status of all customer's paid.

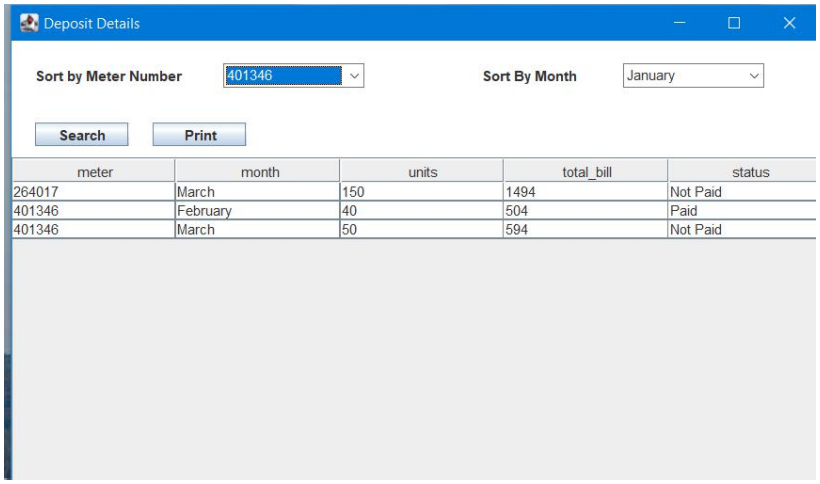


fig1.7(Customer Deposit Details)

Calculate Bill:

This module allows admin to calculate the bill of user by entering the meter readings.

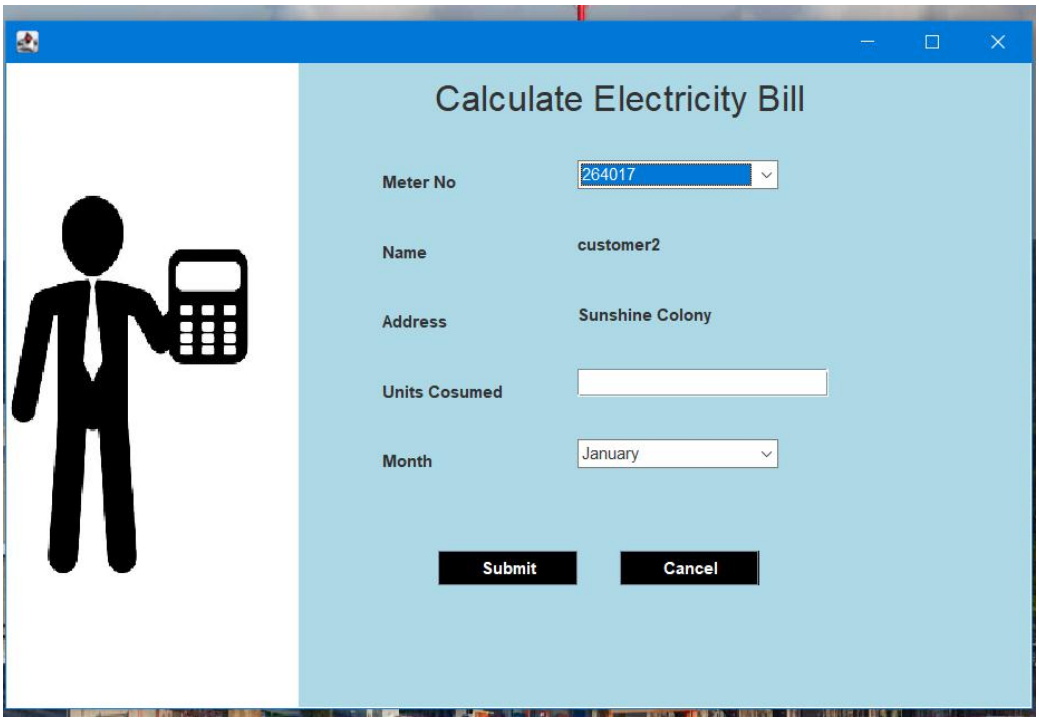


fig1.8(Calculate Bill)

Pay Bill:

This module allows user to pay their monthly bill.

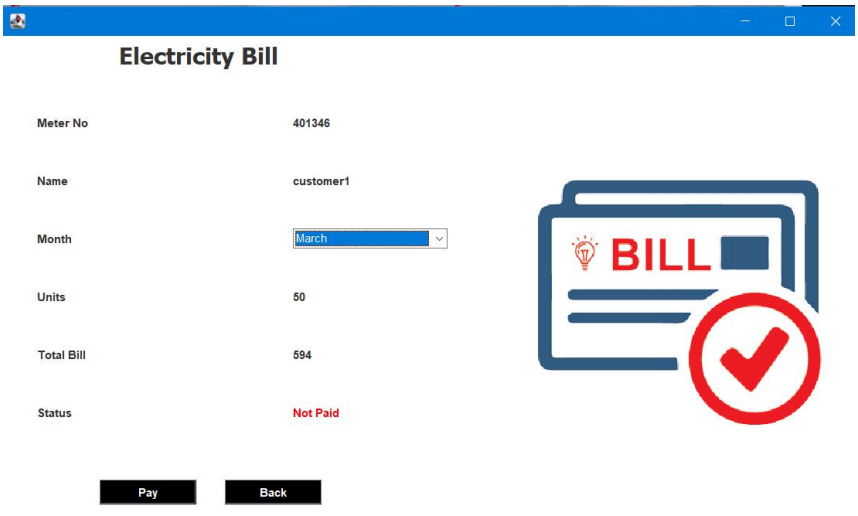


Fig1.9(Pay Bill)

Paytm:

Payment gateway

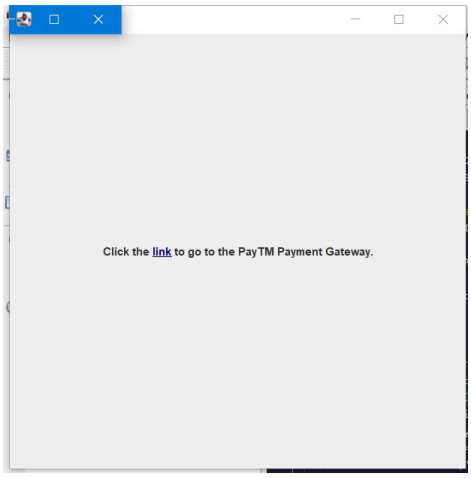


Fig1.10(Paytm gateway link window)

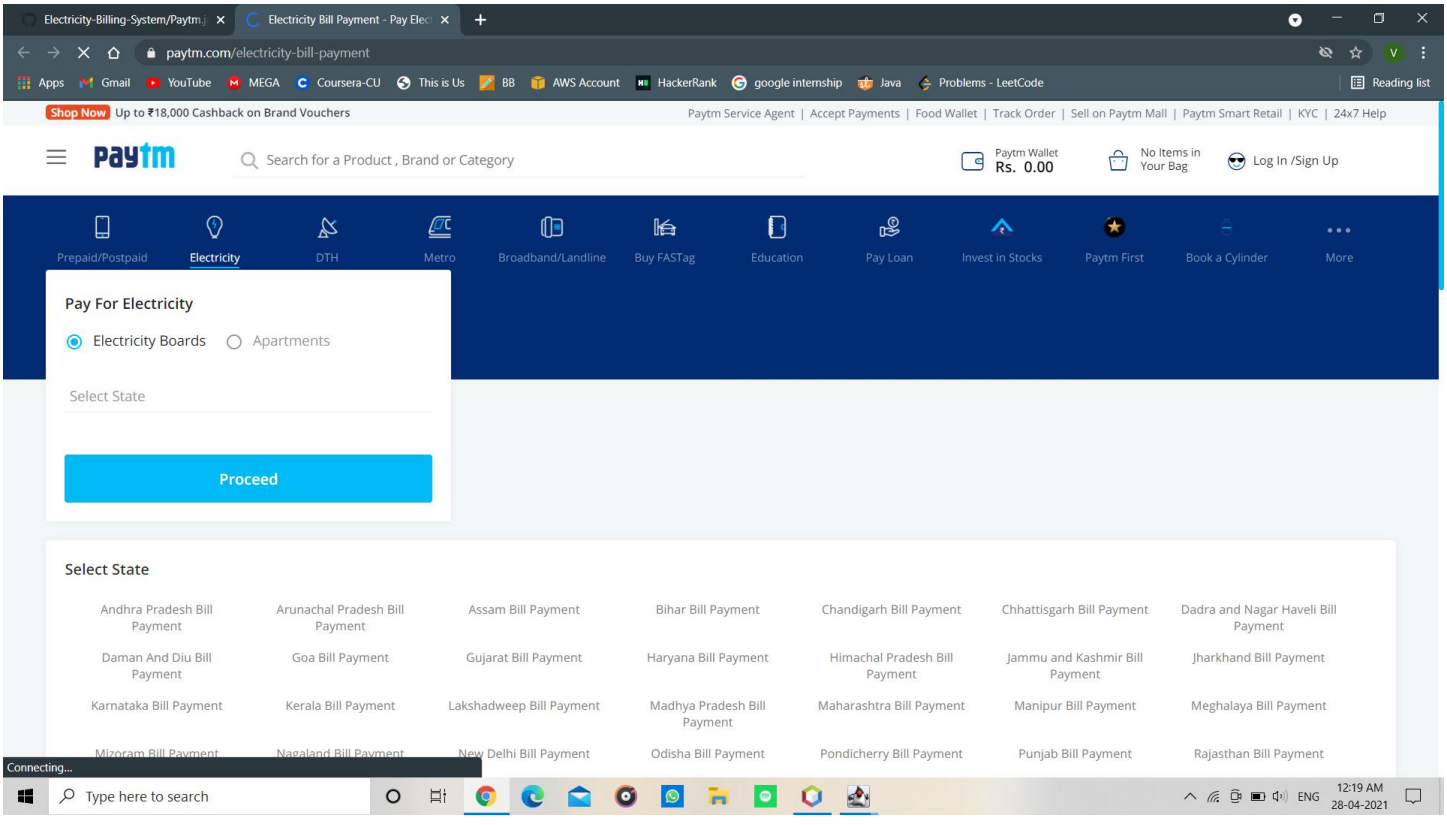


Fig1.11(Paytm)

Bill Details:

This module display the monthly bill and its status to user.

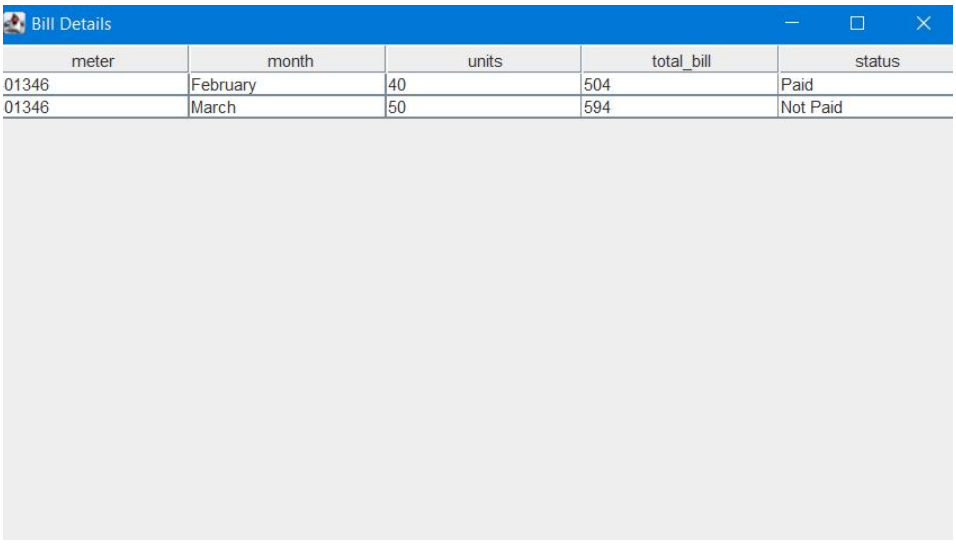


fig1.12(Monthly Bill Status)

Generate Bill:

This module gives the detailed bill to the customer.

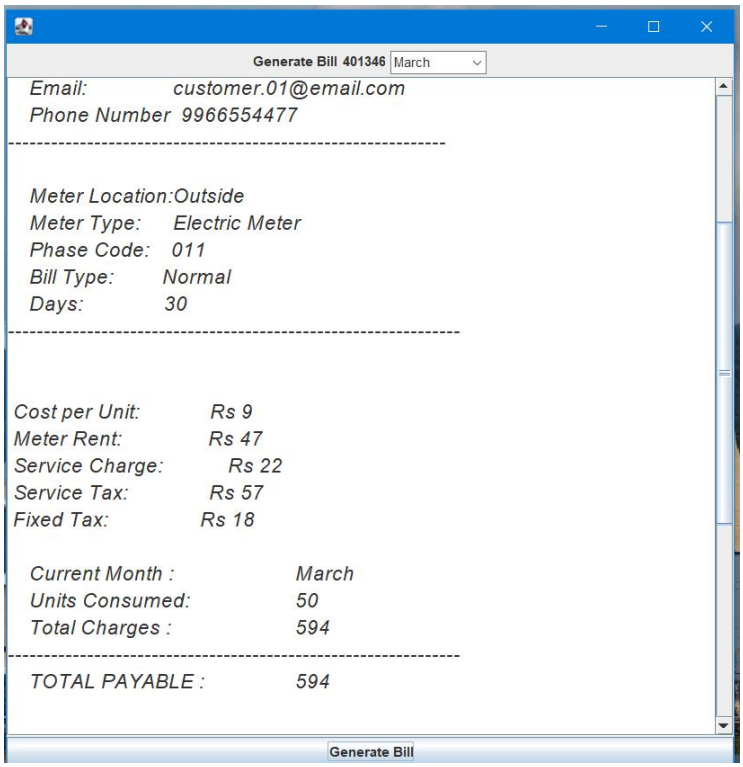


fig1.13 (Bill details)

Project:

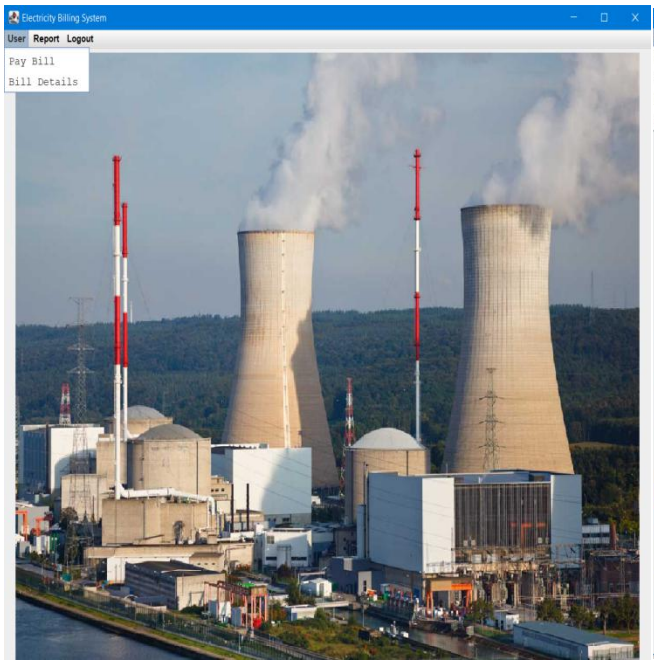


fig1.14(Customer Display window)

fig1.15 (Admin Display Window)

Database:

MySQL database management system is used to store the information of customer and customer details. It consists of five tables:

```
mysql> show tables;
+------------------+
| Tables_in_project |
+------------------+
| bill             |
| customer         |
| login            |
| meter_info       |
| tax              |
+------------------+
5 rows in set (0.03 sec)
```

Fig1.16(tables)

Bill: This table stores the bill details of customer.

```
mysql> desc bill;
+------------+-------------+------+-----+---------+-------+
| Field      | Type        | Null | Key | Default | Extra |
+------------+-------------+------+-----+---------+-------+
| meter      | varchar(20) | YES  |     | NULL    |       |
| month      | varchar(20) | YES  |     | NULL    |       |
| units      | varchar(20) | YES  |     | NULL    |       |
| total_bill | varchar(20) | YES  |     | NULL    |       |
| status     | varchar(20) | YES  |     | NULL    |       |
+------------+-------------+------+-----+---------+-------+
5 rows in set (0.02 sec)
```

Fig1.17(description of table-bill)

Customer: This table stores customer details.

```
mysql> desc customer;
+---------+-------------+------+-----+---------+-------+
| Field   | Type        | Null | Key | Default | Extra |
+---------+-------------+------+-----+---------+-------+
| name    | varchar(30) | YES  |     | NULL    |       |
| meter   | varchar(20) | YES  |     | NULL    |       |
| address | varchar(50) | YES  |     | NULL    |       |
| city    | varchar(20) | YES  |     | NULL    |       |
| state   | varchar(30) | YES  |     | NULL    |       |
| email   | varchar(30) | YES  |     | NULL    |       |
| phone   | varchar(20) | YES  |     | NULL    |       |
+---------+-------------+------+-----+---------+-------+
7 rows in set (0.00 sec)
```

Fig 1.18(description of table-customer)

Login: This table stores login credentials.

```
mysql> desc login;
+----------+-------------+------+-----+---------+-------+
| Field    | Type        | Null | Key | Default | Extra |
+----------+-------------+------+-----+---------+-------+
| meter_no | varchar(20) | YES  |     | NULL    |       |
| username | varchar(30) | YES  |     | NULL    |       |
| name     | varchar(30) | YES  |     | NULL    |       |
| password | varchar(30) | YES  |     | NULL    |       |
| user     | varchar(30) | YES  |     | NULL    |       |
+----------+-------------+------+-----+---------+-------+
5 rows in set (0.00 sec)
```

Fig1.19(Description of table-login)

Meter_info: Stores meter info of customers.

```
mysql> desc meter_info;
+----------------+-------------+------+-----+---------+-------+
| Field          | Type        | Null | Key | Default | Extra |
+----------------+-------------+------+-----+---------+-------+
| meter_number   | varchar(20) | YES  |     | NULL    |       |
| meter_location | varchar(20) | YES  |     | NULL    |       |
| meter_type     | varchar(20) | YES  |     | NULL    |       |
| phase_code     | varchar(20) | YES  |     | NULL    |       |
| bill_type      | varchar(20) | YES  |     | NULL    |       |
| days           | varchar(20) | YES  |     | NULL    |       |
+----------------+-------------+------+-----+---------+-------+
6 rows in set (0.00 sec)
```

Fig1.20(description of table-meter_info)

Tax: Stores tax details.

```
mysql> desc tax;
+----------------+-------------+------+-----+---------+-------+
| Field          | Type        | Null | Key | Default | Extra |
+----------------+-------------+------+-----+---------+-------+
| cost_per_unit  | varchar(20) | YES  |     | NULL    |       |
| meter_rent     | varchar(20) | YES  |     | NULL    |       |
| service_charge | varchar(20) | YES  |     | NULL    |       |
| service_tax    | varchar(20) | YES  |     | NULL    |       |
| fixed_tax      | varchar(20) | YES  |     | NULL    |       |
+----------------+-------------+------+-----+---------+-------+
5 rows in set (0.00 sec)
```

Fig1.21(description of table-tax)

Hardware Specification: -

- Processor Intel Pentium V or higher
- Clock Speed: -1.7 GHz or more
- System Bus: -64 bits
- RAM: -16GB
- HDD: -2TB
- Monitor: -LCD Monitor
- Keyboard: -Standard keyboard
- Mouse: -Compatible mouse

Software Specification :-

- Operating System: -Windows 10
- Software: -Microsoft SQL Server
- Front End: -Java core/swings (NetBeans)
- Back End: -My SQL

LITERATURE SURVEY

Global Journals Inc. (USA) This paper examines the effectiveness of the electricity billing and payment system and its probable contribution to energy losses vis-à-vis the billing and payment system deployed by the telecommunication companies in rural mining communities in the Western Region of Ghana. We used field observations, interviewed respondents with both open-ended and structured questionnaires and literature survey to validate our conclusion. This study firmed up the following facts: over 50% of Electricity Company of Ghana's (ECG's) legal customers in most mining rural areas do not pay commensurable electricity bills every month for the power used; a heap of power customers (47% of respondents) are unmetered and 26% of respondents used power freely. The study also revealed that most rural folks are capable of paying their electricity bills without any external interventions for the reasons imbued in their business activities for livelihoods and the sums of money disbursed on mobile phone recharge cards. Finally, the installed metering and payment system for electricity consumption contributes immensely to the ECG's non-technical losses. Weighing the current costs of electricity production, this study provides real and premier foundation for future research on the type of energy metering and payment systems and energy policies to be adopted by developing countries.

H. G.Rodney Tan,C.H. Lee,V.H.Mok (Dec 2007) The development of a GSM automatic power meter reading (GAPMR) system is presented in this paper. The GAPMR system is consists of GSM digital power meters installed in every consumer unit and an electricity e-billing system at the energy provider side. The GSM digital power meter (GPM) is a single phase IEC61036 standard compliance digital kWh power meter with embedded GSM modem which utilize the GSM network to send its power usage reading using short messaging system (SMS) back to the energy provider wirelessly. At the power provider side an e-billing system is used to manage all received SMS meter reading, compute the billing cost, update the database, and to publish billing notification to its respective consumer through SMS, email, Web portal and printed postage mailing. A working prototype of the GAPMR system was build to demonstrate the effectiveness and efficiency of automatic meter reading, billing and notification through the use of GSM network.

T El-Djazairy, B J Beggs and I F Stewart (June 1997) This paper presents the results of an investigation which show that the development of the GSM network as a low cost, global carrier of digital

telecommunications signals provides exciting opportunities for novel applications such as the handling of power system metering and load management telemetry. As the use of GSM for telephony becomes more widespread, it is inevitable that costs will be driven lower, and it is also inevitable that this medium for the transfer of telemetry data.

P. K. Lee and L.L. Lai, Fieee (June 2007) In this paper, the authors discuss the way to adopt the cost effective GPRS applications. Although there have been lots of theories and concepts on the GPRS applications but the real applications applying to a large network, distributed power generation or building energy/power distribution monitoring are limited. The authors focus the application of the GPRS to this on-line system application and the techniques. A practical scheme is proposed and its use to real-life system will be introduced. A practical implementation for an wireless GPRS on-line Power Quality Monitoring System will be illustrated. Results and benefit to the end users in some practical applications will be discussed.

International Journal of Innovative Research in Science, Engineering and Technology (December 2018), This paper proposed and demonstrated Smart Energy Meter that the users will be able to monitor their current power consumptions (bill) anytime from anywhere by using their mobile phone via. This concept provides a cost efficient manner of electricity billing. The present energy billing systems are discrete, inaccurate, costly and slow. The major drawback of traditional billing system is power and energy theft. The GSM technology is used so that the consumer would receive messages about the consumption of power (in watts) and if it reaches the minimum amount, it would automatically alert the consumer to recharge.

Existing System

The conventional system of electricity billing is not so effective; one staff must visit each customer's house to note the meter readings and collect the data. Then, another staff must compute the consumed units and calculate the money to be paid. Again, the bills prepared are to be delivered to customers. Finally, individual customer must go to electricity office to pay their dues.

The manual system is suffering from a series of drawbacks. Since whole of the bills is to be maintained with hands the process of keeping and maintaining the information is very tedious and lengthy to customer. It is very time consuming and laborious process because, staff need to be visited the customers place every month to give the bills and to receive the payments. For this reason, we have provided features Present system is partially automated(computerized), existing system is quite laborious as one must enter same information at different places.

Hence, the conventional electricity billing system is uneconomical, requires many staffs to do simple jobs and is a lengthy process overall. In order to solve this lengthy process of billing, a web based computerized system is essential. This proposed electricity billing system project overcomes all these drawbacks with the features. It is beneficial to both consumers and the company which provides electricity.

Proposed System

To design the billing system more service oriented and simple, the following features have been implemented in the project. The application has high speed of performance with accuracy and efficiency.

The software provides facility of data sharing, it does not require any staff as in the conventional system. Once it is installed on the system only the meter readings are to be given by the admin where customer can view all details, it has the provision of security restriction.

The electricity billing software calculates the units consumed by the customer and makes bills, it requires small storage for installation and functioning. There is provision for debugging if any problem is encountered in the system.

The system excludes the need of maintaining paper electricity bill, administrator does not have to keep a manual track of the users, users can pay the amount without visiting the office. Thus, it saves human efforts and resources.

- This project system excludes the need of maintaining paper electricity bill as all the electricity bill records are managed electronically.

- Administrator doesn't have to keep a manual track of the users. The system automatically calculates fine.

- Users don't have to visit to the office for bill payment.

- There is no need of delivery boy for delivery bills to user's place.

- Thus, it saves human efforts and resources.

PROBLEM FORMULATION

The manual system is suffering from a series of drawbacks. Since whole of the bills is to be maintained with hands the process of keeping and maintaining the information is very tedious and lengthy to customer. It is very time consuming and laborious process because, staff need to be visited the customers place every month to give the bills and to receive the payments. The customer needs to stand in long queues for bill payment.

For this reason, we have provided features Present system is partially automated (computerized), existing system is quite laborious as one must enter same information at different places.

The online bill payment system is advantageous for both customer and service provider. The service provider now has all records in one place and can check the bill status of each customer . The customer has all bills and its details are in one place. They can pay the bill online and can generate a detailed receipt of monthly bill anytime they want.

OBJECTIVES

The objectives of our project are as follows:

- The manual meter reading and bill data entry process is automated.
- To reduce data collection costs.
- To improve meter reading accuracy.
- To enable faster, more efficient reading times and billing process.
- To improve customer service and enable conservation of resources.
- To provide accurate information to the customer
- To keep the information of the consuming unit of energy of current month.

METHODOLOGY

This project caters for consumers' bills and also enables the administrator to generate monthly reports. It is possible for the administrator to know the consumers have made payment in respect of their bills for the current month, thereby improving the billing accuracy, reducing the consumption and workload on the Electricity Board employees or designated staff, tariff scheduling and eliminates variation in bills based on market demand.

The following methodology will be followed to achieve the objectives :

- Gather data and knowledge about the previous approaches / existingmodels .
- Research regarding relevant domains and papers for enriching domainknowledge.
- Constitution of the dataset after cleansing raw data.
- Implementing Java Swing for making web pages.
- Adding dataset to those programs for working of the system.
- Adding additional functionalities to the system.
- Granting required access to user depending on whether they are admin ora consumer.

CONCLUSIONS AND DISCUSSION

After all the hard work is done for ELECTRICITY BILL MANAGEMENT SYSTEM is here. It is a software which helps the user to work with the billing cycles, paying bills, managing different DETAILS under which are working etc.

This software reduces the amount of manual data entry and gives greater efficiency.

The User Interface of it is very friendly and can be easily used by anyone.

It also decreases the amount of time taken to write details and other modules.

REFERENCES

Book Reference

Database Management Systems 3rd Edition by Raghu Ramakrishnan (TEXTBOOK).

Websites

- https://www.youtube.com/watch?v=iL_5MhKSSN0&list=PL5BFcXE899zxmT9vmSuleorXKrxjOOErp (Code for Interview YouTube Channel)
- http://www.github.com
- www.youtube.com
- www.stackoverflow.com
- www.google.com
- http://www.javatpoint.com/