A
PROJECT REPORT ON

"ELECTRICITY BILLING SYSTEM"

By

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PUNE – 43

A.Y. 2023-24

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1. PROBLEM STATEMENT:

Electricity billing system developed using Java and MySQL, offering accurate billing, online payment options, and a user-friendly interface for both consumers and administrators.

2. OBJECTIVE:

The objective of this work is to give a complete approach to the personnel billing system. This will be accomplished by developing and deploying an Electricity Billing System that will result in a significant shift in the way employee data is managed. This system's objectives include the following:

- To keep the information of Customer.
- To keep the information of consuming unit energy of current month.
- To keep the information of consuming unit energy of previous month.
- To calculate the units consumed every month regularly.
- To generate the bills adding penalty and rent.
- To save time by implementing payment process online.

The current manual electricity billing system is prone to errors, lacks efficiency, and lacks user-friendly features for consumers to manage their accounts. To address these issues, there is a need for an automated electricity billing system developed using Java and MySQL, offering accurate billing, online payment options, and a user-friendly interface for both consumers and administrators.

3. INTRODUCTION:

3.1 Background/context

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 have 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 the 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. The IntelliJ IDE is employed for the development and testing of the application.

The project's aim is to provide an efficient, user-friendly, and scalable solution that meets the industry requirement for electricity billing system and contributes to the overall growth and success of any organization.

3.2 Relevance

The Electricity Billing System is highly relevant in the context of the industry, which is experiencing rapid digital transformation. With the increasing demand for efficient and streamlined online services, there is a critical need for advanced technological solutions that can automate and simplify the management of various operations. By utilizing Core Java and MySQL, the project offers a robust and scalable software solution that enables users to effectively manage their operations, enhance customer satisfaction, and improve overall productivity. The use of Core Java facilitates the development of a user-friendly interface and efficient business logic, while MySQL provides a secure and reliable database management system for storing critical Customer and Admin data.

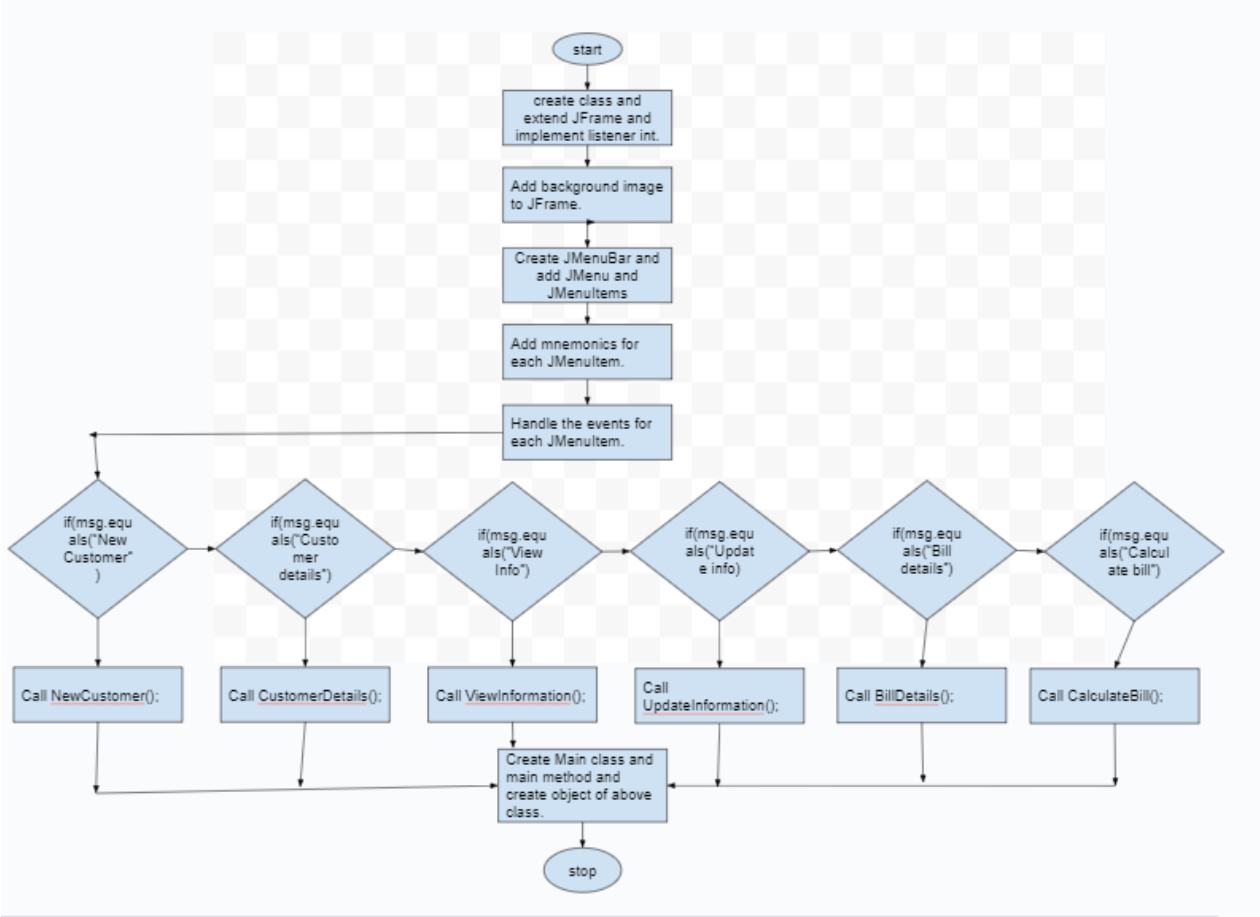
3.3 Project Details

- **Core Java:** Utilized for developing the front-end user interface and implementing the business logic of the Electricity Billing System.
- **MySQL Database:** Employed for secure and efficient data storage, management, and retrieval of user information, and other relevant data.
- **Intellij IDE:** Utilized as the integrated development environment for coding, testing, and debugging the application. Intellij provides a user-friendly interface and facilitates seamless development and deployment

3.4 Scope

The scope of the Electricity Billing System project is to automate and streamline the electricity billing process. It seeks to enhance accuracy, customer satisfaction, and data management while promoting transparency and compliance with regulations. The project's scope is to reduce fraud, support various billing models, and encourage energy conservation. Overall, it aims to empower utility companies with an efficient and adaptable billing system for the evolving energy industry.

4.Flow Chart and SOURCE CODE:



1. **Explanation of Algorithm or pseudocode of system:**

   - Start system.
   - Enter login name and password.
   - Click the login button.
   - Connect to database.
   - Query database to know whether user credentials are correct.
   - If not, deny access and return login page with an error message.
   - If correct, check if credentials for administrator.

- If yes, allow login
- Set admin session, re-direct administrator to admin login page
- If no, allow login set user session
- Re-direct user to user home page

2. Algorithm or pseudocode of admin:

To see source code:
https://github.com/Maitree0208/AJP_PBL_Electricity_Billing_System_AY23-24

- **Login:**

This program will allow the admin to enter the username and password.
If the entered credentials are correct, then the login will be successful otherwise need to be signup.
If admin forgets password, it can be retrieved by giving username and answer for security question.
After successful login the admin will be redirected to admin portal page where he/she can do following activities.

- **NewCustomer:**

This program will allow the admin to enter the customer details and automatically generates unique meter number.
If customer name, address, city, state, email and phone number is entered, insert the values into customer
else print error while next=true
enter the meter_info details else print meter_info error
Submit the details of customer that has been entered by clicking onto next button.
If we need to cancel the particulars that has been entered click onto cancel option.
If we need to submit the particulars that has been entered click onto submit option.

- **CustomerDetails:**

This program will allow the admin to view customer details.
If we need to print the particulars that has been viewed click onto print option.

- **DepositDetails:**

This program will allow the admin to view bill details. If we need to sort the particulars based on meter_no and month.
If we need to search the particulars that has been viewed click onto search option.
If we need to print the particulars that has been viewed click onto print option.

- **TaxDetails:**

This program will allow the admin to add tax details. Insert the values into tax else print error.Submit the details of tax that has been entered by clicking onto submit button.
If we need to cancel the particulars that have been entered, click onto cancel option.

- **CalculateBill:**

This program will allow the admin to calculate total_bill when units consumed are inserted where meter_no and month is selected.
insert the values into bill else print error
Submit the details of tax that has been entered by clicking onto submit button.
If we need to cancel the particulars that has been entered click onto cancel option.

- **DeleteBill:**

This Program will allow the admin to delete the customer info when meter_no is selected.
If we need to delete the particulars that has been saved click onto delete option.
If we need to cancel the particulars that has been entered click onto back option.

3. Algorithm or pseudocode of Customer:

Login:

This program will allow the customer to enter the username and password. 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.
If customer forgets password, it can be retrieved by giving username and answer for security question. After successful login the customer will be redirected to customer portal page where he/she can do following activities.

UpdateInfo:

This program will allow the customer to update the customer details. If customer address, city, state, email
and phone number is updated,
update the values into customer else print error
update the details of customer that has been updated by clicking onto update button.
If we need to cancel the particulars that has been updated, click onto back option.

ViewInfo:

This program will allow the customer to view his/her own details.
If we need to go back from the particulars that has been viewed click onto back option.

PayBill:
This program will allow the customer to view bill details and redirects to pay the bill where status will be updated.
If we need to cancel the particulars that has been viewed click onto back option.
If we need to pay the bill amount that has been viewed click onto pay option.

BillDetails:
This program will allow the customer to view bill details.
If we need to print the particulars that has been viewed click onto print option.

GenerateBill:
This program will allow the customer to generate bill when meter_no and month is selected.
Generate the details by clicking on generatebill button.

5.RESULT:

Frontend:

Fig.5.1: Splash page of Electricity Billing System

Fig.5.2: Login page

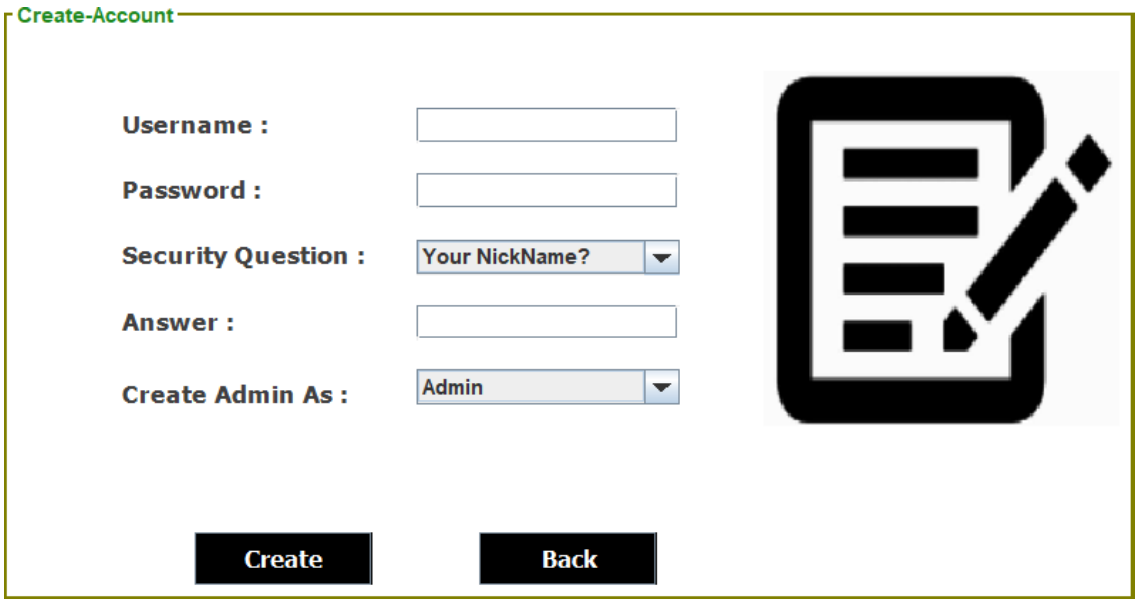


Fig.5.3: Signup page

Fig.5.4: Admin home page

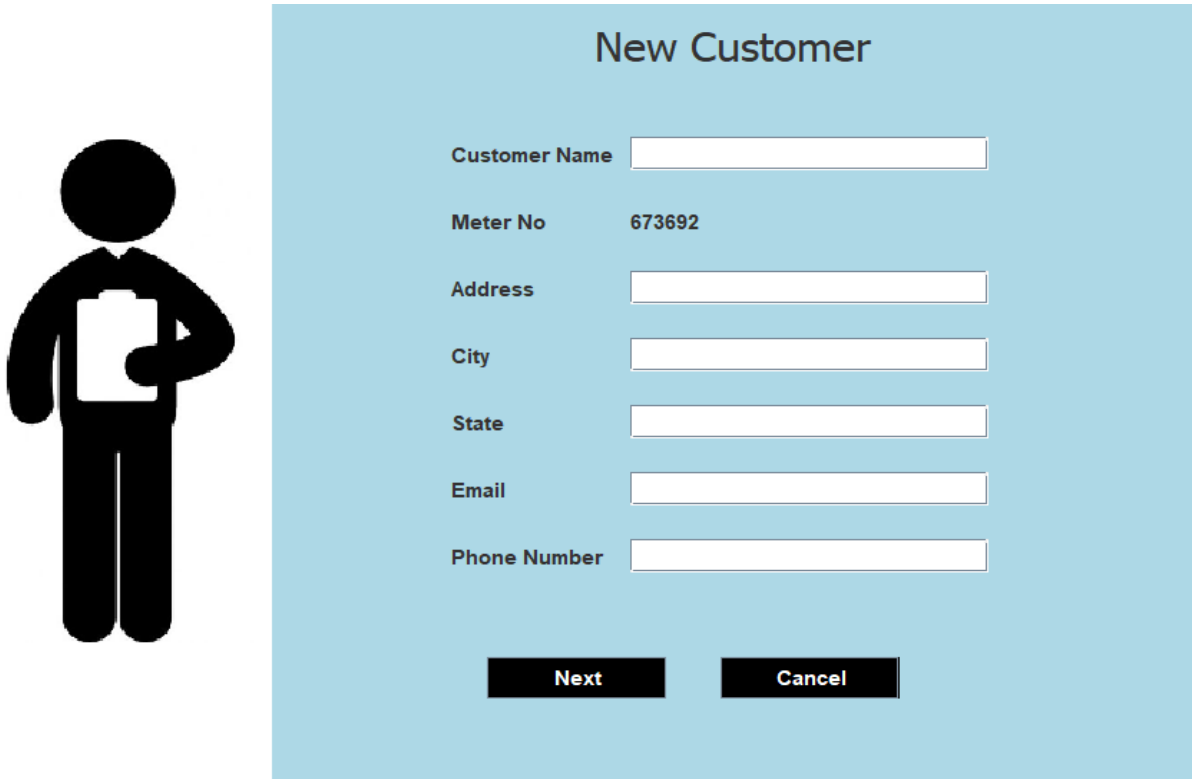


Fig.5.5: New customer page

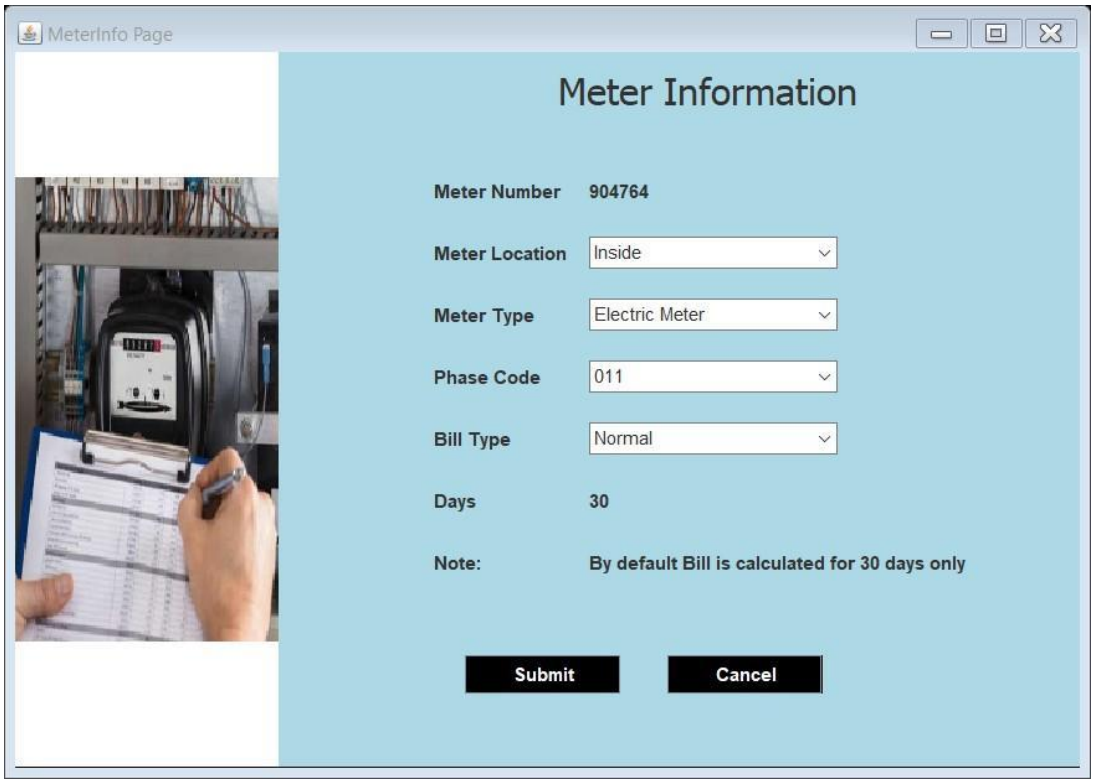


Fig.5.6: Meter Info page

Customer Name	Meter No	Address	City	State	Email	Phone Number
aki	413098	btm layout	bangalore	karnataka	aki@gmail.com	8989998888
sai	673692	btm	bangalore	karnataka	sai@gmail.com	8769998877

Print

Fig.5.7: Customer Details page

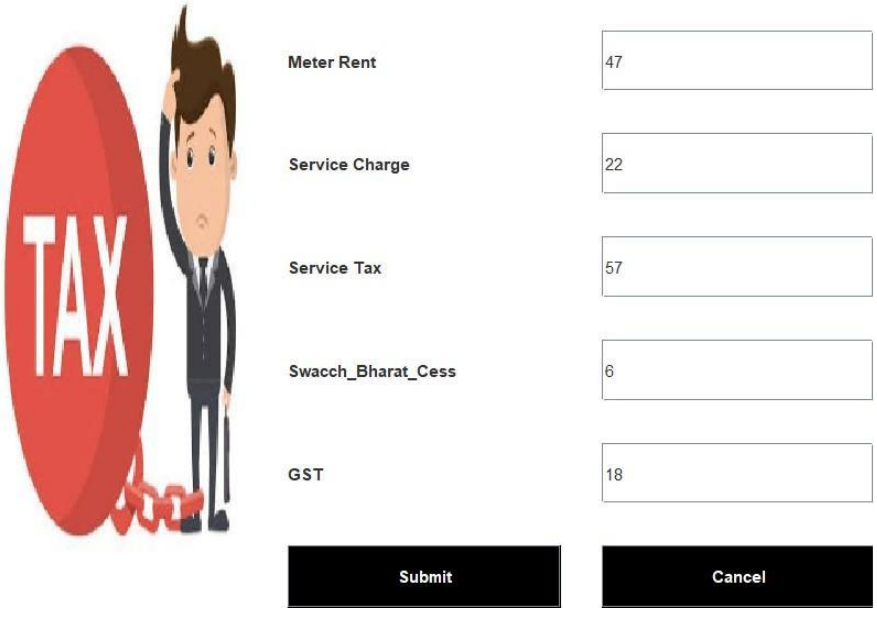


Fig.5.8: Tax Details page

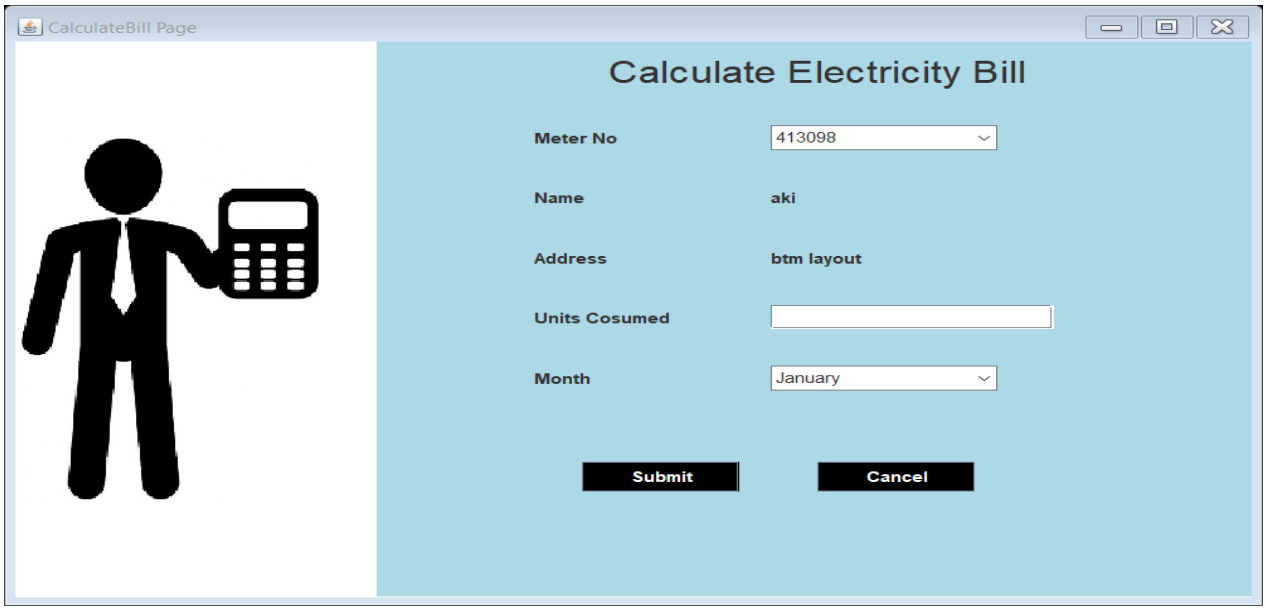


Fig.5.9: Calculate Bill page

Fig.5.10: Customer Home page

UPDATE CUSTOMER DETAILS

Name :	aki
Meter Number :	413098
Address :	btm layout
City :	bangalore
State :	karnataka
Email :	aki@gmail.com
Phone :	8989998888

Update Back

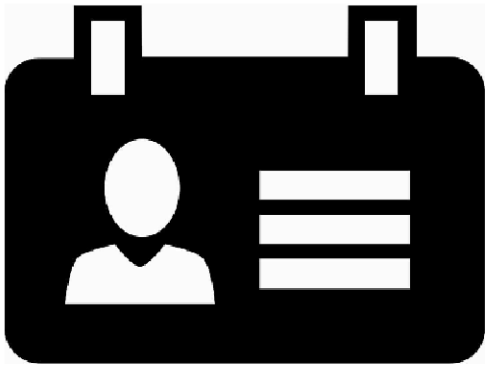


Fig.5.11: Update customer details page

VIEW CUSTOMER DETAILS

Name :	aki	State :	karnataka
Meter Number :	413098	Email :	aki@gmail.com
Address :	btm layout	Phone :	8989998888
City :	bangalore		

Back

Fig.5.12: View Customer Details page

Meter No	Month	Units	Total Bill	Status
413098	January	25	375	Paid

Print

Fig.5.13: Bill Details page

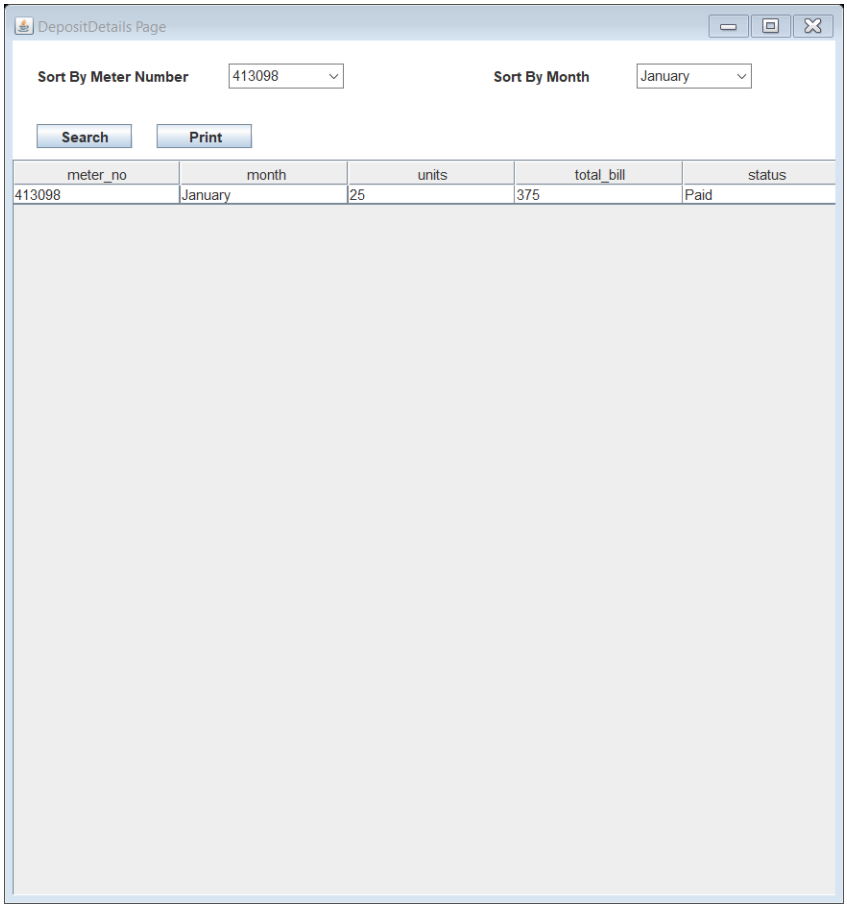


Fig.5.14: Deposit Details page

6. CONCLUSION:

In conclusion, the electricity billing system project has demonstrated the capability to streamline the billing process, enhance user convenience, and minimize errors in electricity billing. By leveraging Java for the application's front-end and MySQL for the backend database, we have created a robust and scalable solution that can be easily adapted and extended for future requirements. This project not only simplifies the billing process but also improves the overall efficiency of electricity management, thereby contributing to a more sustainable and consumer-friendly power distribution system.

7.APPLICATIONS:

The Java and MySQL-based electricity billing system successfully facilitates accurate billing, online payment, and user-friendly interface for both consumers and administrators. Rigorous testing ensured the system's reliability, performance, and security, making it a practical solution for efficient electricity management.

7.1.1 Database Design and Schema

The database schema was designed to store employee information including personal details, job history, performance records, and attendance.

Schema diagram of Electricity Billing System which has six tables:

1. Login - "meter_no”, "username”, “password”, "user”, "question”, "answer”.
2. Customer - "name”, "meter_no"(primary key), "address”, "city”, "state”, “email”, "phone”
3. Tax - "service_tax”, "swacch_bharat_cess”, "gst”.
4. Rent - attributes "cost_per_unit"(primary key), " meter_rent”, "service_charge".
5. Bill - "meter_no"(foreign key that references the primary key of the customer table meter_no), "month”, "units”,"total_bill”, "status”.
6. meter_info - "meter_no"(foreign key that references the primary key of the customer table meter_no), "meter_location”, "meter_type”, "phase_code”, " bill_type”, "days ".

The use of MySQL ensured data integrity and provided a reliable platform for managing large datasets.

7.1.2 User Interface and Functionality

The Java-based user interface provided an intuitive experience for users to perform operations such as adding new customers, updating information, and generating reports.
The system allowed for easy navigation and efficient data entry.

7.1.3 Data Operations

- **Adding Customer:** Here admin can add new customer to the customer list who started using electricity bill system.
- **Searching Deposit Details:** Here admin can search according to meter number and month to view deposit details.
- **Viewing Details:** Here admin and user can view customer details and about details.
- Adding Tax: Here admin can add tax details.
- **Updating Customer:** Here customer can update his/her details by using meter_no of the customer.
- **Delete Customer:** Here admin can delete details based on meter number.

7.1.4 Performance and Scalability

The use of MySQL contributed to the system's performance, with efficient querying and retrieval of data even as the dataset grew.
Thus, the system demonstrated scalability, handling a simulated increase in customer records without a significant decrease in performance.

7.1.5 Data Security

Measures were implemented to ensure data security, including encryption of sensitive information and role-based access control to restrict unauthorized access.

8. FUTURE SCOPE:

The electricity billing system project offers several avenues for improvement and expansion. To enhance the
system, consider implementing the following:

1. **Advanced GUI with AWT and Swing:**
   Enhance the user interface by incorporating advanced features of AWT and Swing to create a more visually appealing and user-friendly interface. Utilize components like tables, charts, and interactive graphs for better data visualization and user experience.

2. **Integration with Smart Meters:**
   Integrate the system with smart meters to allow for real-time monitoring of electricity usage, leading to more accurate billing. This can also enable consumers to receive notifications and alerts about their energy consumption.

3. **Multi-language Support:**
   Implement multi-language support to cater to a broader range of users, especially in regions with diverse language preferences.

4. **Data Analytics:**
   Utilize data analytics to generate insights from consumption data, helping the utility company make informed decisions and optimize energy distribution.

5. **Billing History and Usage Trends**:
   Provide consumers with detailed billing history and usage trends, enabling them to make informed decisions about their energy consumption.

9. COPY RIGHT AFFIRMATION:

We undersigned pledge and represent that the source code printed in this project report does not violate any proprietary or personal rights of others (including, without limitation, any copyrights or privacy rights); that the Work is factually accurate and contains no matter libelous or otherwise unlawful; that we have substantially participated in the creation of the Work and that it represents our original work sufficient for us to claim authorship.

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