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Easy Electricity Billing System

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Abstract: *Due to various issues, electricity users frequently deal with the issue of inaccurate and delayed monthly billing. For these reasons, having an effective system via an electronic platform that takes proximity into account is crucial. The laborious and time-consuming process of visiting the Electricity Board to pay an electricity bill is automated by the suggested method. For user convenience, it is also intended to automate the computation and payment of electricity bills. Java Swings, a foundational programming language for creating websites, online apps, and web services, is utilized in the development of the system. Back-end databases are also created using the Microsoft Structured Query Language (SQL) server. The administrator and user logins would be the two logins available on the system.*
The administrator can upload the customer's details regarding the energy units they consumed this month to their account and check the user's account data. Data about electricity usage must be entered into each user's account by the administrator. Next, each user's electricity cost is computed by the system, which then updates the data in their account each month. Once viewed, users can pay their electricity bill before the end of the month.

Keywords: Microsoft Structured Query Language

I. INTRODUCTION

The Easy Electricity Billing System operates on a software platform. By computerizing the billing system, this project seeks to assist the Department of Electricity. It is primarily concerned with calculating the number of units used within the allotted period and the amount of money that the electricity offices will charge. The entire billing method will be simple, accessible, efficient, and pleasant for customers thanks to this automated system.

The project now includes the following elements to help simplify and improve the service-oriented nature of the billing system. The application performs at a high rate of accuracy and efficiency. Unlike a traditional system, the software allows for data sharing without the need for staff. It features security restrictions and, once put on the system, the admin alone is responsible for providing the meter readings, while the consumer can examine all details.

The electricity billing software creates bills and computes the customer's use in units; installation and operation require a small amount of storage. In the event that the system has an issue, debugging is possible. The technology eliminates the need for administrators to manually keep track of customers, eliminates the need for paper electricity bills, and allows users to make payments without having to come into the office. As a result, it conserves resources and human labor. A vital component of the energy distribution system is electricity billing, which guarantees that customers are fairly billed for the energy they use. Nevertheless, there are a number of drawbacks to using the conventional ways of billing and payment, such as delays, inaccuracies, and the trouble of physically visiting the Electricity Board offices. Customer discontent and operational difficulties are frequently the results of these inefficiencies. It is crucial to create an effective, automated, and user-friendly electronic billing system in order to address these problems.

By utilizing cutting-edge technology technologies, the suggested system seeks to update the traditional method of invoicing and paying for electricity. The entire lifespan of an electrical billing process, from calculating monthly usage to making payments, is designed to be automated by the system. This improves accuracy, cuts down on delays, and greatly increases customer convenience.

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II. EXISTING SYSTEM

The conventional system of electricity billing is fraught with inefficiencies and challenges that make it less effective and highly labor-intensive. Due to its many problems and inefficiencies, the traditional electricity billing system is very labor-intensive and less effective[1]. A staff worker must manually record the meter readings and gather the consumption information within this system, which requires them to visit each customer's home. Human mistake is a common occurrence in this labor-intensive the procedure for gathering data, which can result in inaccurate billing[1]. The data must be given to another employee after it has been gathered so they may compute the units consumed and determine the associated costs. The amount of human labor involved in this stage, including data entering and mathematical computations, raises the possibility of mistakes even more.The bills need to be prepared and printed after computations have been made, which takes more time and resources[2]. Another round of physical distribution is necessary to distribute the prepared bills to every customer. Particularly in places with difficult logistics, this hand delivery method is ineffective and might cause delays[3]. Additionally, at this point, there is a chance that bills could be misplaced or delivered to the wrong address, which would annoy customers even more and possibly cost the electrical provider money. individual customers are required to visit the electricity office to pay their dues. This step is disruptive to clients, who may need to take time off work or other commitments to travel to the payment office. It also results in long queues and waiting times at the office, causing frustration among customers and requiring the electricity provider to allocate significant resources to manage the payment process[6]. The physical handling of payments and cash further prompts worries about security and the potential for financial discrepancies[5]. As a whole, the process is uneconomical since it raises operating expenses by requiring a big workforce to complete seemingly simple activities. Error-prone points of failure are created by the manual computation, data collection, and bill distribution processes. Furthermore, since paying bills is physical, clients cannot simply monitor their payment history or obtain instant proof of their payment, which could result in disagreements and discontent[13]. Moreover, clients cannot receive real-time updates about their energy usage and billing status via the traditional method. Because they are unable to efficiently regulate their energy consumption and keep an eye on their usage habits, Clients could become displeased due to this lack of transparency[7]. Without real-time data, consumers might not be aware of odd trends in their use that could point to problems like broken equipment or energy waste[8]. Due to its reliance on labor-intensive, error-prone manual processes, the traditional power billing system is antiquated and ineffective. It is labor-intensive to administer, which drives up operating expenses and makes the client experience difficult. From meter reading to bill payment, the entire process is drawn out, difficult, and opaque, which emphasizes the need for modernization to solve these issues.

III. PROPOSED SYSTEM

The proposed solution aims to modernize and streamline the entire process of electricity bill management and payment. The technology ensures that each and every record is kept electronically, improving efficiency and lowering the possibility of physical papers being lost or damaged by doing away with the need to keep paper electricity bills. Administrators gain from the system's automated features, which reduce administrative load and human error by tracking user accounts and computing fines without human intervention.

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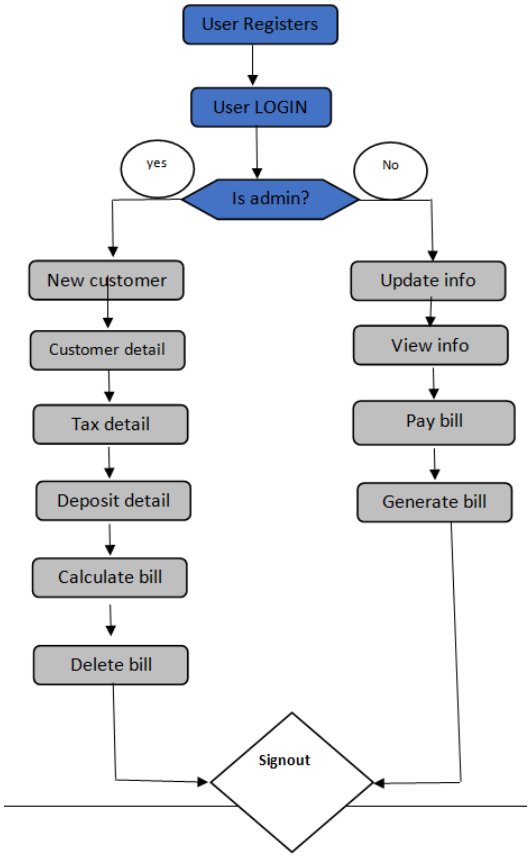
PROPOSED METHODOLOGY



By allowing users to pay their bills online, the technology eliminates the need for them to come into the office in person to pay their bills. Time is saved, and the annoyance of using conventional payment methods is diminished as well. To further save resources and cut operating expenses, the method eliminates the need for delivery workers to bring bills to users' homes. The system's digitization of the billing process reduces the amount of paper used and waste that comes with it, making it a more sustainable method. All things considered, the automated electricity billing system improves resource efficiency, accuracy, and ease for the benefit of administrators and users alike.

IV. IMPLEMENTATION

In order to ensure accuracy and efficiency, the Easy electricity billing system attempts to simplify and automate the billing and payment process for electricity use[5]. The system, which was Microsoft SQL Server was used to construct the backend and Java Swings for the front end, offers safe data management and an easy-to-use interface[6]. User management, billing administration, and payment processing are the three primary components that comprise the implementation; each has unique features and interactions.

Module for User administration: This module is in charge of account administration and authentication. Customers and administrators alike must log in to use the system. Verifying credentials against user data contained in the SQL Server database is a step in the login process[7]. Through a registration process, administrators can add new clients, saving client data in the database such as meter number and personal information. Current users have the ability to update their profiles, with changes being stored back to the database.

Billing Management Module: Monthly meter readings that administrators input into the system are necessary for bill computation[4]. The system computes, retrieves user information and relevant rates from the database, and prepares bills for every client. The database's billing data table contains bill information, such as the number of units used and

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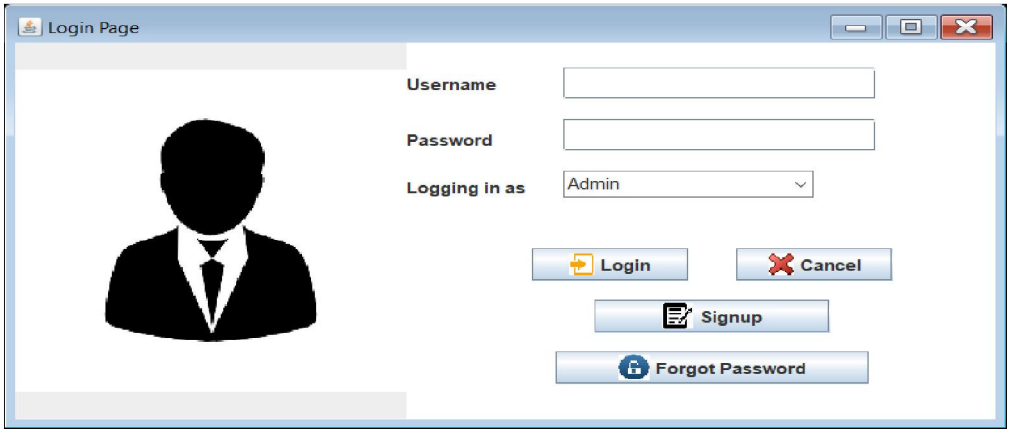
the total amount owed[9]. Clients can log in to view past and present bills, with the system pulling pertinent information from the database.

Online bill payment is made easier using this module. The technology, which is coupled with an online payment gateway for safe transactions, allows users to examine their bill data and make payments. The payment data table in the database contains the payment details, including the amount, date, and method, which are recorded by the system upon successful payment. The payment has been received, and the customer's bill status has been changed[12].

Database Design: The database design makes sure that data is accessible and stored effectively. The primary tables are called Meter Readings, which records monthly energy use; Bills, which stores generated bills; Payments, which records transactions; Users, which stores user credentials and profiles; and Rates, which maintains unit rates and taxes. Many functionalities of the system are supported by this organized design[10].

V. RESULTS

Splash page of Easy Electricity Billing System



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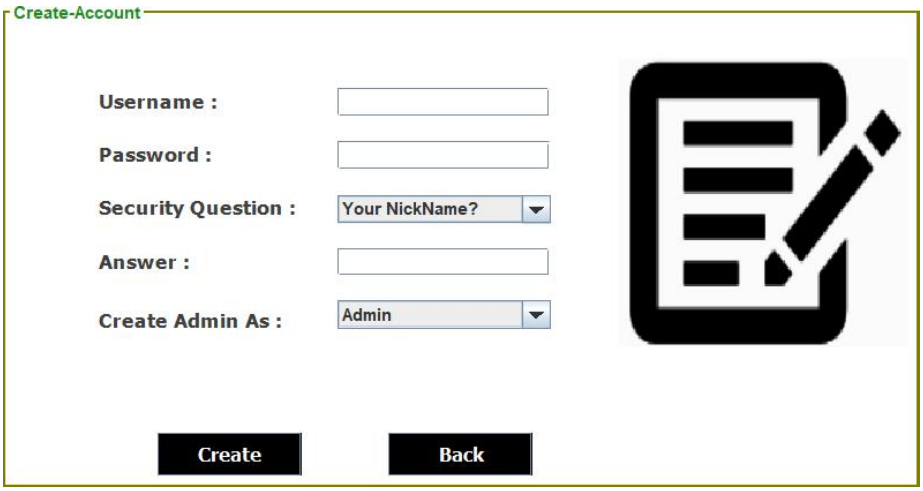
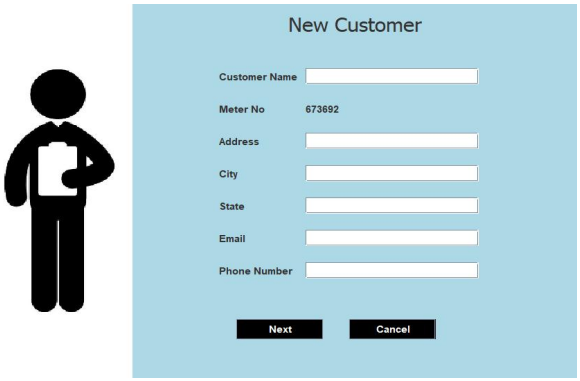
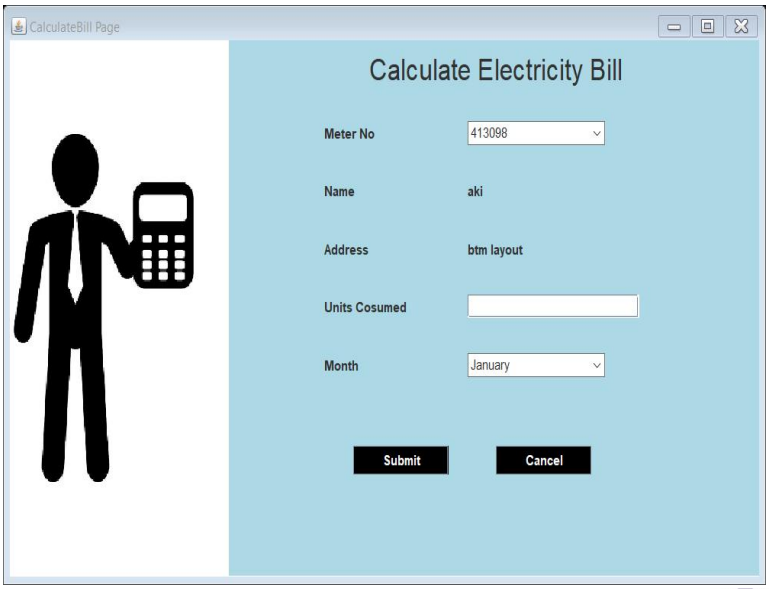


Login page



Signup page



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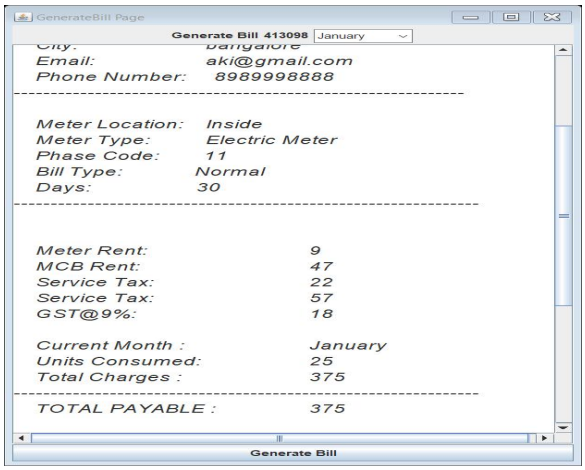

VI. CONCLUSION

A noteworthy accomplishment in automating and optimizing the billing process is the completion of the power bill management system. All of these tasks are made much more accurate and efficient by this program, which offers a complete solution for handling billing cycles, handling payments, and monitoring other operational information. The technology can decrease human error and speed up processing times by minimizing manual data entry. Because of its intuitive design, users of all technical backgrounds—administrators as well as customers—can easily explore and utilize the system. Users may easily do operations including updating profiles, examining bills, and making payments thanks to the user-friendly design. The time and effort typically needed for these tasks are further reduced by the system's speedy data recording and retrieval capabilities. All things considered, this software is a priceless resource for power providers and customers alike, since it streamlines the billing process while also improving user experience and operational productivity.

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