DATA STRUCTURES AND ALGORITHM

TITLE: ELECTRICITY BILLING SYSTEM

ABSTRACT:

The Electricity Billing System (EBS) is a modern utility tool that automates billing processes, reducing errors and improving customer trust. It offers real-time consumption data, allowing customers to manage their usage effectively. EBS supports dynamic pricing and demand response, optimizing energy distribution and lowering costs. It also provides alerts and automated payment processing for customer convenience. Overall, EBS enhances efficiency, accuracy, and customer satisfaction in the electricity billing process.

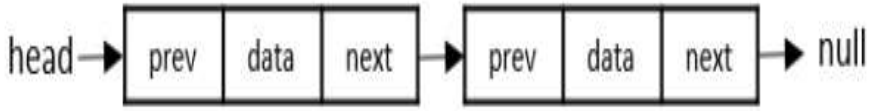
OBJECTIVE:

- Automate and streamline the electricity billing process to ensure accuracy and efficiency.
- Enhance customer satisfaction by providing real-time consumption data and transparent billing information.
- Support dynamic pricing and demand response for efficient energy distribution.
- Reduce operational costs and billing errors.
- Promote energy conservation and sustainability by empowering customers with usage data.

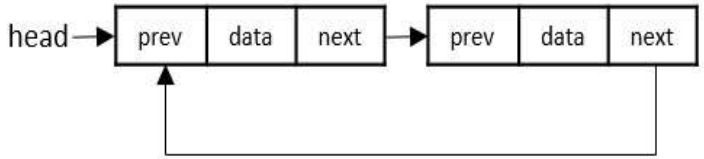
LINKED LIST:

- **Singly Linked List** – The nodes only point to the address of the next node in the list.

- **Doubly Linked List** – The nodes point to the addresses of both previous and next nodes.



- **Circular Linked List** – The last node in the list will point to the first node in the list. It can either be singly linked or doubly linked.



UTILITY:

The utility of the Electricity Billing System (EBS) is multifaceted and extends to various stakeholders, including utility companies and customers:

+ **Efficiency**: EBS streamlines the billing process, reducing the need for manual data entry and meter reading. This significantly decreases operational costs and the administrative burden for utility companies.
+ **Accuracy**: By automating data collection and processing, EBS minimizes errors in billing, leading to more precise and fair charges for customers. This boosts customer trust and reduces billing disputes.
+ **Transparency**: EBS offers real-time consumption data to customers, empowering them to make informed decisions about their energy usage. This transparency improves customer satisfaction and enhances their control over electricity costs.
+ **Cost Savings**: Through dynamic pricing and demand response, utility companies can optimize energy distribution, potentially lowering operational costs and avoiding grid strain during peak periods.

UTILITY:

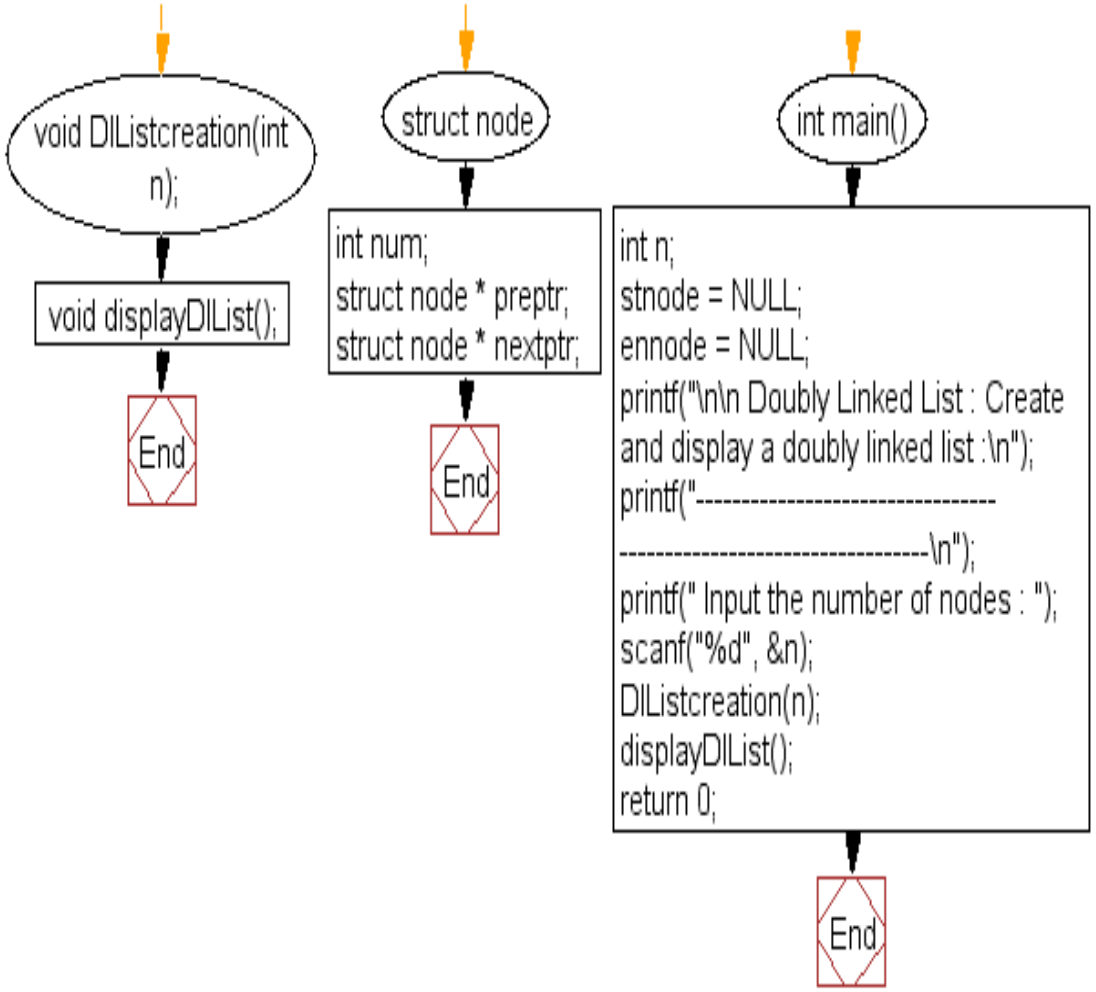
- **Environmental Impact**: EBS encourages energy conservation and sustainable consumption practices, indirectly contributing to a reduction in overall energy demand and environmental impact.
- **Customer Convenience**: EBS provides customers with automated payment processing and alerts, making bill payment more convenient and timely.

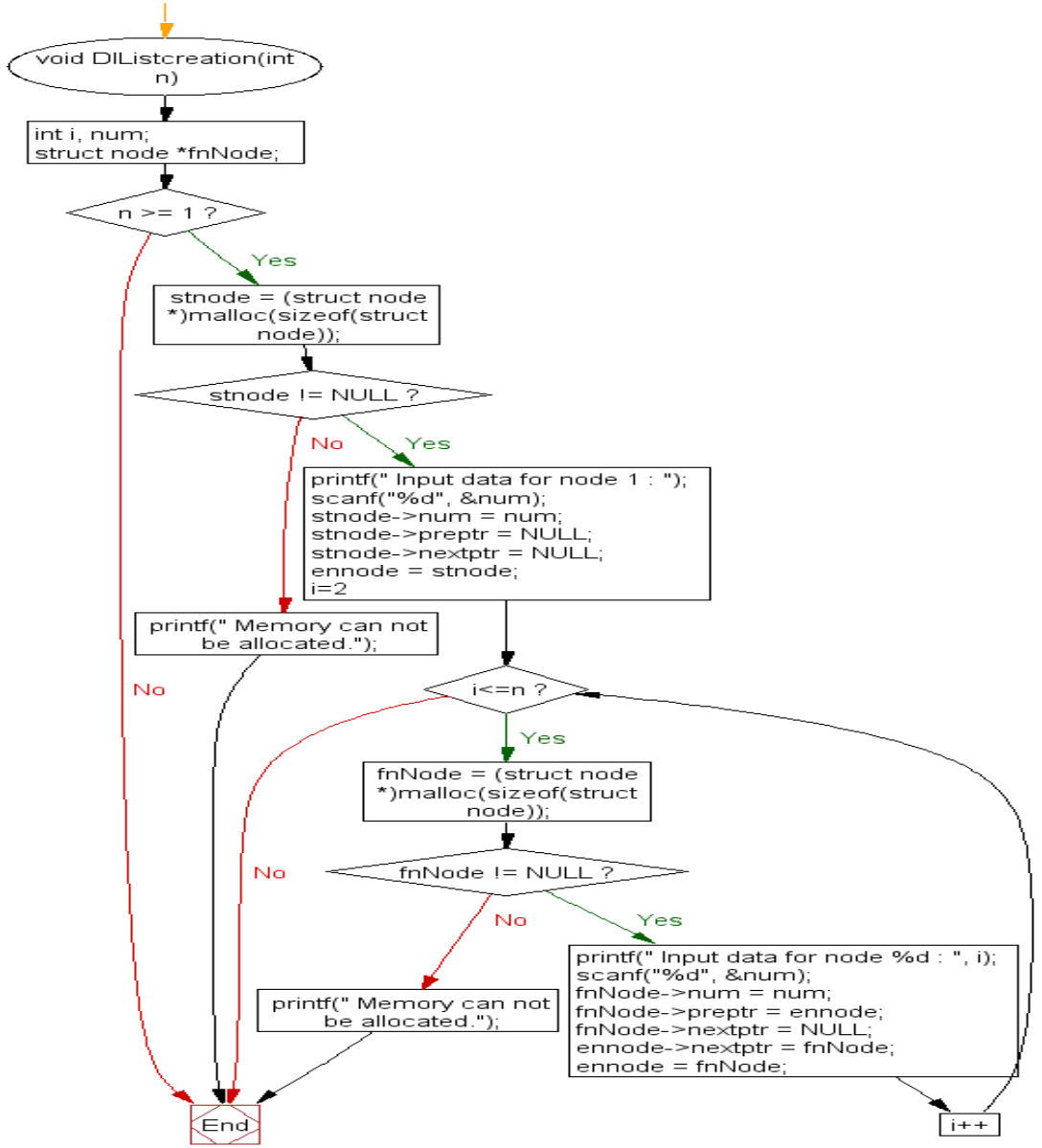
Overall, the utility of the Electricity Billing System is to create a more efficient, customer-centric, and environmentally conscious electricity billing process, benefiting both utility providers and consumers while helping to achieve long-term sustainability goals.

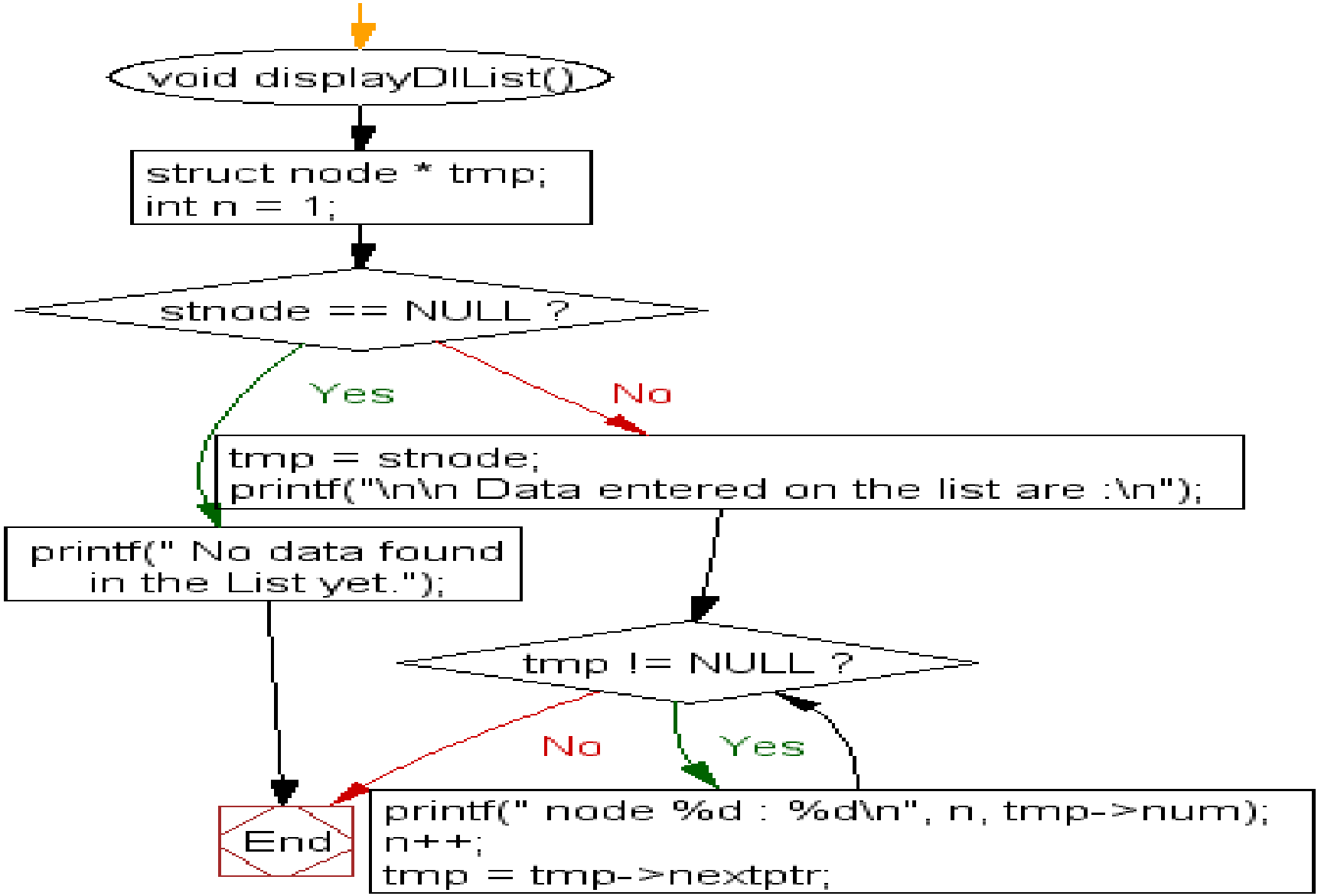
PROBLEM STATEMENT:

- Billing Inefficiency: Manual billing processes are error-prone, leading to inaccurate billing and customer disputes. Utility companies struggle with resource-intensive data entry and meter reading.
- Lack of Transparency: Customers often lack real-time visibility into their electricity consumption, making it challenging to manage and reduce energy costs effectively.
- Peak Demand Challenges: Utilities face difficulties in managing peak electricity demand efficiently, resulting in potential strain on the grid and higher operational costs.
- Payment Hassles: Customers encounter difficulties in paying their bills, leading to delayed payments and increased administrative workload for utility companies.
- Environmental Impact: Inefficient energy management can contribute to unnecessary energy consumption, negatively impacting the environment.
- The objective of addressing these problems with the EBS is to enhance accuracy, efficiency, and customer satisfaction in the electricity billing process while promoting energy conservation and sustainability.

FLOWCHART:


void DlListcreation(int n);
void displayDlList();
End
struct node
int num;
struct node * preptr;
struct node * nextptr;
End
int main()
int n;
stnode = NULL;
ennode = NULL;
printf("\n\n Doubly Linked List : Create and display a doubly linked list :\n");
printf("----------\n");
printf(" Input the number of nodes : ");
scanf("%d", &n);
DlListcreation(n);
displayDlList();
return 0;
End


void DlListcreation(int n)
int i, num;
struct node *fnNode;
n >= 1 ?
Yes
stnode = (struct node *)malloc(sizeof(struct node));
stnode != NULL ?
No
Yes
printf(" Input data for node 1 : ");
scanf("%d", &num);
stnode->num = num;
stnode->preptr = NULL;
stnode->nextptr = NULL;
ennode = stnode;
i=2
printf(" Memory can not be allocated.");
No
i<=n ?
Yes
fnNode = (struct node *)malloc(sizeof(struct node));
No
fnNode != NULL ?
No
Yes
printf(" Memory can not be allocated.");
printf(" Input data for node %d : ", i);
scanf("%d", &num);
fnNode->num = num;
fnNode->preptr = ennode;
fnNode->nextptr = NULL;
ennode->nextptr = fnNode;
ennode = fnNode;
i++
End


void displayDlList()
struct node * tmp;
int n = 1;
stnode == NULL ?
Yes
No
tmp = stnode;
printf("\n\n Data entered on the list are :\n");
printf(" No data found in the List yet.");
tmp != NULL ?
No
Yes
End
printf(" node %d : %d\n", n, tmp->num);
n++;
tmp = tmp->nextptr;

CODE:

```
#include<stdio.h>
#include<stdlib.h>
#include<conio.h>
#include<string.h>
#include<Windows.h>
#include"MainElectricityBill.h"

void details()
{
    printf("Enter your  area name:\n");
    scanf("%s", B.area);
    printf("Enter your  name:\n");
    scanf("%s", B.name);
    printf("Enter your Meter Number:\n");
    scanf("%d", &B.meternumber);
    printf("Enter units consumed:\n");
    scanf("%d", &B.unitsconsumed);
```

CODE:

```
printf("Enter email ID :\n");
    scanf("%s", B.email);
    printf("Enter the permanent address :\n");
    scanf("%s", B.address);
    printf("Enter the phone number : \n");
    scanf("%s", B.phonenumber);
}

void Urban()
{
    int amount=0;
    B.unitsconsumed;
    if(B.unitsconsumed <=30 && B.unitsconsumed >= 0)
    {
        amount = B.unitsconsumed * 3.25; //3.25 is rupees
    }
    else if(B.unitsconsumed >= 31 && B.unitsconsumed <= 100)
    {
        amount = B.unitsconsumed * 4.70;
    }
```

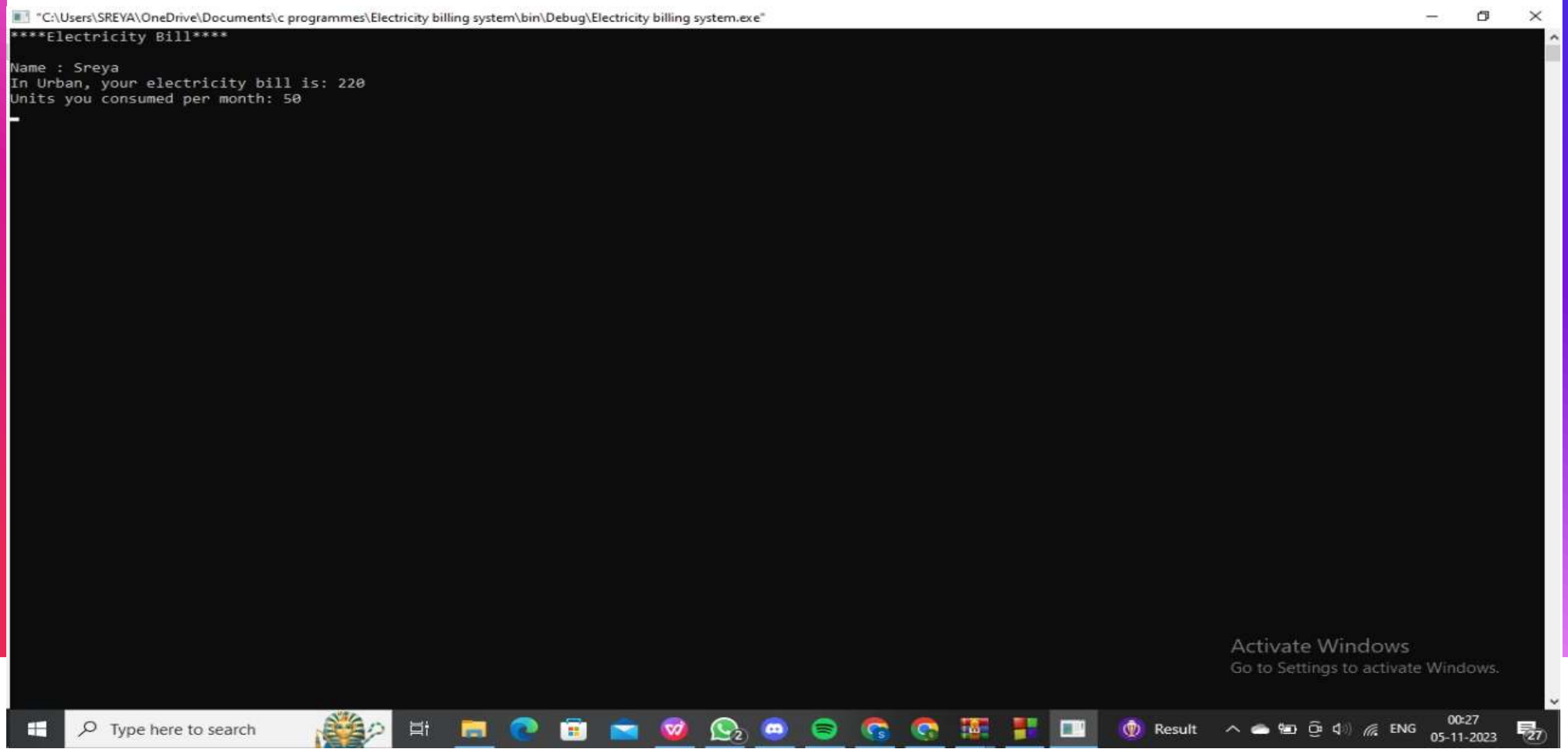
CODE:

```
else if(B.unitsconsumed >= 101 && B.unitsconsumed <= 200)
    {
        amount = B.unitsconsumed * 6.25;
    }
    else
    {
        amount = B.unitsconsumed * 7.30;
    }

    printf("***Electricity Bill***\n\n");
    printf("Name : %s\n", B.name);
    printf("In Urban, your electricity bill is: %d\n", amount);
    printf("Units you consumed per month: %d\n", B.unitsconsumed);
}

void Rural()
{
    int amount=0;
    B.unitsconsumed;
    if(B.unitsconsumed <=30 && B.unitsconsumed >= 0)
    {
```

CODE:

```
amount = B.unitsconsumed * 3.15; //3.25 is rupees
    }
    else if(B.unitsconsumed >= 31 && B.unitsconsumed <= 100)
    {
        amount = B.unitsconsumed * 4.40;
    }
    else if(B.unitsconsumed >= 101 && B.unitsconsumed <= 200)
    {
        amount = B.unitsconsumed * 5.95;
    }
    else
    {
        amount = B.unitsconsumed * 6.80;
    }
    printf("***Electricity Bill***\n\n");
    printf("Name : %s\n", B.name);
    printf("In Urban, your electricity bill is: %d\n", amount);
    printf("Units you consumed per month: %d\n", B.unitsconsumed);
}
```

OUTPUT:


"C:\Users\SREYA\OneDrive\Documents\c programmes\Electricity billing system\bin\Debug\Electricity billing system.exe"
****Electricity Bill****
Name : Sreya
In Urban, your electricity bill is: 220
Units you consumed per month: 50
Activate Windows
Go to Settings to activate Windows.
Type here to search
Result
ENG
00:27
05-11-2023

"C:\Users\SREYA\OneDrive\Documents\c programmes\Electricity billing system\bin\Debug\Electricity billing system.exe"

```
Enter your  area name:
Tnagar
Enter your  name:
Sreya
Enter your Meter Number:
5
Enter units consumed:
50
Enter email ID :
sreya@gmail.com
Enter the permanent address :
PotheriKattankulathur
Enter the phone number :
8078216777
****Electricity Bill****
Please enter your choice from below (1-2):
1. Urban
2. Rural
3. EXIT
Electricity Board Helpline: 8435 2340
Enter your choice :
2
```

CONCLUSION :

In conclusion, the Electricity Billing System (EBS) is designed to tackle the multifaceted issues present in the electricity billing process. By automating billing, providing real-time consumption data, and supporting dynamic pricing and demand response, the EBS aims to bring about a more accurate, efficient, and customer-friendly system. This not only benefits utility companies by reducing operational costs and errors but also empowers customers to manage their energy consumption effectively. Furthermore, the EBS contributes to environmental sustainability by encouraging energy conservation. Overall, it represents a significant step forward in the modernization of utility infrastructure, enhancing the quality of service and the well-being of both service providers and customers.

THANK YOU

Submitted by

Sreya Susan Roy-RA2211003010089

Parvathy Ullas-RA2211003010098

Aarthi N- RA2211003010126