MINI PROJECT [BCI1023] [PROGRAMMING TECHNIQUES]

TITLE: DEPARTMENT OF ENERGY AND NATURAL RESOURCES

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SEM 1 2021

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1. Background study

Do you know the history of electricity? Back to 2750 B.C., Ancient Egyptian were aware that certain types of fish could produce electric shock and described the electric catfish as the "Thunder of the Nile". Thousand of years later, the Greek mathematician Thales of Miletus discovered static electricity by rubbing fur on amber, which would then attract light objects such as feathers. In June 1752, Benjamin Franklin, a prominent scientist from America wanted to prove that electricity and lightning were the same thing by tying a key to a kite string and flying the kite during a storm. The kite reportedly picked up ambient electrical charge from the storm, resulting in sparks jumping from the key to his hand and proving his theory that lightning was electrical. Electricity was first introduced into people's homes near the end of the Victorian period in the late 19th century. The world's first electric streetlight was set up in London in 1878 and can be found almost everywhere in the world today.

Electricity first made its appearance in Malaysia at the turn of the 20th century, and the earliest record of power generation can be tracked back to a small mining town in Rawang, Selangor. Here, two enterprising individuals Loke Yew and Thamboosamy Pillai installed an electric generator in 1894 to operate their mines; they were the first to use electric pumps for mining in Malaya and marked the great beginning of the story of electricity in Malaysia. In the same year, private supply for street lighting purposes was extended to Rawang town, and in 1895 the railway stations in Kuala Lumpur received its first electricity supply. In 1900, the Sempam Hydroelectric Power Station in Raub, built by the Raub Australian Gold Mining Company became the first power station in Malaysia.

In this modern era with advanced technologies, electricity has become the necessity for human being to live every day. We need electricity to turn on our lights, appliances, devices and to charge our phones. Therefore, the usage of electricity is unavoidable. However, there are still a lot of users out there do not know how to calculate their electricity bills every month especially in this time where price of almost everything is increasing, they might be curious or worry about their usage of electricity whether it is overcharged or they have overused it.

For that matter, a system needs to be developed to help calculating to give us confirmation about our bills. In this project, an electrical calculator system is built to ease the pain for all the struggling users to calculate their bills. All they have to do is by keying in their basic information like name, IC number, mobile number, bill date, address and total electricity consumption (kWh) and our calculator will do the rest. The best thing about this calculator is

it is extremely fast and beginner-friendly meaning everyone can use it easily. Why don’t you start to use our electricity calculator from today onwards?

2. Objectives

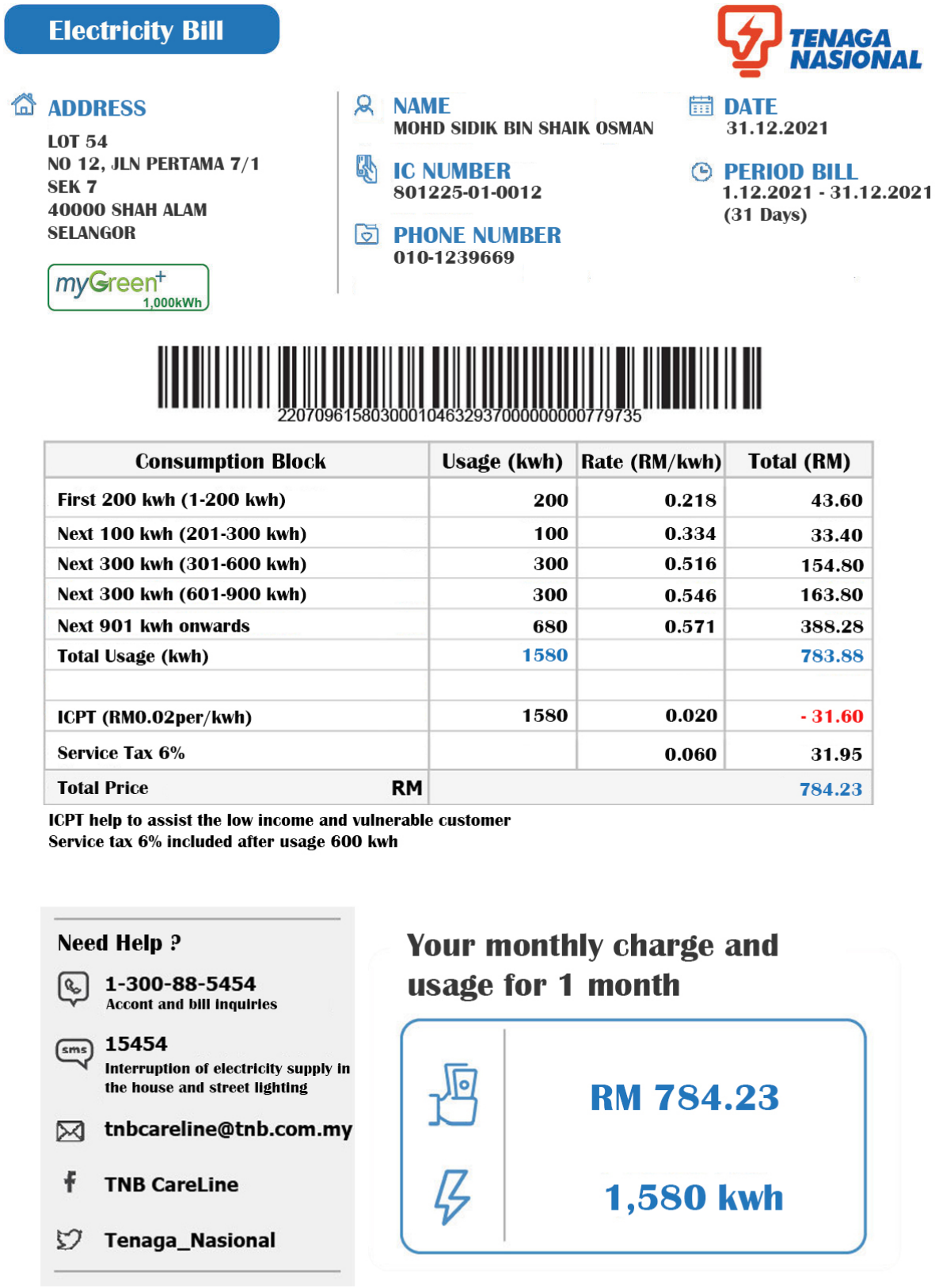
The objectives of this project are as follow:

I. To design a simple but powerful calculator to help users to calculate their bills

II. To help users confirm their electricity bills without any mistakes to ease their worries

III. To remind whether users have overused electricity every month to avoid any waste

3. Input and output



Electricity Bill

TENAGA NASIONAL

ADDRESS
LOT 54
NO 12, JLN PERTAMA 7/1
SEK 7
40000 SHAH ALAM
SELANGOR

myGreen+ 1,000kWh

NAME
MOHD SIDIK BIN SHAIK OSMAN

IC NUMBER
801225-01-0012

PHONE NUMBER
010-1239669

DATE
31.12.2021

PERIOD BILL
1.12.2021 - 31.12.2021
(31 Days)

220709615803000104632937000000000779735

Consumption Block	Usage (kwh)	Rate (RM/kwh)	Total (RM)
First 200 kwh (1-200 kwh)	200	0.218	43.60
Next 100 kwh (201-300 kwh)	100	0.334	33.40
Next 300 kwh (301-600 kwh)	300	0.516	154.80
Next 300 kwh (601-900 kwh)	300	0.546	163.80
Next 901 kwh onwards	680	0.571	388.28
Total Usage (kwh)	1580		783.88
ICPT (RM0.02per/kwh)	1580	0.020	- 31.60
Service Tax 6%		0.060	31.95
Total Price RM			784.23

ICPT help to assist the low income and vulnerable customer
Service tax 6% included after usage 600 kwh

Need Help ?

1-300-88-5454
Accont and bill inquiries

15454
Interruption of electricity supply in the house and street lighting

tnbcareline@tnb.com.my

TNB CareLine

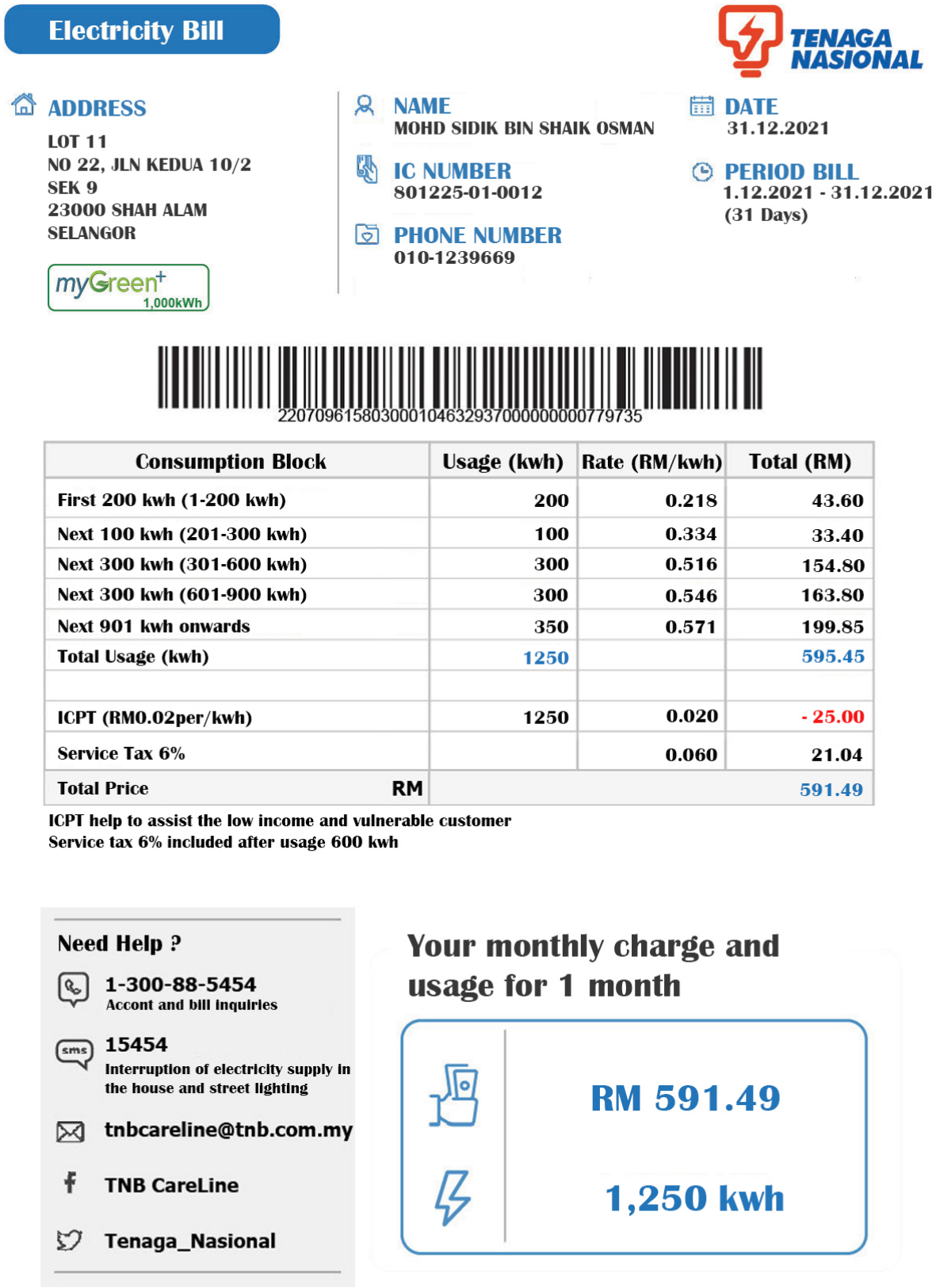
Tenaga_Nasional

Your monthly charge and usage for 1 month

RM 784.23

1,580 kwh

Example 1: Image Electricity Bill for Output 1



Electricity Bill

TENAGA NASIONAL

ADDRESS
LOT 11
NO 22, JLN KEDUA 10/2
SEK 9
23000 SHAH ALAM
SELANGOR

myGreen+ 1,000kWh

NAME
MOHD SIDIK BIN SHAIK OSMAN

IC NUMBER
801225-01-0012

PHONE NUMBER
010-1239669

DATE
31.12.2021

PERIOD BILL
1.12.2021 - 31.12.2021
(31 Days)

220709615803000104632937000000000779735

Consumption Block	Usage (kwh)	Rate (RM/kwh)	Total (RM)
First 200 kwh (1-200 kwh)	200	0.218	43.60
Next 100 kwh (201-300 kwh)	100	0.334	33.40
Next 300 kwh (301-600 kwh)	300	0.516	154.80
Next 300 kwh (601-900 kwh)	300	0.546	163.80
Next 901 kwh onwards	350	0.571	199.85
Total Usage (kwh)	1250		595.45
ICPT (RM0.02per/kwh)	1250	0.020	- 25.00
Service Tax 6%		0.060	21.04
Total Price RM			591.49

ICPT help to assist the low income and vulnerable customer
Service tax 6% included after usage 600 kwh

Need Help ?

1-300-88-5454
Accont and bill inquiries

15454
Interruption of electricity supply in the house and street lighting

tnbcareline@tnb.com.my

TNB CareLine

Tenaga_Nasional

Your monthly charge and usage for 1 month

RM 591.49

1,250 kwh

Example 2: Image Electricity Bill for Output 2

i) Details Displays

```
WELCOME TO USING THE ELECTRICAL CALCULATOR TO COMFIRM YOUR BILLS!!

----------------------Details---------------------------
-------------------------------------------------------
Consumption block                     Rate(RM/kWh)
-------------------------------------------------------

First 200 kWh (1-200 kWh)             0.218
Next 100 kWh (201-300 kWh)            0.334
Next 300 kWh (301-600 kWh)            0.516
Next 300 kWh (601-900 kWh)            0.546
Next 901 kWh onwards                  0.571
-------------------------------------------------------
More than 600 kWh need include service tax 6 percent
ICPT help to assist the low income and vulnerable customers under this consumption band which is RM0.02per(kWh)
```

Show about details of consumption block for calculate

ii) User Management

```
Please enter your name : MOHD SIDIK BIN SHAIK OSMAN
Please enter your IC number : 801225-01-0012
Please enter your mobile phone number : 010-1239669
Please enter the bill date: 31/12/2021
```

User input name, IC number, mobile phone number and bill date

iii) Bill Calculation

```
Bill 1
================================================
Please enter your address : LOT 54, NO12, JALAN PERTAMA 7/1, SEK 7, 40000 SHAH ALAM, SELANGOR
```

User need to input their address

```
Bill 1
================================================
Please enter your address : LOT 54, NO12, JALAN PERTAMA 7/1, SEK 7, 40000 SHAH ALAM, SELANGOR
Please enter your total consumption (kWh): 1580
```

User input their total consumption (kWh)

```
Bill 1
================================================
Please enter your address : LOT 54, NO12, JALAN PERTAMA 7/1, SEK 7, 40000 SHAH ALAM, SELANGOR
Please enter your total consumption (kWh): 1580
Price : RM784.23
```

The system will automatically calculate your total consumption and display your bill price

```
Bill 1
============================================
Please enter your address : LOT 54, NO12, JALAN PERTAMA 7/1, SEK 7, 40000 SHAH ALAM, SELANGOR
Please enter your total consumption (kWh): 1580
Price : RM784.23
Anymore electric bills (Y/N)? : Y
```

User need to answer the survey (Y = Yes| N = No) which asking about have any more bills

```
Bill 2
============================================
Please enter your address : LOT 11, NO22, JALAN KEDUA 10/2, SEK 9, 23000 SHAH ALAM, SELANGOR
Please enter your total consumption (kWh): 1250
Price : RM591.49
Anymore electric bills (Y/N)? : N
```

Looping until the user input (N = No)

iv) Display Total and Details

```
Name                    : MOHD SIDIK BIN SHAIK OSMAN
IC Number               : 801225-01-0012
Mobile Phone Number     : 010-1239669
Date                    : 31/12/2021
=========================================================================
 Summary of Electrical Bills
-------------------------------------------------------------------------

Bill 1
_________________________________________________________________________
Address:     LOT 54, NO12, JALAN PERTAMA 7/1, SEK 7, 40000 SHAH ALAM, SELANGOR
Payment:   RM784.23

Bill 2
_________________________________________________________________________
Address:     LOT 11, NO22, JALAN KEDUA 10/2, SEK 9, 23000 SHAH ALAM, SELANGOR
Payment:   RM591.49

-------------------------------------------------------------------------
Total Price                 RM 1375.72
```

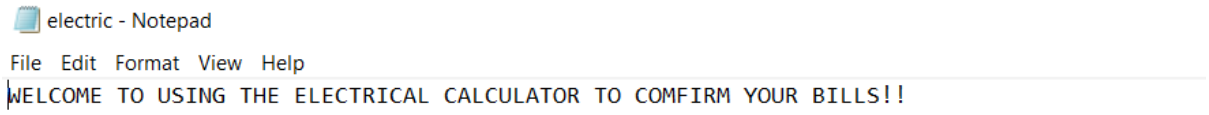
User can view about details, bills and payment details in summary

User can pay it that total price for all the electrical bills

v) File Operation

```
input = fopen("electric.txt", "w");//create the file
fprintf(input, "WELCOME TO USING THE ELECTRICAL CALCULATOR TO COMFIRM YOUR BILLS!!");//write to file
fclose(input);//close file
```

The file will create and store the data in file



Sample create file from C programming

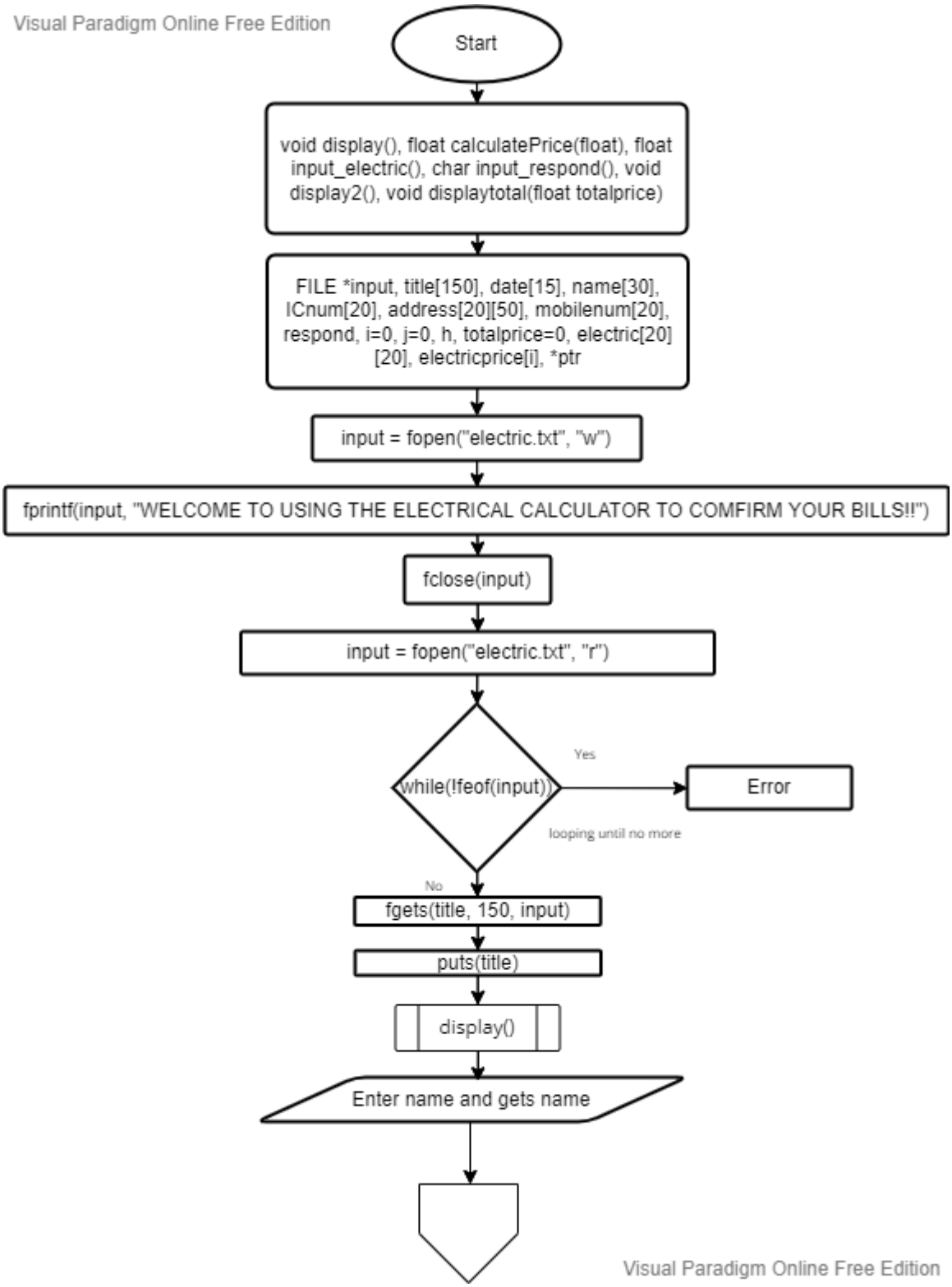
```
input = fopen("electric.txt", "r");//read the file
while(!feof(input))//read from file
{
    fgets(title, 150, input);
    puts(title);//display on screen
}
```

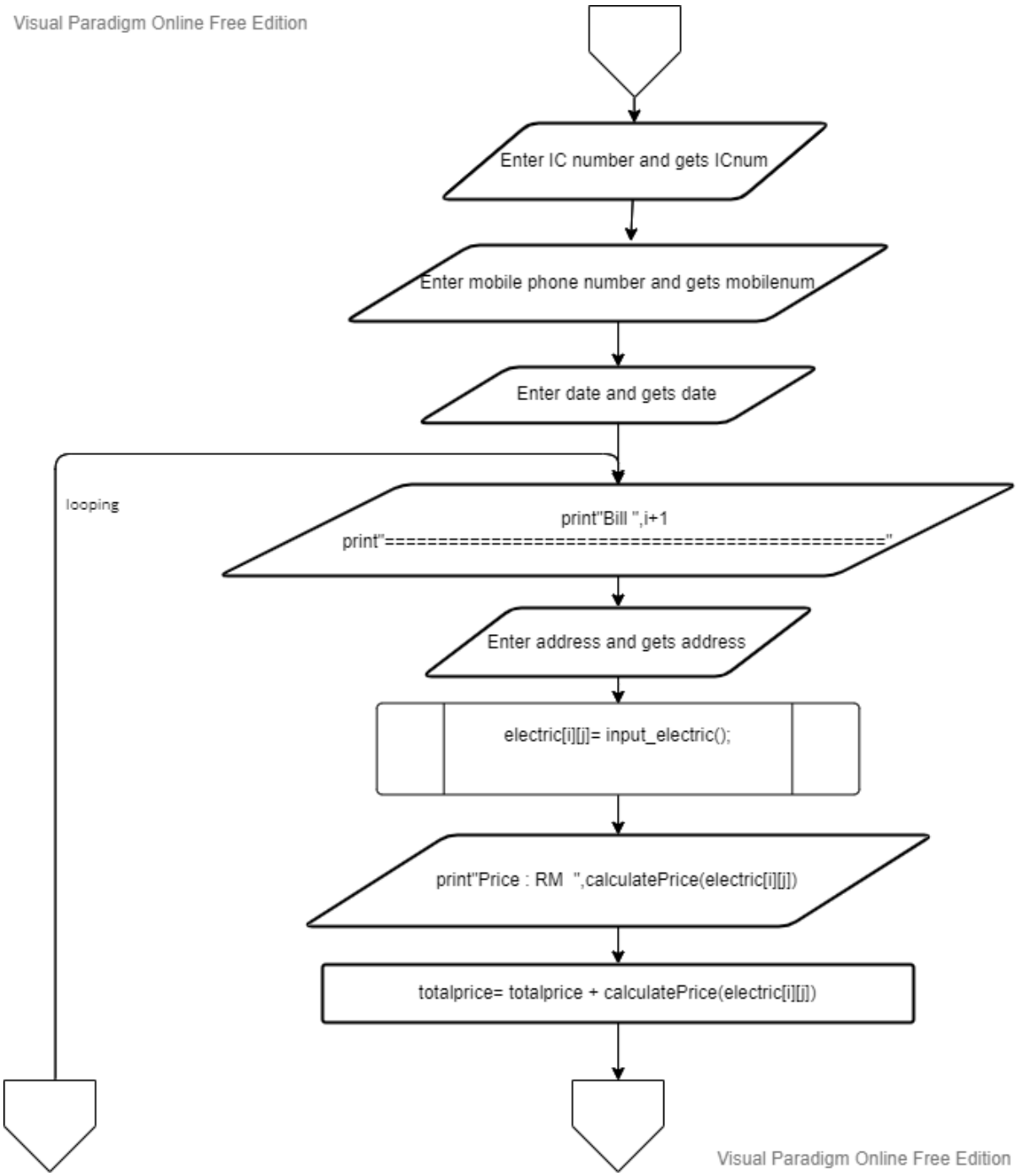
```
WELCOME TO USING THE ELECTRICAL CALCULATOR TO COMFIRM YOUR BILLS!!
```

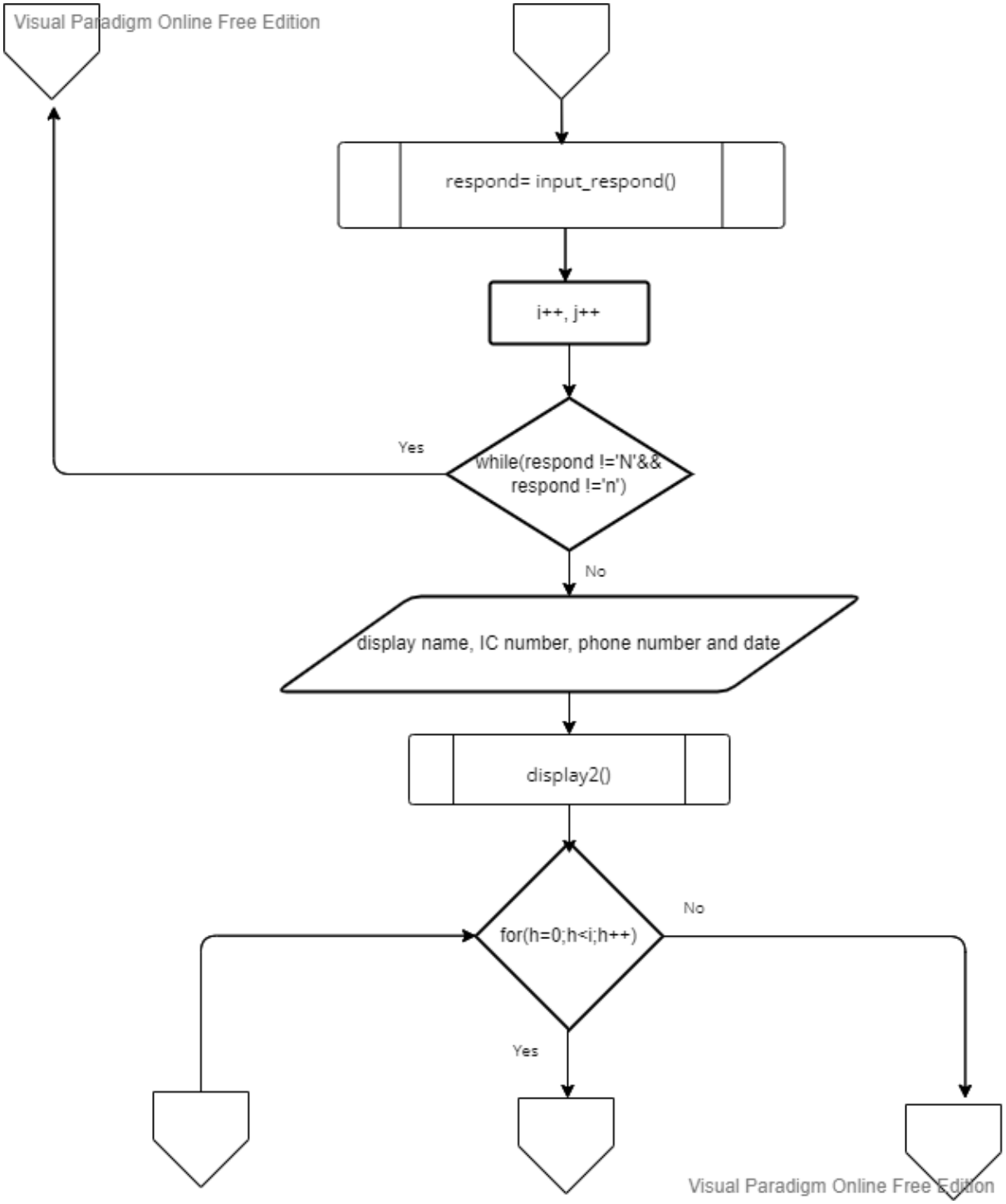
The file will read and display the title on screen

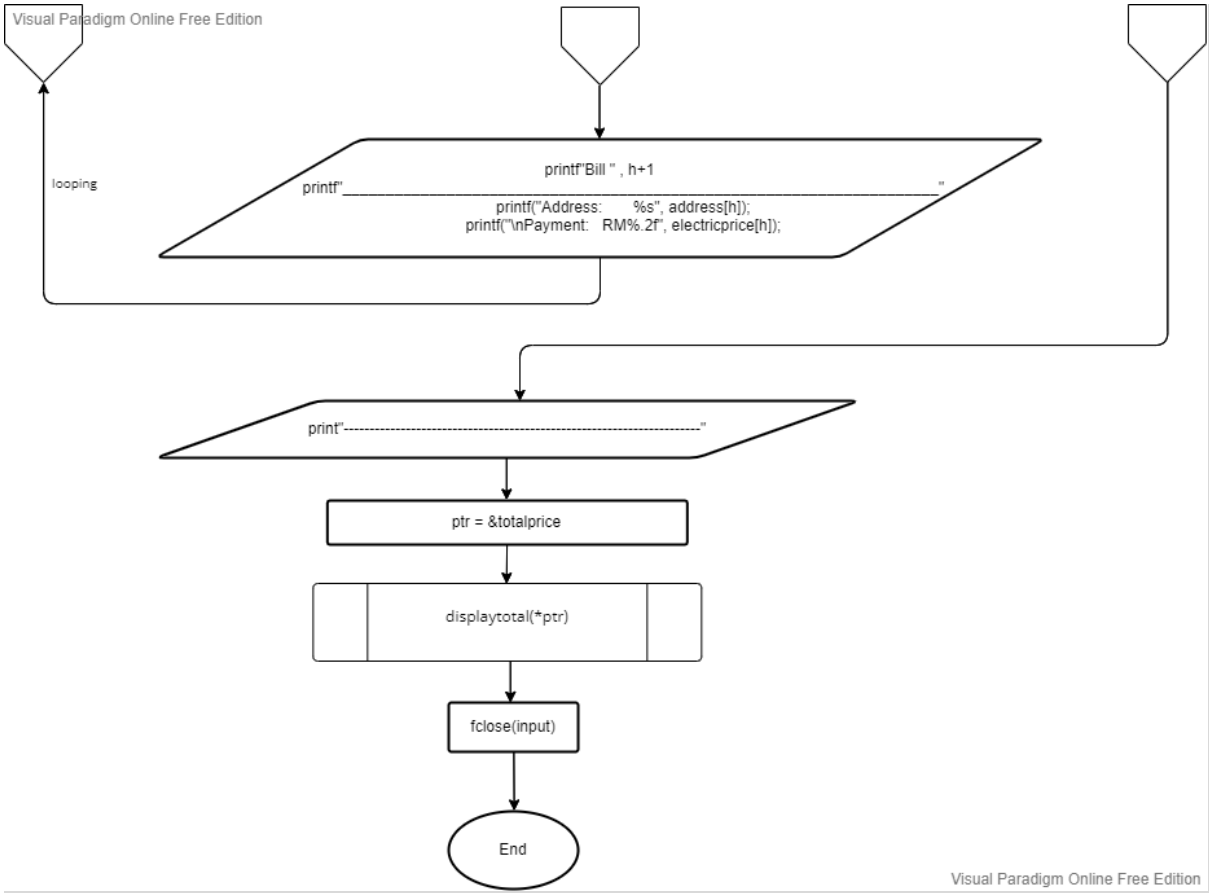
4. Flowchart

i) Main function

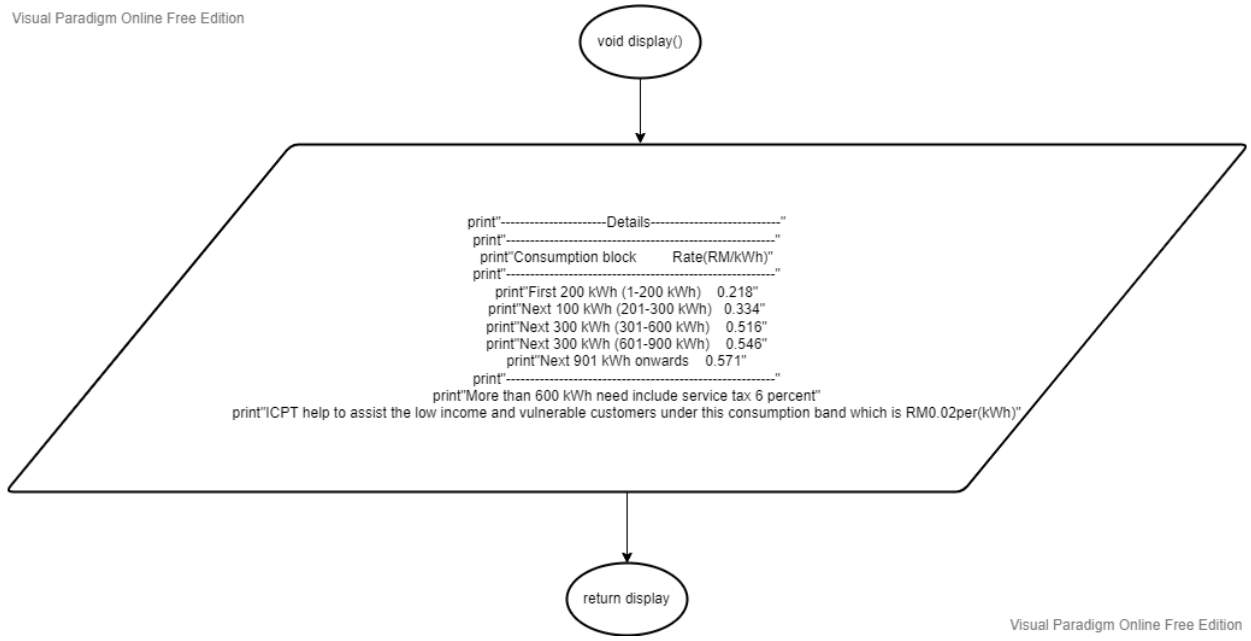



Visual Paradigm Online Free Edition
Enter IC number and gets ICnum
Enter mobile phone number and gets mobilenum
Enter date and gets date
looping
print"Bill ",i+1
print"=="
Enter address and gets address
electric[i][j]= input_electric();
print"Price : RM ",calculatePrice(electric[i][j])
totalprice= totalprice + calculatePrice(electric[i][j])
Visual Paradigm Online Free Edition

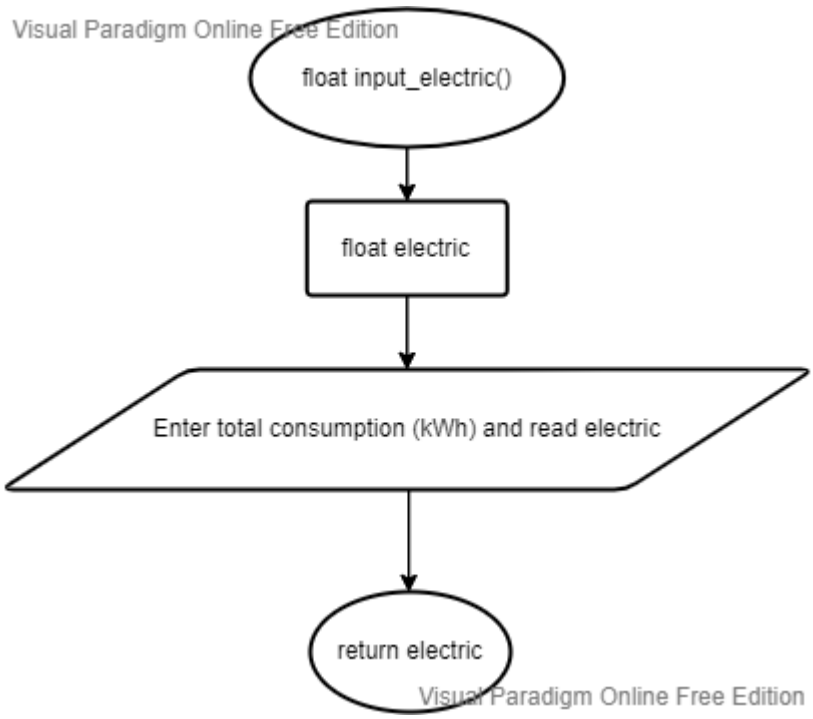

Visual Paradigm Online Free Edition
respond= input_respond()
i++, j++
Yes
while(respond !='N'&&
respond !='n')
No
display name, IC number, phone number and date
display2()
for(h=0;h<i;h++)
No
Yes
Visual Paradigm Online Free Edition



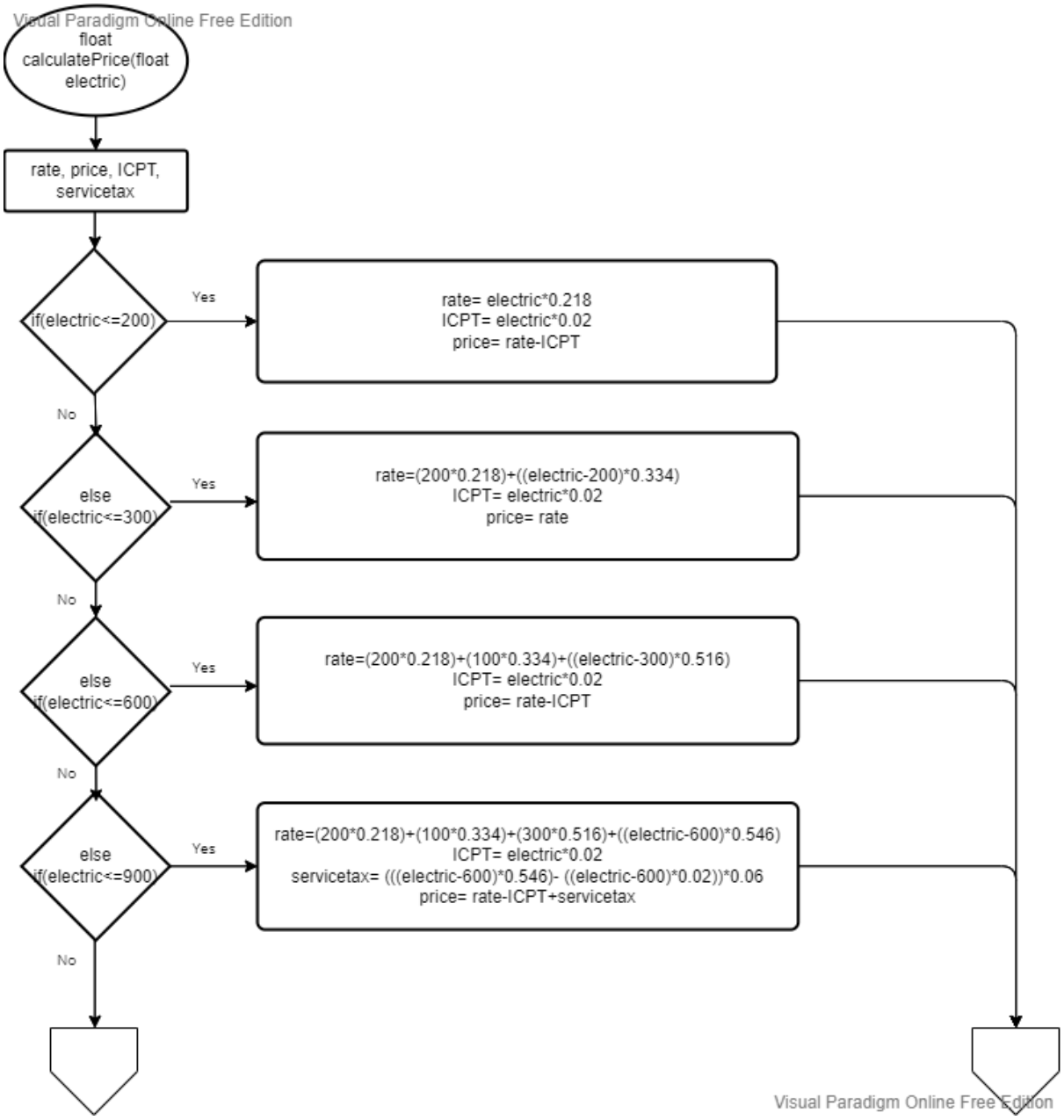
ii) Void display()

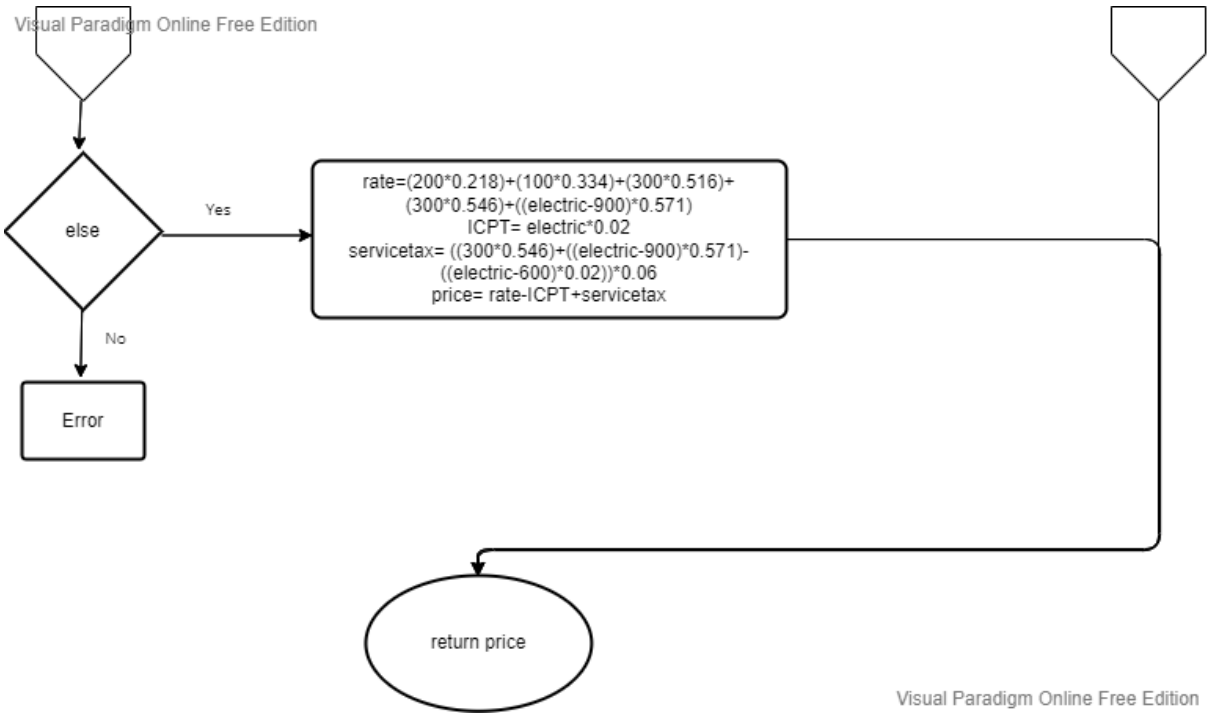


iii) Float input_electric()

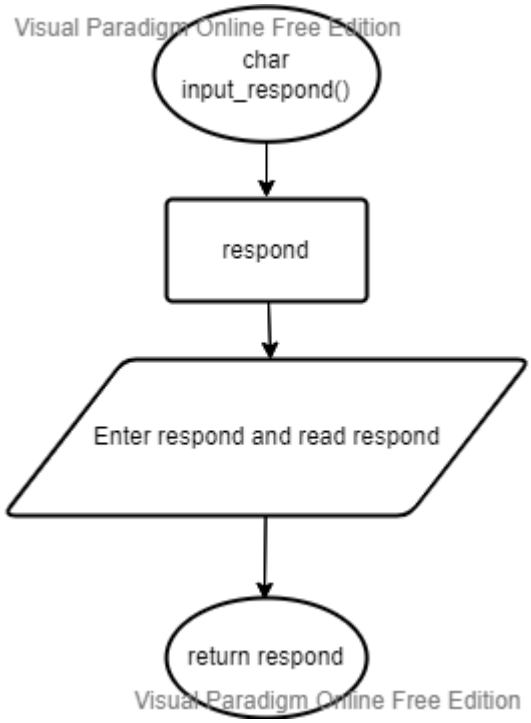


iv) Float calculatePrice (float electric)

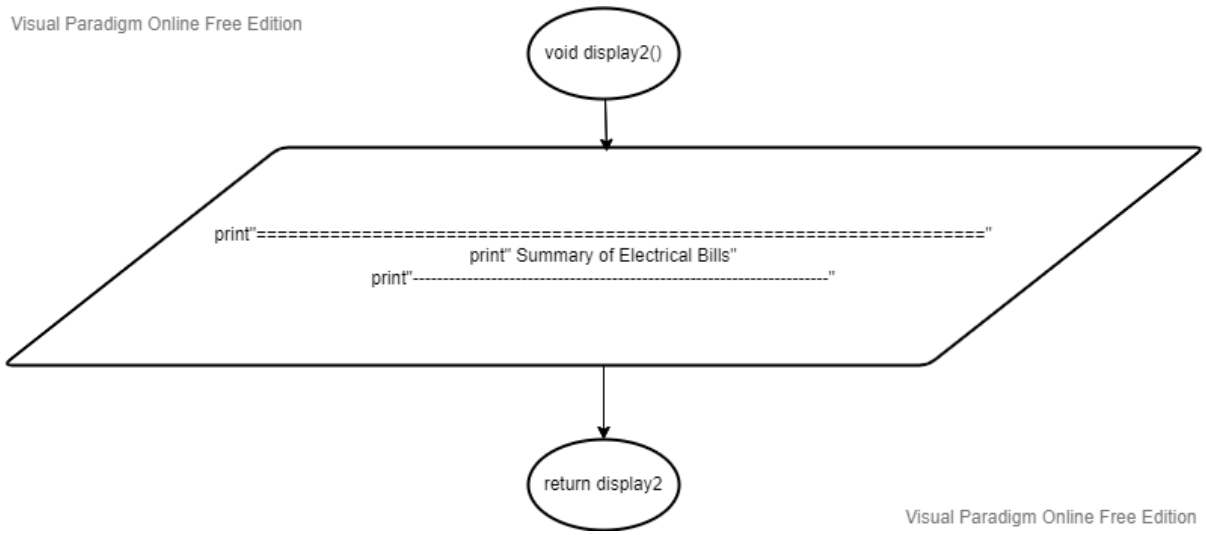




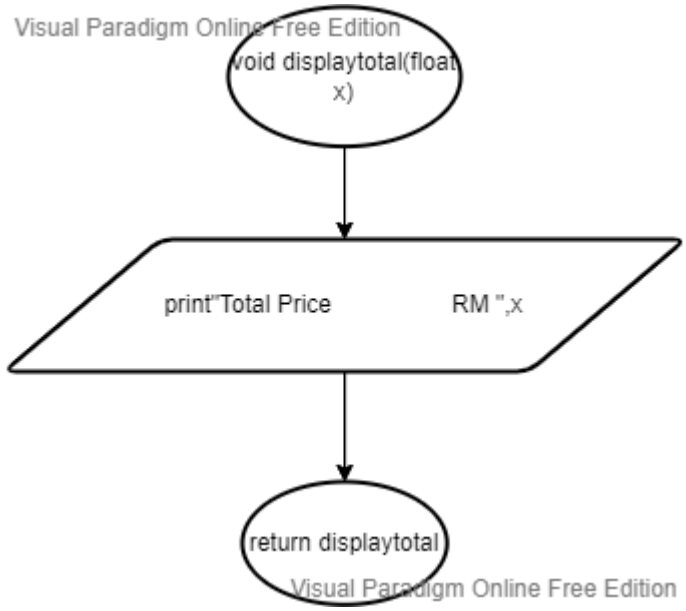
v) Char input_respond()



vi) Void display2()



vii) Void displaytotal (float x)



5. Coding

```c
#include<stdio.h>
#include<wchar.h>
#include<windows.h>
void display();
float calculatePrice(float);
float input_electric();
char input_respond();
void display2();
void displaytotal(float totalprice);
int main()
{
    FILE *input;//declaration of file
    char title[150], date[15], name[30], ICnum[20], address[20][150], mobilenum[20], respond;
    int i=0, j=0, h;
    float totalprice=0, electric[20][20], electricprice[i], *ptr;//declaration

    input = fopen("electric.txt", "w");//create the file
    fprintf(input, "WELCOME TO USING THE ELECTRICAL CALCULATOR TO COMFIRM YOUR BILLS!!");//write to file
    fclose(input);//close file

    input = fopen("electric.txt", "r");//read the file
    while(!feof(input))//read from file
    {
        fgets(title, 50, input);
        puts(title);//display on screen
    }

    display();//function call
    fflush(stdin);
    printf("\nPlease enter your name : ");//enter name
    gets(name);

    fflush(stdin);
    printf("Please enter your IC number : ");//enter IC
    gets(ICnum);

    fflush(stdin);
    printf("Please enter your mobile phone number : ");//enter phone number
    gets(mobilenum);

    fflush(stdin);
    printf("Please enter the bill date: ");//enter date
    gets(date);

    do
    {
        printf("\n\nBill %d",i+1);//display bill number
        printf("\n==============================================\n");

        fflush(stdin);
        printf("Please enter your address : ");//enter address
        gets(address[i]);

        electric[i][j]= input_electric();//function change
        printf("Price : RM%.2f",calculatePrice(electric[i][j]));//function statement
        electricprice[i] = calculatePrice(electric[i][j]);//function change
        totalprice= totalprice + calculatePrice(electric[i][j]);//calculation
        respond= input_respond();//function change
        i++;//i=i+1
        j++;//j=j+1
    }
    while(respond !='N'&& respond !='n');//do while statement
    printf("\nName\t\t\t: %s", name);//print name
    printf("\nIC Number\t\t: %s", ICnum);//print IC
    printf("\nMobile Phone Number\t: %s", mobilenum);//print phone number
    printf("\nDate\t\t\t: %s", date);//print date
```

```
67      display2();//function call
68
69      for(h=0;h<i;h++)//for statement
70      {
71              printf("\n\nBill %d" , h+1);//bill display
72              printf("\n_____________________________________________________________________\n");
73              printf("Address:        %s", address[h]);
74              printf("\nPayment:    RM%.2f", electricprice[h]);
75      }
76      printf("\n\n---------------------------------------------------------------------\n");
77      ptr = &totalprice;//pointer change
78      displaytotal(*ptr);//function call
79      fclose(input);//close file
80      return 0;
81  }
82
83  void display()
84  {
85      printf("\n----------------------Details--------------------------\n");
86      printf("-------------------------------------------------------\n");
87      printf("Consumption block\t\t\tRate(RM/kWh)\n");
88      printf("-------------------------------------------------------\n");
89      printf("\nFirst 200 kWh (1-200 kWh)\t\t0.218");
```

```
90      printf("\nNext 100 kWh (201-300 kWh)\t\t0.334");
91      printf("\nNext 300 kWh (301-600 kWh)\t\t0.516");
92      printf("\nNext 300 kWh (601-900 kWh)\t\t0.546");
93      printf("\nNext 901 kWh onwards\t\t\t0.571");
94      printf("\n-------------------------------------------------------\n");
95      printf("More than 600 kWh need include service tax 6 percent\n");
96      printf("ICPT help to assist the low income and vulnerable customers under this consumption band which
is RM0.02per(kWh)\n");//details of calculate electric kWh
97      return;
98  }
99
100 float input_electric()
101 {
102     float electric;
103     printf("Please enter your total consumption (kWh): ");//enter your total electrical using without (kWh)
104     scanf("%f", &electric);
105     return electric;
106 }
107
108
109 float calculatePrice(float electric)//main function statement
110 {
111     float rate, price, ICPT, serviceTax;//declaration
```

```
112
113      if(electric<=200)//if else statement
114      {
115          rate= electric*0.218;
116          ICPT= electric*0.02;
117          price= rate-ICPT;
118      }//calculation
119
120      else if(electric<=300)//if else statement
121      {
122          rate=(200*0.218)+((electric-200)*0.334);
123          ICPT= electric*0.02;
124          price= rate;
125      }//calculation
126
127      else if(electric<=600)//if else statement
128      {
129          rate=(200*0.218)+(100*0.334)+((electric-300)*0.516);
130          ICPT= electric*0.02;
131          price= rate-ICPT;
```

```
    }//calculation

    else if(electric<=900)//if else statement
    {
        rate=(200*0.218)+(100*0.334)+(300*0.516)+((electric-600)*0.546);
        ICPT= electric*0.02;
        servicetax= (((electric-600)*0.546)- ((electric-600)*0.02))*0.06;
        price= rate-ICPT+servicetax;
    }//calculation

    else//if else statement
    {
        rate=(200*0.218)+(100*0.334)+(300*0.516)+(300*0.546)+((electric-900)*0.571);
        ICPT= electric*0.02;
        servicetax= ((300*0.546)+((electric-900)*0.571)- ((electric-600)*0.02))*0.06;
        price= rate-ICPT+servicetax;
    }//calculation

    return price;//return back price to function statement
}

char input_respond()
{
```

```
    char respond;
    printf("\nAnymore electric bills (Y/N)? : ");//enter anymore electric bills that need to pay
    scanf(" %c", &respond);
    return respond;
}

void display2()
{
    printf("\n=========================================================================\n");
    printf(" Summary of Electrical Bills\n");
    printf("-------------------------------------------------------------------------");//display screen
    return;
}

void displaytotal(float x)
{
    printf("Total Price                 RM %.2f",x);//total payment of all the electric bills
}
```

6. Conclusion

In a nutshell, the electricity bills calculator system is successfully developed and built to help our users calculating their bills. At the same time, we have learnt that we should not overuse or cause any waste of our electricity as it is a valuable resource, a precious gift to all of us and we should use it wisely. Besides, we can avoid the costly bills that will burden us if we use electricity with wisdom.

7. Reference

1) https://www.pulseenergy.co.nz/our-blog/a-brief-history-of-electricity/#:~:text=Ancient%20Egyptian%20texts%20dated%20to,light%20objects%20such%20as%20feathers.
2) https://www.tnb.com.my/about-tnb/history#:~:text=The%20Story%20Of%20Electricity,-Electricity%20first%20made&text=In%201900%2C%20the%20Sempam%20Hydroelectric,first%20power%20station%20in%20Malaysia.
3) https://en.wikipedia.org/wiki/Electricity
4) https://www.mytnb.com.my/
5) https://www.mytnb.com.my/residential/understand-your-bill/bill-calculator