INDIVIDUAL ASSIGNMENT
Deadlines: 7 June 2021

Reminder:

This is an individual assignment and please do it yourself. Please do not copy your friend's report. If caught both parties will be given 0 mark. Use all the knowledge that you have learned (i.e., Black-box and White-box testing techniques) in order to complete the assignment.

Introduction

The aim of the assignment is to assess your understanding on the basic concepts and techniques of software testing. You are going to test a simple system based on both black-box and white-box testing techniques. You are given a Java code (i.e. ElectricityBil.java), the requirements and the design as the test basis. The function of the Java code is to calculate electricity bill based on the electricity consumption, type of user and type of sector.

You are required to test the functionality of the code based on the following requirements:

1. The system shall calculate the estimated bill for residential type of user.
2. The system shall calculate the estimated bill for commercial type of user under Tariff B.

What you have to do:

1. Analyze the given test basis.
2. Design test cases based on the techniques that you have learned.
3. Prepare a test script.
4. Execute the tests using a tool.
5. Assess the quality of the test cases that you have design.
6. Prepare a report that consists of:
    a. Test strategy (i.e. based on your analysis, how are you going to conduct the test)
    b. Test design
    c. Test Script (i.e. a list of test cases that you have identified from test design)
    d. Test class that consists of test methods (i.e. in the format of JUnit test class)
    e. Coverage information (i.e. print screen code under test and the percentage coverage. This can be obtained after you execute you JUnit coverage)
    f. Concluding remarks,
        i. Justify why your solution (i.e. in terms of strategy and techniques) is the most effective in testing the given system.
        ii. Justify the readiness of the system for deployment?

Test Basis:

1. System's requirements
2. System's design
3. Source code, ElectricityBill.java (see **Appendix A**)

System Requirements

The Electricity Tariff:

The system displays the estimated price based on the following information:

	TARIFF CATEGORY	UNIT	CURRENT RATE (1 JAN 2018)
	Tariff A - Domestic Tariff		
	For the first 200 kWh (1 - 200 kWh) per month	sen/kWh	21.80
	For the next 100 kWh (201 - 300 kWh) per month	sen/kWh	33.40
1.	For the next 300 kWh (301 - 600 kWh) per month	sen/kWh	51.60
	For the next 300 kWh (601 - 900 kWh) per month	sen/kWh	54.60
	For the next kWh (901 kWh onwards) per month	sen/kWh	57.10
	The minimum monthly charge is RM3.00		

Figure 1: Tariff for Residential User

TARIFF CATEGORY	CURRENT RATES(1 JAN 2014)
TARIFF B - LOW VOLTAGE COMMERCIAL TARIFF	
For the first 200 kWh (1 -200 kWh) per month	43.5 sen/kWh
For the next kWh (201 kWh onwards) per month	50.9 sen/kWh

Figure 2: Tarif for Non-Residential

The system's interface are as follows:

1. Type of Residential consists of Residential or Non-Residential. If the user enters Residential, the system shall calculate the estimated bill based on electricity consumption entered by the user and tariff as specified Figure 1.

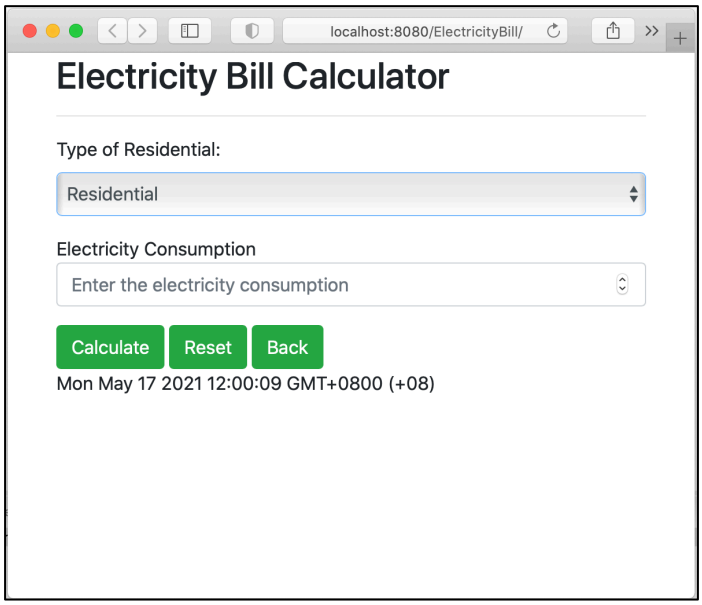


Figure 4: The input for Residential

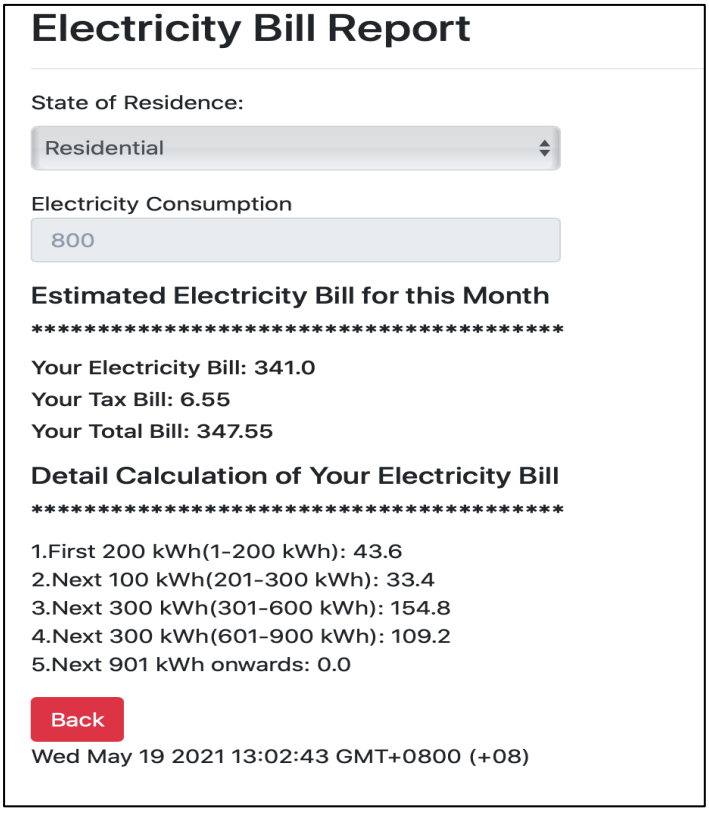


Figure 5: The sample output for Residential

2. On the other hand, if the user select Non-Residential for the type of residential, the system will ask for the value of type of sector. The value can be either Commercial or Industrial. Next, the system will ask for tariff code. Then, the system shall calculate the amount of electricity bill based on the selected tariff code as specified in Figure 2.

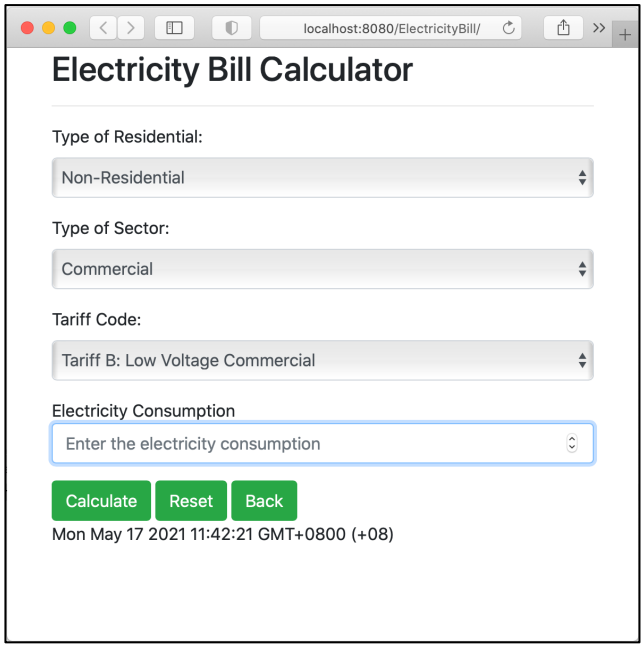


Figure 6: The Input for Non-Residential

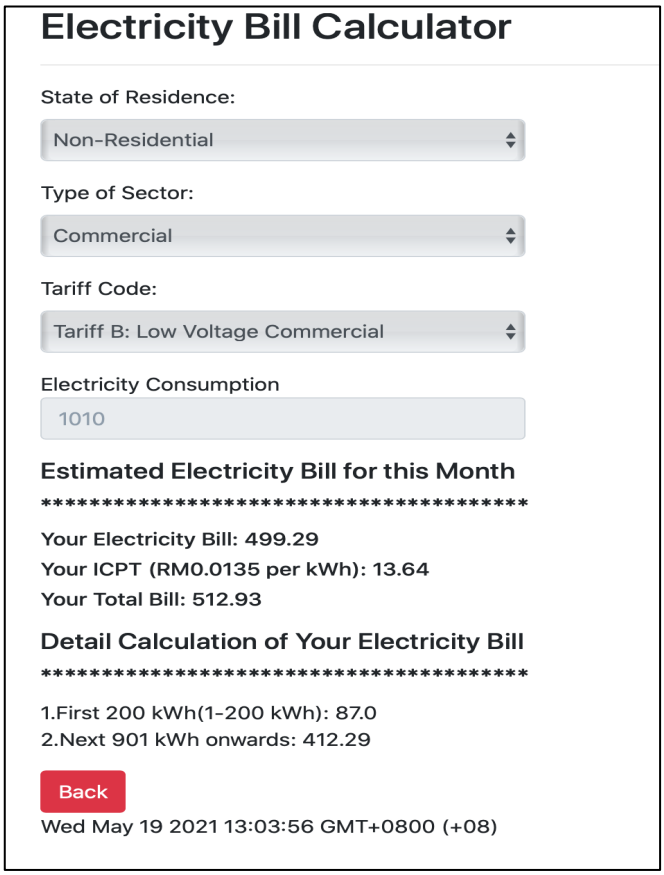
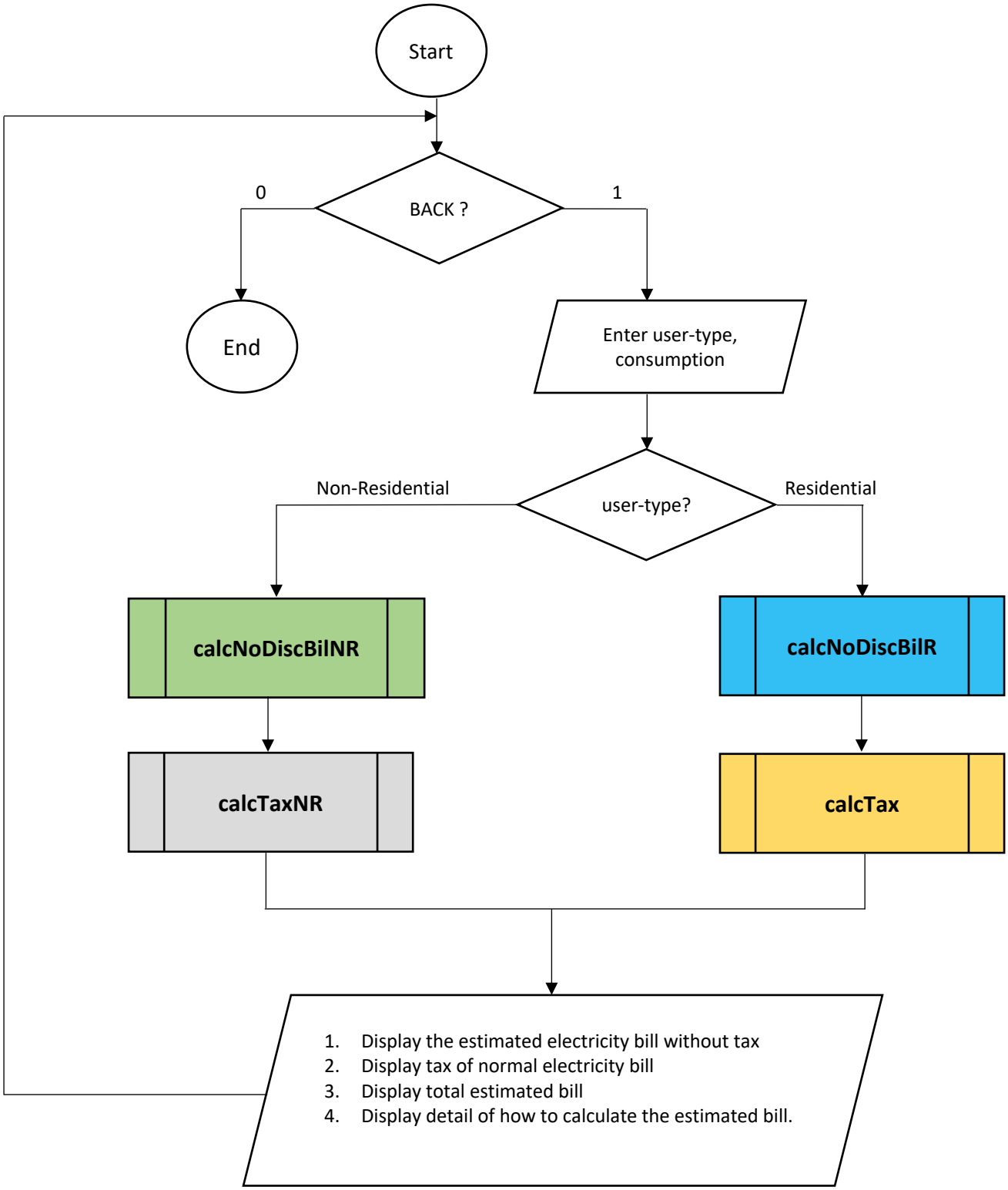
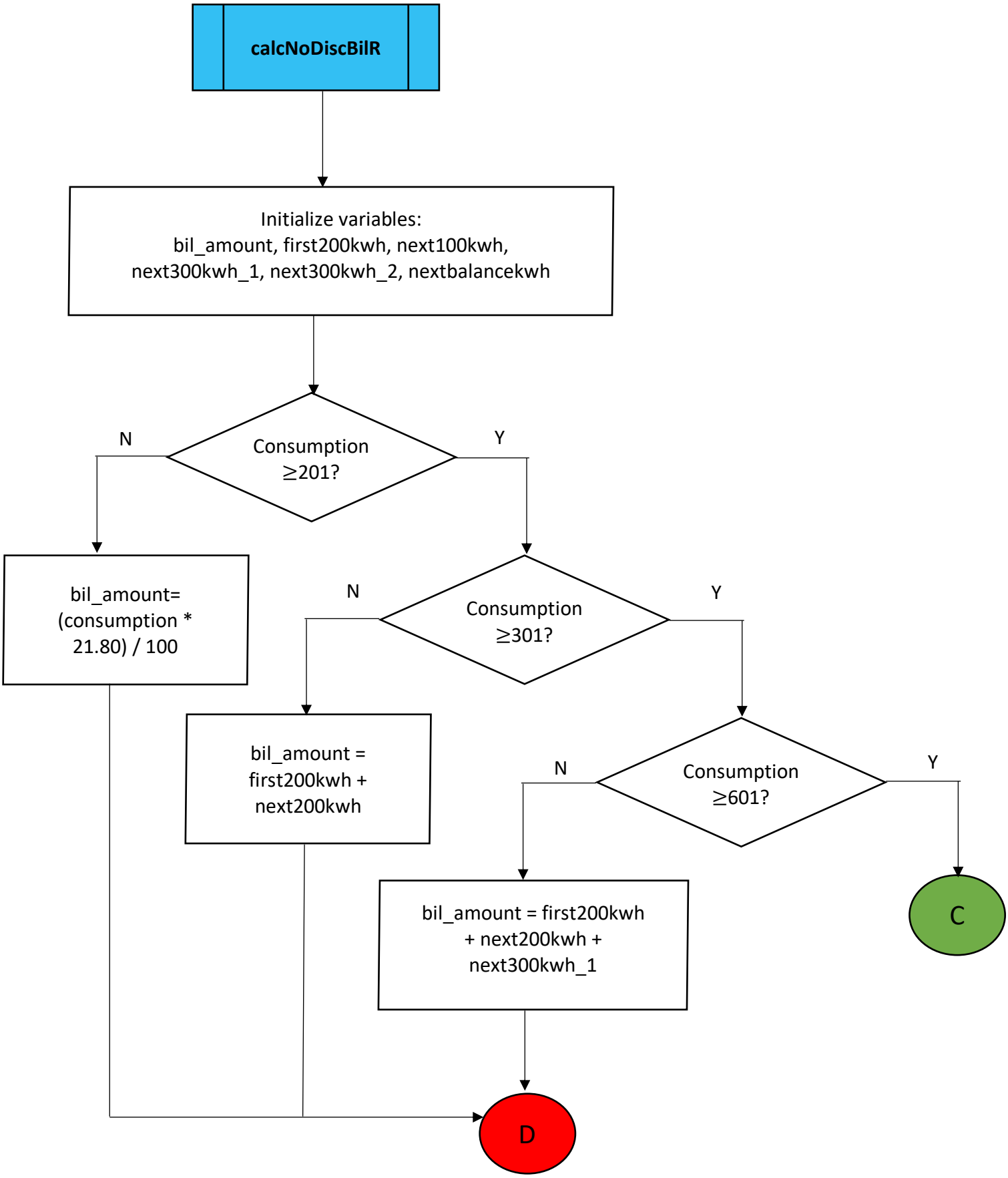
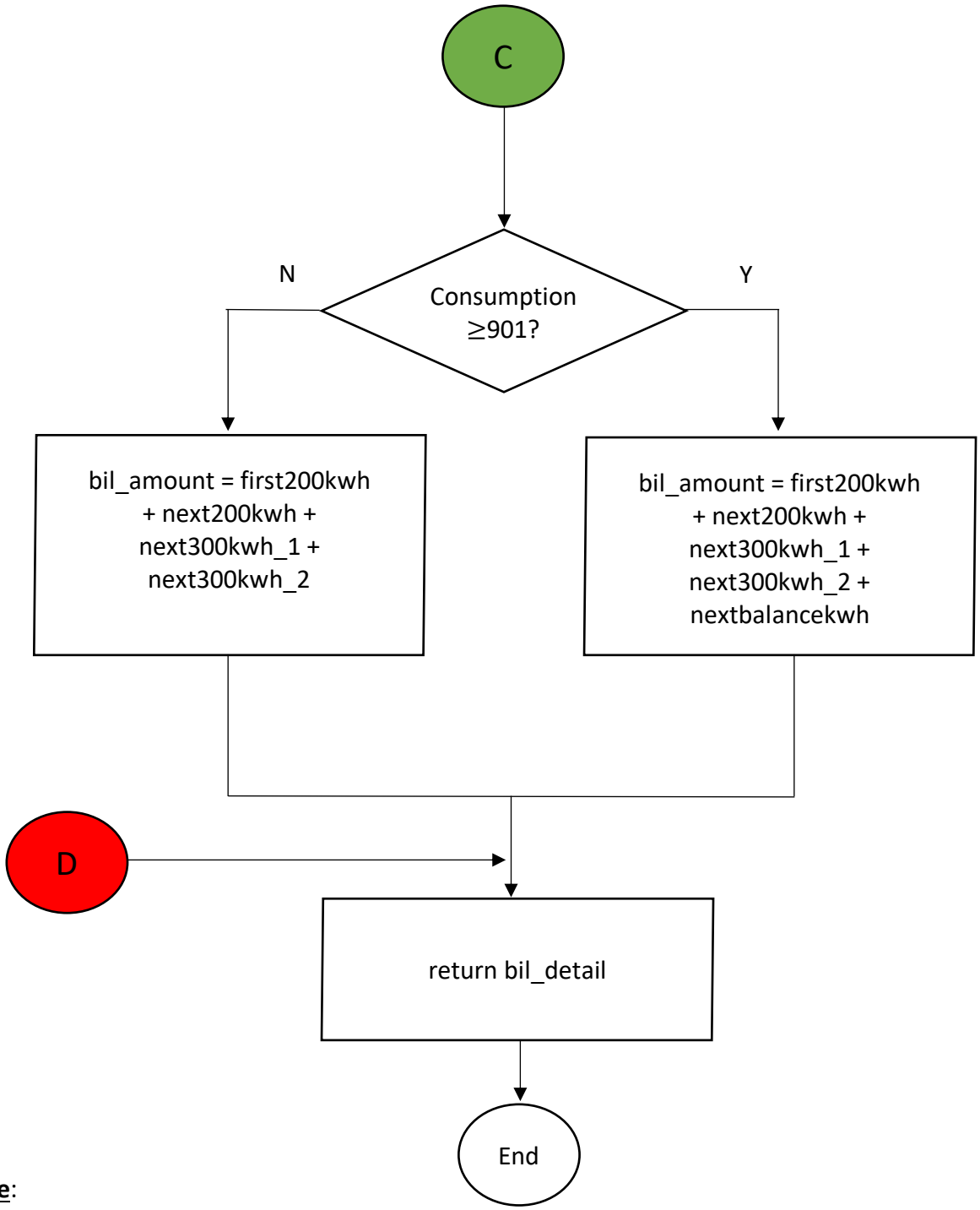


Figure 7: The sample output for Non-Residential

System Design: System Flowchart



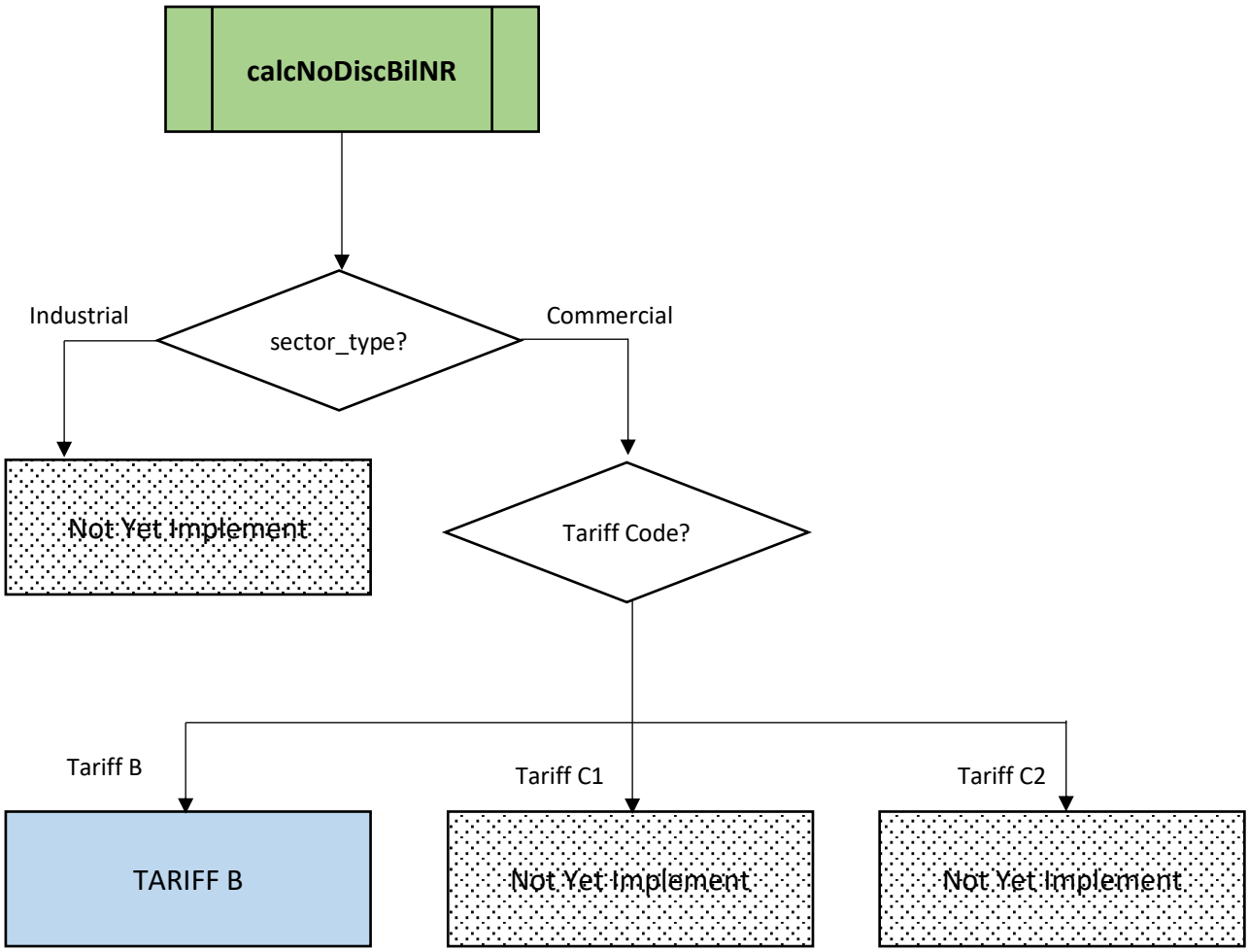

calcNoDiscBilR
Initialize variables:
bil_amount, first200kwh, next100kwh,
next300kwh_1, next300kwh_2, nextbalancekwh
Consumption
≥201?
N
Y
bil_amount=
(consumption *
21.80) / 100
Consumption
≥301?
N
Y
bil_amount =
first200kwh +
next200kwh
Consumption
≥601?
N
Y
bil_amount = first200kwh
+ next200kwh +
next300kwh_1
C
D

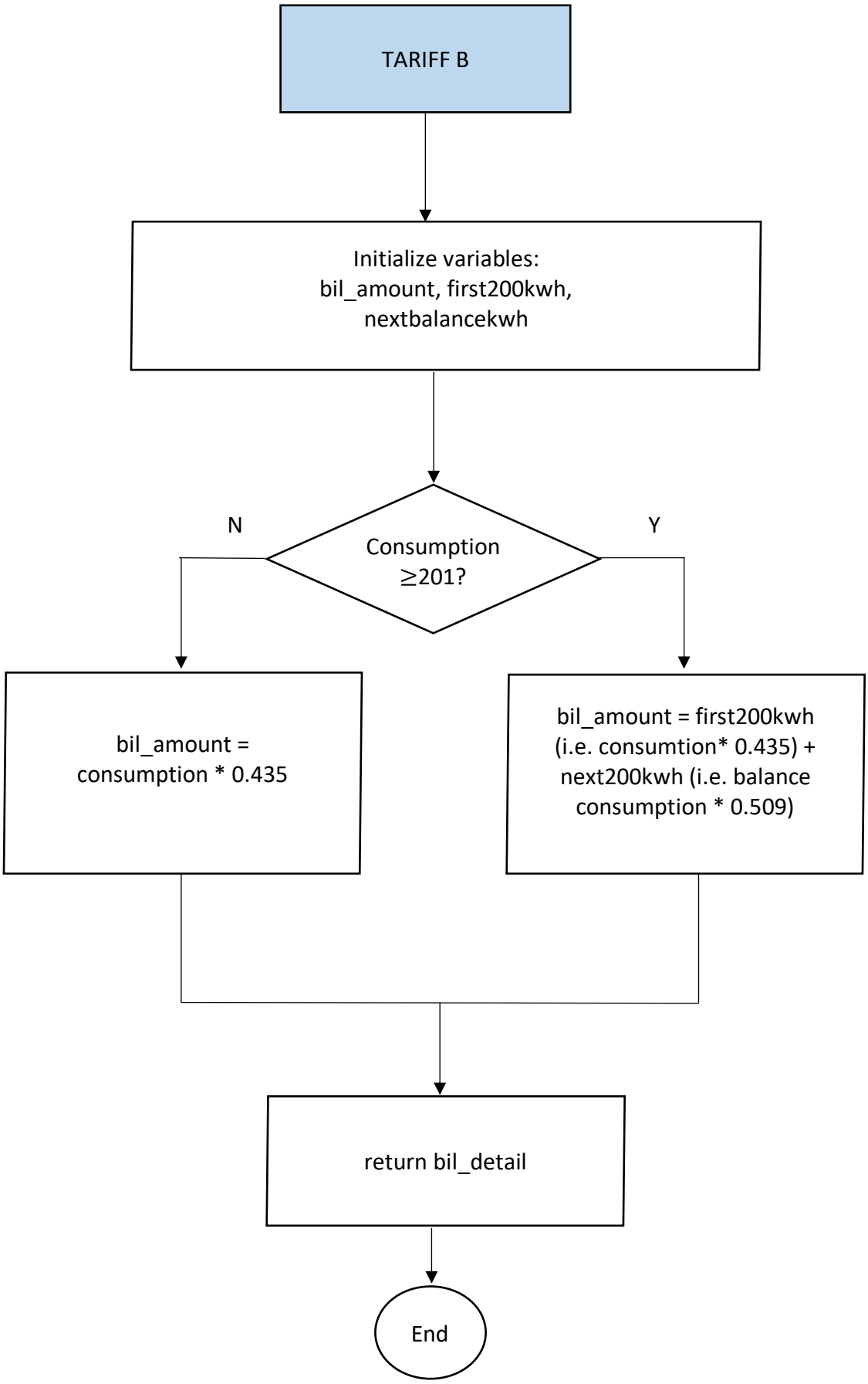


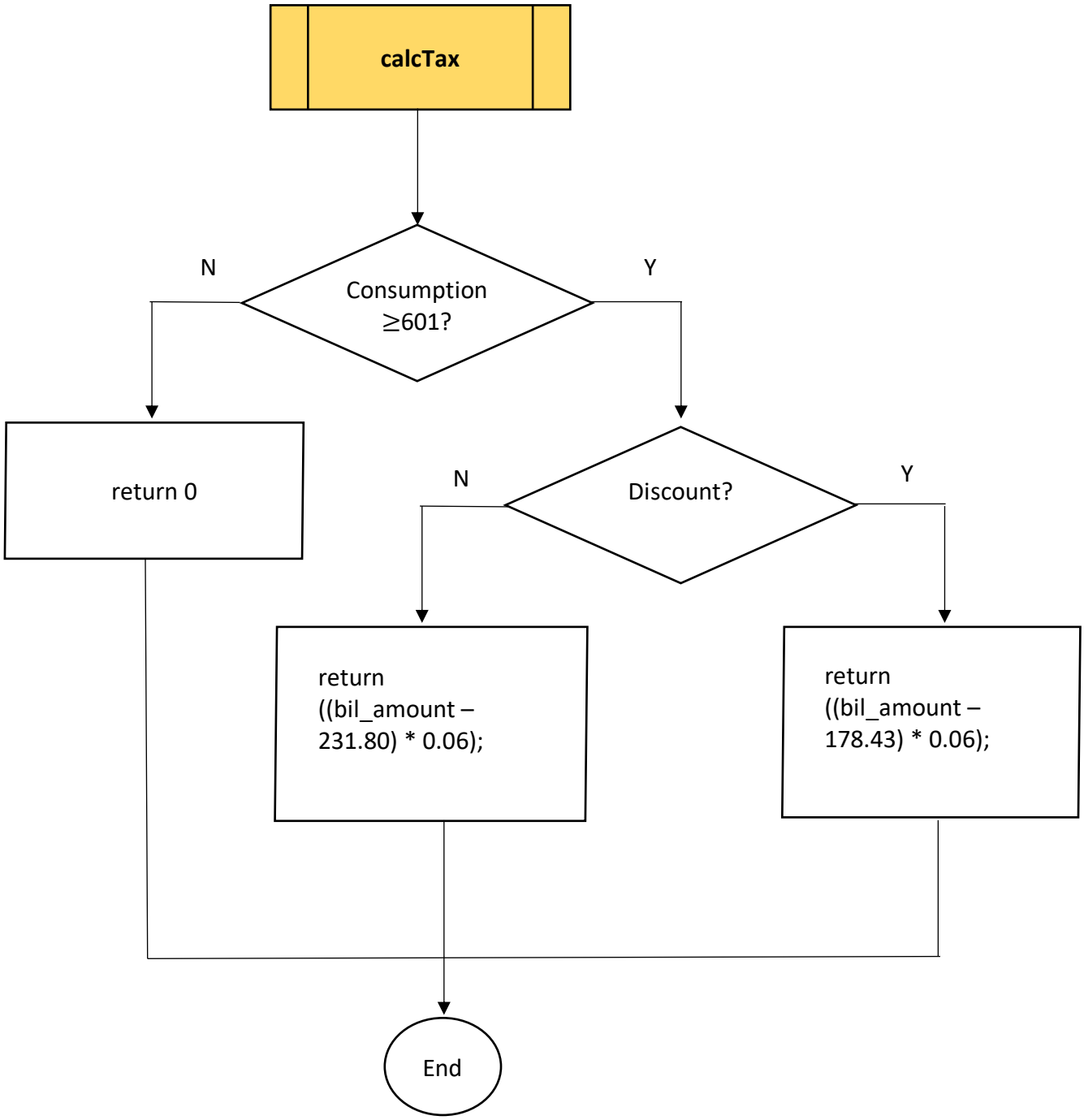
Note:

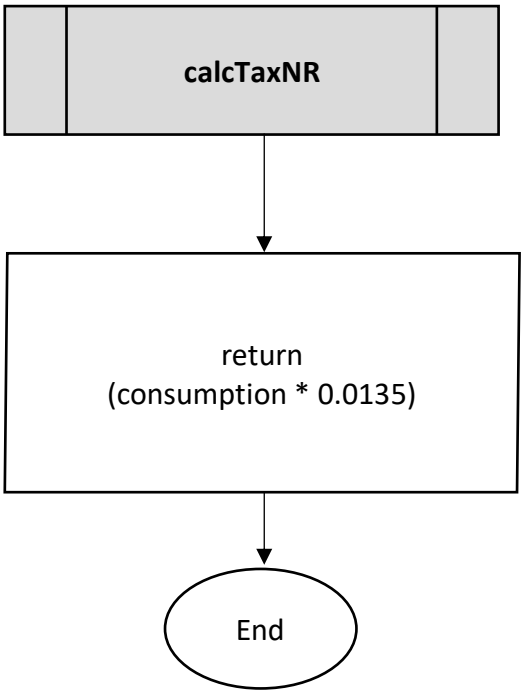
1. first100kwh = (consumption * 21.80) / 100
2. next200kwh = (@consumption * 33.40) / 100
3. next300kwh_1 = (@consumption * 51.60) / 100
4. next300kwh_1 = (@consumption * 54.60) / 100
5. nextbalancekwh = (@consumption * 57.60) / 100

@consumption – electricity consumption after deduction previous consumption


calcNoDiscBilNR
sector_type?
Industrial
Commercial
Not Yet Implement
Tariff Code?
Tariff B
Tariff C1
Tariff C2
TARIFF B
Not Yet Implement
Not Yet Implement


TARIFF B
Initialize variables:
bil_amount, first200kwh,
nextbalancekwh
N
Consumption
≥201?
Y
bil_amount =
consumption * 0.435
bil_amount = first200kwh
(i.e. consumtion* 0.435) +
next200kwh (i.e. balance
consumption * 0.509)
return bil_detail
End


calcTax
N
Consumption
≥601?
Y
return 0
N
Discount?
Y
return
((bil_amount –
231.80) * 0.06);
return
((bil_amount –
178.43) * 0.06);
End


calcTaxNR
return
(consumption * 0.0135)
End