AI Assisted Coding-Lab 3

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Batch – 41

Question 1:

TASK 1 : AI-Generated Logic for Reading Consumer Details

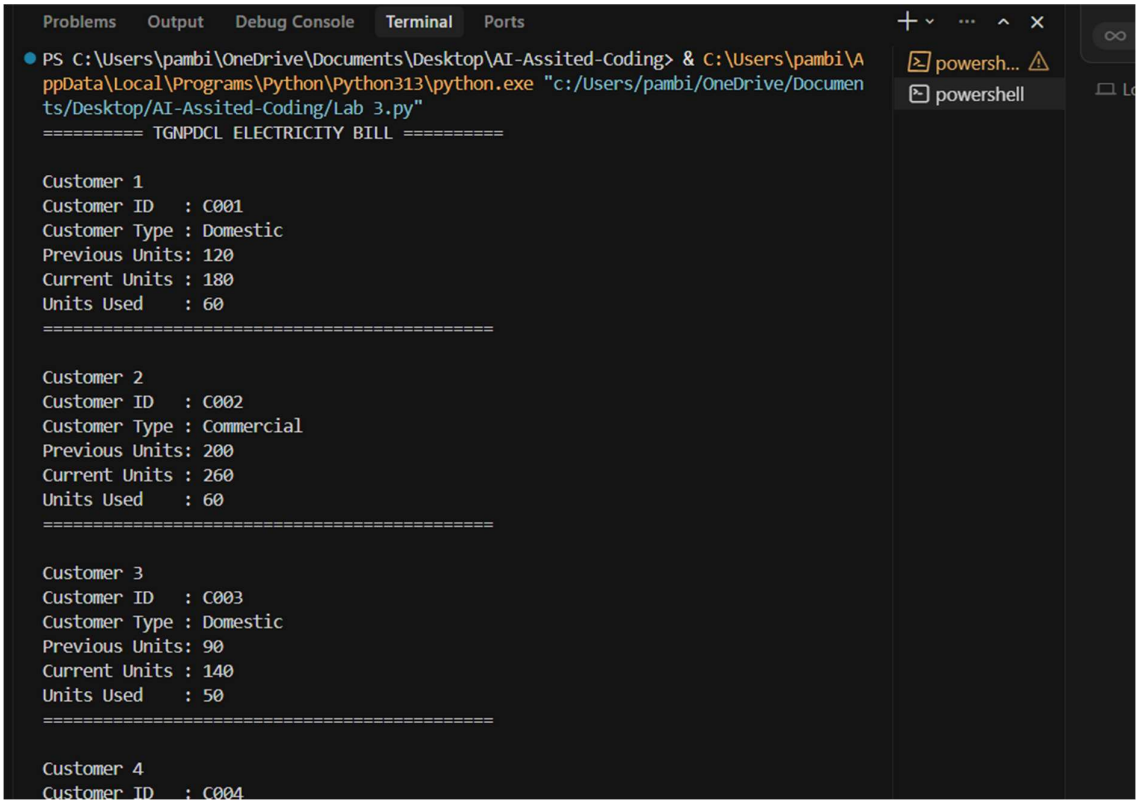
PROMPT: Generate sample electricity billing input data for 10 customers.For each customer, include Customer ID, Previous Units, Current Units, and Customer Type (Domestic or Commercial).Make sure Current Units are greater than Previous Units.Display the data in a clear table or list format suitable for input to a Python electricity billing program.

CODE:

```
customers = [
    ("C001", "Domestic", 120, 180),
    ("C002", "Commercial", 200, 260),
    ("C003", "Domestic", 90, 140),
    ("C004", "Commercial", 300, 380),
    ("C005", "Domestic", 150, 210),
    ("C006", "Commercial", 400, 470),
    ("C007", "Domestic", 220, 290),
    ("C008", "Domestic", 180, 240),
    ("C009", "Commercial", 260, 330),
    ("C010", "Domestic", 100, 160)
]
print("========== TGNPDCL ELECTRICITY BILL ==========\n")
customer_number = 1
for customer in customers:
    print("Customer", customer_number)
    customer_id = customer[0]
    customer_type = customer[1]
    previous_units = customer[2]
    current_units = customer[3]
    units_used = current_units - previous_units
    print("Customer ID   :", customer_id)
    print("Customer Type :", customer_type)
    print("Previous Units:", previous_units)
    print("Current Units :", current_units)
```

```
current_units = customer[3]
units_used = current_units - previous_units
print("Customer ID   :", customer_id)
print("Customer Type :", customer_type)
print("Previous Units:", previous_units)
print("Current Units :", current_units)
print("Units Used    :", units_used)
print("==========================================\n")
customer_number += 1
```

OUTPUT:



JUSTIFICATION:

Customer details are taken as input to identify each consumer.Previous and current units help track electricity usage.Units consumed are calculated using a simple formula.Correct input ensures accurate billing.This task forms the base for all further calculations.

Question 2:

TASK 2: Energy Charges Calculation Based on Units Consumed

PROMPT:

Write a Python program to calculate Energy Charges (EC) based on units consumed.Use conditional statements for Domestic, Commercial, and Industrial customers with different rates.Display customer ID, type, units consumed, and energy charges.Keep logic in the main program and optimize for readability.

CODE:

Lab 3.py > ... C:\Users\pambi\OneDrive\Documents\Desktop\AI-Assited-Coding\Lab 2.py

```
customers = [
    ("C001", "Domestic", 120, 180),
    ("C002", "Commercial", 200, 260),
    ("C003", "Industrial", 90, 150),
    ("C004", "Commercial", 300, 380),
    ("C005", "Domestic", 150, 210),
    ("C006", "Industrial", 400, 470),
    ("C007", "Domestic", 220, 290),
    ("C008", "Domestic", 180, 240),
    ("C009", "Commercial", 260, 330),
    ("C010", "Domestic", 100, 160)
]
print("========== TGNPDCL ELECTRICITY BILL WITH ENERGY CHARGES ==========\n")
customer_number = 1
for customer in customers:
    customer_id = customer[0]
    customer_type = customer[1]
    previous_units = customer[2]
    current_units = customer[3]
    units_used = current_units - previous_units
    if customer_type == "Domestic":
        # Example rate: Rs. 5 per unit for Domestic
        ec = units_used * 5
    elif customer_type == "Commercial":
        # Example rate: Rs. 8 per unit for Commercial
        ec = units_used * 8
    elif customer_type == "Industrial":
        # Example rate: Rs. 10 per unit for Industrial
        ec = units_used * 10
    else:
        ec = 0  # default if customer type is invalid
```

```
    ec = units_used * 10
else:
    ec = 0  # default if customer type is invalid
# Print bill details
print("Customer", customer_number)
print("Customer ID   :", customer_id)
print("Customer Type :", customer_type)
print("Previous Units:", previous_units)
print("Current Units :", current_units)
print("Units Used    :", units_used)
print("Energy Charges: Rs.", ec)
print("========================================\n")
customer_number += 1
```

OUTPUT:

```
PS C:\Users\pambi\OneDrive\Documents\Desktop\AI-Assited-Coding> ^C
PS C:\Users\pambi\OneDrive\Documents\Desktop\AI-Assited-Coding> & C:\Users\pambi\AppData\Local\Programs\Python\Python313\python.exe "c:/Users/pambi/OneDrive/Documents/Desktop/AI-Assited-Coding/Lab 3.py"
========== TGNPDCL ELECTRICITY BILL WITH ENERGY CHARGES ==========

Customer 1
Customer ID   : C001
Customer Type : Domestic
Previous Units: 120
Current Units : 180
Units Used    : 60
Energy Charges: Rs. 300
========================================

Customer 2
Customer ID   : C002
Customer Type : Commercial
Previous Units: 200
Current Units : 260
Units Used    : 60
Energy Charges: Rs. 480
========================================

Customer 3
Customer ID   : C003
Customer Type : Industrial
Previous Units: 90
Current Units : 150
Units Used    : 60
Energy Charges: Rs. 600
========================================

Customer 4
Customer ID   : C004
```

JUSTIFICATION:

This task calculates energy charges based on the number of units consumed. Different customer types are charged at different rates to ensure fair billing. Conditional statements are used to apply the correct tariff for each customer. This logic makes the program closer to real electricity billing systems. Energy charges form the major part of the total bill. This task helps understand how electricity costs are calculated in real life.

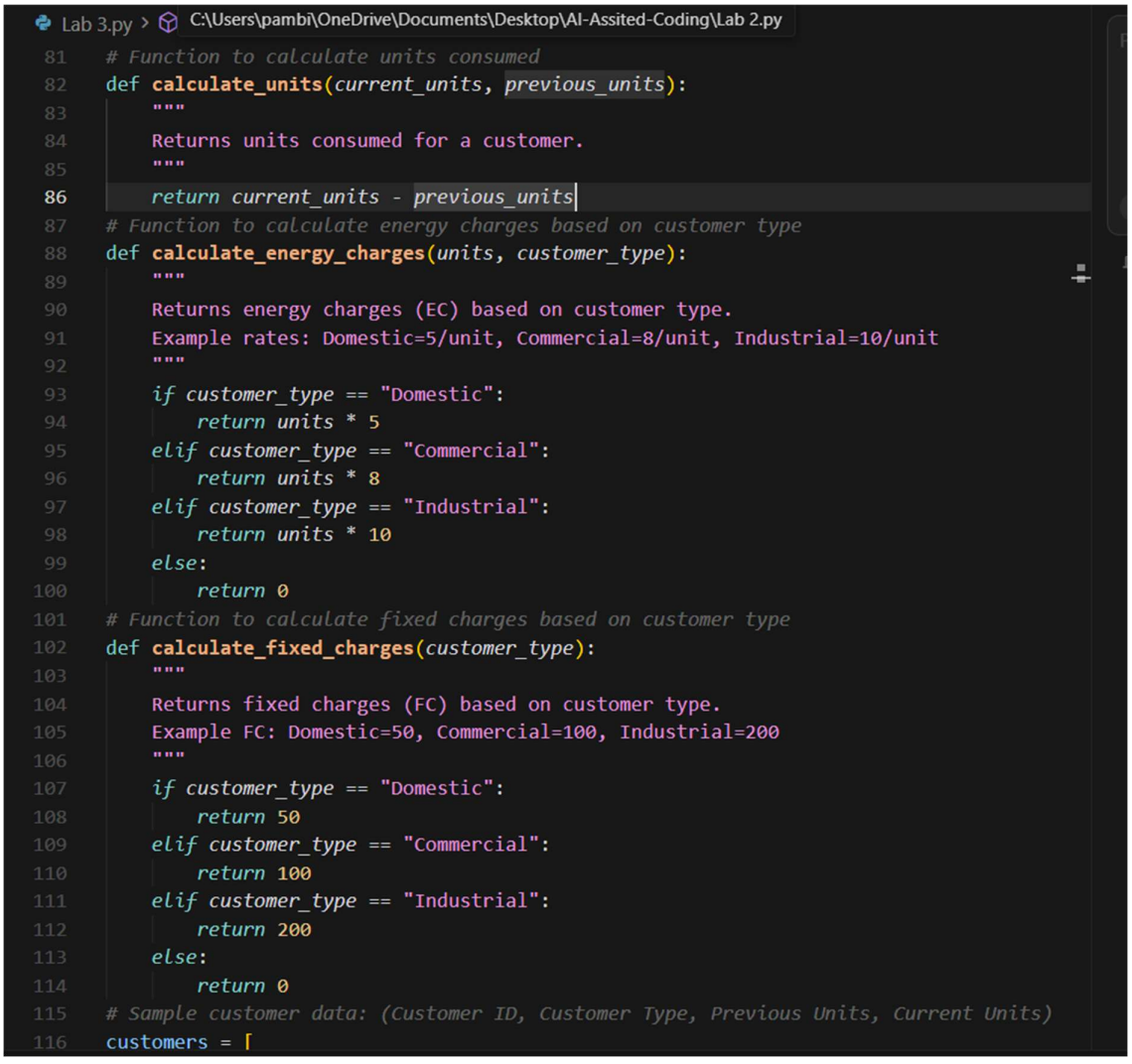
Question 3:

TASK 3: Modular Design Using AI Assistance (Using Functions)

PROMPT:

Create a Python program using functions to calculate units consumed, energy charges, and fixed charges for Domestic, Commercial, and Industrial customers, then display customer details and total charges with comments.

CODE:



```python
        return 0
customers = [
    ("C001", "Domestic", 120, 180),
    ("C002", "Commercial", 200, 260),
    ("C003", "Industrial", 90, 150),
    ("C004", "Commercial", 300, 380),
    ("C005", "Domestic", 150, 210),
    ("C006", "Industrial", 400, 470),
    ("C007", "Domestic", 220, 290),
    ("C008", "Domestic", 180, 240),
    ("C009", "Commercial", 260, 330),
    ("C010", "Domestic", 100, 160)
]
print("========== TGNPDCL FUNCTION-BASED ELECTRICITY BILL ==========\n")
customer_number = 1
for customer in customers:
    customer_id = customer[0]
    customer_type = customer[1]
    previous_units = customer[2]
    current_units = customer[3]
    units_used = calculate_units(current_units, previous_units)
    ec = calculate_energy_charges(units_used, customer_type)
    fc = calculate_fixed_charges(customer_type)
    total = ec + fc
    print(f"Customer {customer_number}")
    print("Customer ID   :", customer_id)
    print("Customer Type :", customer_type)
    print("Previous Units:", previous_units)
    print("Current Units :", current_units)
    print("Units Used    :", units_used)
    print("Energy Charges: Rs.", ec)
    print("Fixed Charges : Rs.", fc)
    print("Total Charges : Rs.", total)
    print("=============================================\n")
    customer_number += 1
```

OUTPUT:

```
PS C:\Users\pambi\OneDrive\Documents\Desktop\AI-Assited-Coding> ^C
PS C:\Users\pambi\OneDrive\Documents\Desktop\AI-Assited-Coding> & C:\Users\pambi\A
ppData\Local\Programs\Python\Python313\python.exe "c:/Users/pambi/OneDrive/Documen
ts/Desktop/AI-Assited-Coding/Lab 3.py"
========== TGNPDCL FUNCTION-BASED ELECTRICITY BILL ==========

Customer 1
Customer ID   : C001
Customer Type : Domestic
Previous Units: 120
Current Units : 180
Units Used    : 60
Energy Charges: Rs. 300
Fixed Charges : Rs. 50
Total Charges : Rs. 350
=============================================

Customer 2
Customer ID   : C002
Customer Type : Commercial
Previous Units: 200
Current Units : 260
Units Used    : 60
Energy Charges: Rs. 480
Fixed Charges : Rs. 100
Total Charges : Rs. 580
=============================================

Customer 3
Customer ID   : C003
Customer Type : Industrial
Previous Units: 90
Current Units : 150
```

JUSTIFICATION:

In this task, functions are used to make the program modular and reusable. Separate functions are created to calculate energy charges and fixed charges. This improves code readability and makes debugging easier. Modular design reduces repetition and errors in the program. It also allows handling multiple customers efficiently. This approach makes future modifications simple and manageable.

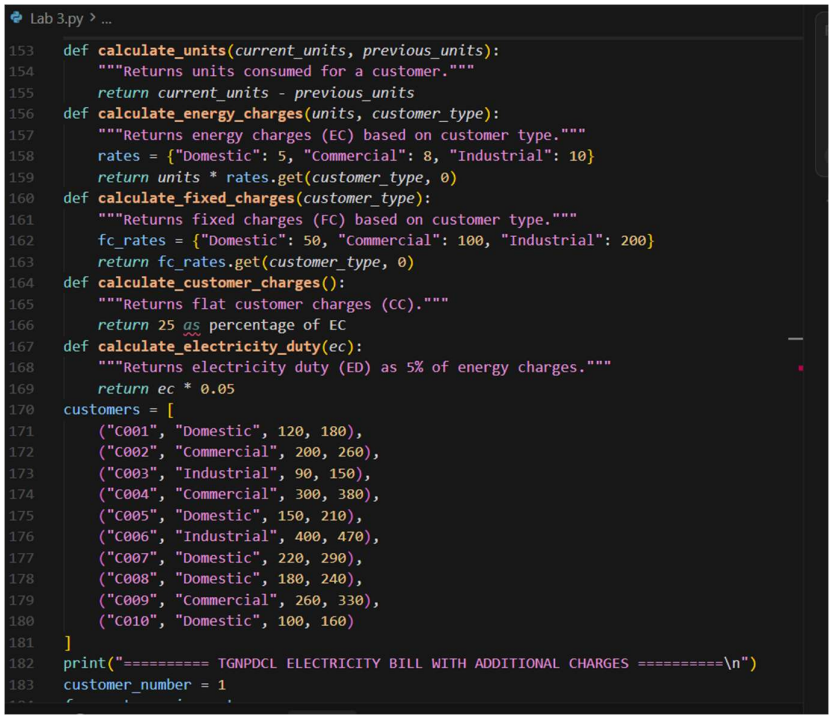
Question 4:

TASK 4: Calculation of Additional Charges

PROMPT:

Write a Python program using functions to calculate electricity bills with Energy Charges (EC), Fixed Charges (FC), Customer Charges (CC), and Electricity Duty (ED).Include units consumed formula, return values from functions, and display all charges and total in a clear format.

CODE:



```
    ("C010", "Domestic", 100, 160)
]
print("========== TGNPDCL ELECTRICITY BILL WITH ADDITIONAL CHARGES ==========\n")
customer_number = 1
for customer in customers:
    customer_id = customer[0]
    customer_type = customer[1]
    previous_units = customer[2]
    current_units = customer[3]
    units_used = calculate_units(current_units, previous_units)
    ec = calculate_energy_charges(units_used, customer_type)
    fc = calculate_fixed_charges(customer_type)
    cc = calculate_customer_charges()
    ed = calculate_electricity_duty(ec)
    total = ec + fc + cc + ed
    print(f"Customer {customer_number}")
    print("Customer ID   :", customer_id)
    print("Customer Type :", customer_type)
    print("Previous Units:", previous_units)
    print("Current Units :", current_units)
    print("Units Used    :", units_used)
    print("Energy Charges: Rs.", ec)
    print("Fixed Charges : Rs.", fc)
    print("Customer Charges: Rs.", cc)
    print("Electricity Duty: Rs.", round(ed,2))
    print("Total Charges : Rs.", round(total,2))
    print("=========================================\n")
    customer_number += 1
```

OUTPUT:

```
PS C:\Users\pambi\OneDrive\Documents\Desktop\AI-Assited-Coding> & C:\Users\pambi\AppData\Local\Programs\Python\Python313\python.exe "c:/Users/pambi/OneDrive/Documents/Desktop/AI-Assited-Coding/Lab 3.py"
========== TGNPDCL ELECTRICITY BILL WITH ADDITIONAL CHARGES ==========

Customer 1
Customer ID   : C001
Customer Type : Domestic
Previous Units: 120
Current Units : 180
Units Used    : 60
Energy Charges: Rs. 300
Fixed Charges : Rs. 50
Customer Charges: Rs. 25
Electricity Duty: Rs. 15.0
Total Charges : Rs. 390.0
=========================================

Customer 2
Customer ID   : C002
Customer Type : Commercial
Previous Units: 200
Current Units : 260
Units Used    : 60
Energy Charges: Rs. 480
Fixed Charges : Rs. 100
Customer Charges: Rs. 25
Electricity Duty: Rs. 24.0
Total Charges : Rs. 629.0
=========================================

Customer 3
Customer ID   : C003
Customer Type : Industrial
Previous Units: 90
Current Units : 150
Units Used    : 60
Energy Charges: Rs. 600
Fixed Charges : Rs. 200
```

powersh... ⚠
powershell

JUSTIFICATION:

This task adds additional charges such as fixed charges, customer charges, and electricity duty to the bill. Electricity duty is calculated as a percentage of energy charges. Including these charges ensures accurate and complete billing. This task follows real electricity board billing rules. It increases the reliability of the bill generated. It also improves transparency by showing individual charges clearly.

Question 5:

TASK 5: Final Bill Generation and Output Analysis

PROMPT:

Write a Python program using functions to generate the final electricity bill.Calculate Units Consumed, Energy Charges (EC), Fixed Charges (FC), Customer Charges (CC), Electricity Duty (ED), and Total Bill.Display all values neatly with customer details and provide clear, readable output.

CODE:

```
def calculate_units(current_units, previous_units):
    """Returns units consumed for a customer."""
    return current_units - previous_units
def calculate_energy_charges(units, customer_type):
    """Returns energy charges (EC) based on customer type."""
    rates = {"Domestic": 5, "Commercial": 8, "Industrial": 10}
    return units * rates.get(customer_type, 0)
def calculate_fixed_charges(customer_type):
    """Returns fixed charges (FC) based on customer type."""
    fc_rates = {"Domestic": 50, "Commercial": 100, "Industrial": 200}
    return fc_rates.get(customer_type, 0)
def calculate_customer_charges():
    """Returns flat customer charges (CC)."""
    return 25
def calculate_electricity_duty(ec):
    """Returns electricity duty (ED) as 5% of EC."""
    return ec * 0.05
customers = [
    ("C001", "Domestic", 120, 180),
    ("C002", "Commercial", 200, 260),
    ("C003", "Industrial", 90, 150),
    ("C004", "Commercial", 300, 380),
    ("C005", "Domestic", 150, 210),
    ("C006", "Industrial", 400, 470),
    ("C007", "Domestic", 220, 290),
    ("C008", "Domestic", 180, 240),
    ("C009", "Commercial", 260, 330),
    ("C010", "Domestic", 100, 160)
]
print("========== TGNPDCL FINAL ELECTRICITY BILL ==========\n")
customer_number = 1
```

```python
for customer in customers:
    customer_id = customer[0]
    customer_type = customer[1]
    previous_units = customer[2]
    current_units = customer[3]
    units_used = calculate_units(current_units, previous_units)
    # Charges calculation
    ec = calculate_energy_charges(units_used, customer_type)
    fc = calculate_fixed_charges(customer_type)
    cc = calculate_customer_charges()
    ed = calculate_electricity_duty(ec)
    total_bill = ec + fc + cc + ed
    print(f"Customer {customer_number}")
    print("Customer ID      :", customer_id)
    print("Customer Type    :", customer_type)
    print("Previous Units   :", previous_units)
    print("Current Units    :", current_units)
    print("Units Consumed   :", units_used)
    print("Energy Charges   : Rs.", ec)
    print("Fixed Charges    : Rs.", fc)
    print("Customer Charges : Rs.", cc)
    print("Electricity Duty : Rs.", round(ed, 2))
    print("Total Bill Amount: Rs.", round(total_bill, 2))
    print("==========================================\n")
    customer_number += 1
print("Program Analysis:")
print("Accuracy: Charges are calculated using correct formulas for EC, FC, CC, and ED.")
print("Readability: Functions modularize the logic and comments improve clarity.")
print("Real-world applicability: Output format matches standard electricity bills and is scalable for multiple customers.")
```

OUTPUT:

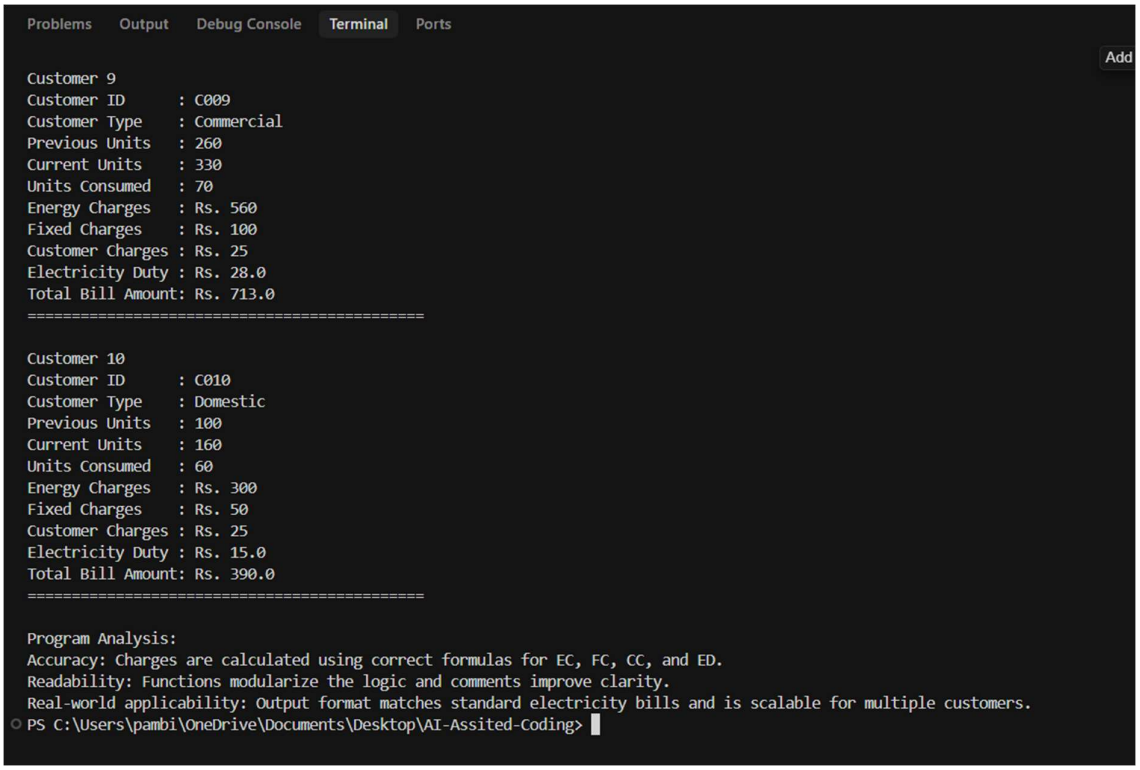
```
Problems  Output  Debug Console  Terminal  Ports

PS C:\Users\pambi\OneDrive\Documents\Desktop\AI-Assited-Coding> & C:\Users\pambi\AppData\Local\Programs\Python\Python313\p Add t
Users/pambi/OneDrive/Documents/Desktop/AI-Assited-Coding/Lab 3.py"
========== TGNPDCL FINAL ELECTRICITY BILL ==========

Customer 1
Customer ID      : C001
Customer Type    : Domestic
Previous Units   : 120
Current Units    : 180
Units Consumed   : 60
Energy Charges   : Rs. 300
Fixed Charges    : Rs. 50
Customer Charges : Rs. 25
Electricity Duty : Rs. 15.0
Total Bill Amount: Rs. 390.0
==========================================

Customer 2
Customer ID      : C002
Customer Type    : Commercial
Previous Units   : 200
Current Units    : 260
Units Consumed   : 60
Energy Charges   : Rs. 480
Fixed Charges    : Rs. 100
Customer Charges : Rs. 25
Electricity Duty : Rs. 24.0
Total Bill Amount: Rs. 629.0
==========================================

Customer 3
Customer ID      : C003
Customer Type    : Industrial
Previous Units   : 90
```



JUSTIFICATION:

In this task, all charges are added together to calculate the total bill amount. The output is displayed in a neat and clear format for easy understanding. Showing each charge separately helps customers know how the bill is formed. The program produces accurate and reliable billing results. This task completes the electricity billing application. It also helps in analyzing and verifying the correctness of calculations.