

ASSIGNMENT-03

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BATCH-41

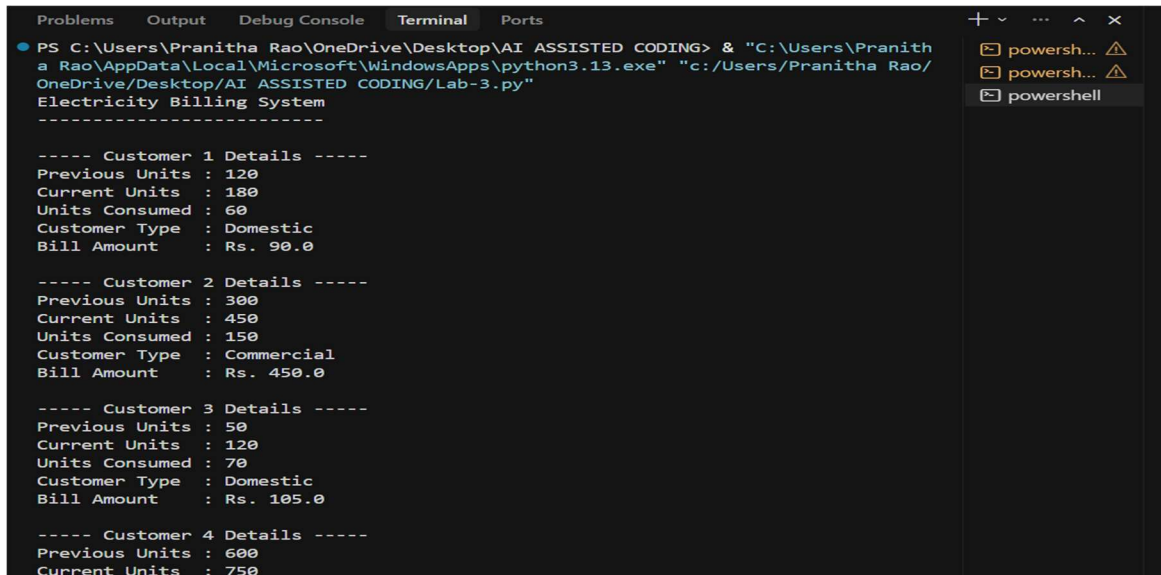
Task 1: AI-Generated Logic for Reading Consumer Details

PROMPT: Write a Python program that stores data for 10 customers (Previous Units, Current Units, Customer Type). Use a loop to calculate units consumed and electricity bill based on Domestic/Commercial rates, then display all details for each customer.

CODE:

```
Lab-1.py Lab-2.py Lab-3.py X
Lab-3.py > ...
1  #Write a Python program that stores data for 10 customers (Previous Units, Current Units,
2  # Electricity Billing System with Data
3
4  print("Electricity Billing System")
5  (function) def print(
6      *values: object,
7      sep: str | None = " ",
8      end: str | None = "\n",
9      file: SupportsWrite[str] | None = None,
10     flush: Literal[False] = False
11 ) -> None
12
13 Prints the values to a stream, or to sys.stdout by default.
14 sep
15 string inserted between values, default a space.
16 end
17 string appended after the last value, default a newline.
18 (500, 700, "Commercial")
19 ]
20
21 # Loop through customers
22 for i in range(10):
23     prev_units = customers[i][0]
24     curr_units = customers[i][1]
25     cust_type = customers[i][2]
26
27     # Calculate units consumed
28     units_consumed = curr_units - prev_units
29
30 # Billing Logic
31 if cust_type.lower() == "domestic":
32     if units_consumed <= 100:
33         amount = units_consumed * 1.5
34     elif units_consumed <= 200:
35         amount = (100 * 1.5) + ((units_consumed - 100) * 2.5)
36     else:
37         amount = (100 * 1.5) + (100 * 2.5) + ((units_consumed - 200) * 4.0)
38
39 elif cust_type.lower() == "commercial":
40     if units_consumed <= 100:
41         amount = units_consumed * 2.5
42     elif units_consumed <= 200:
43         amount = (100 * 2.5) + ((units_consumed - 100) * 4.0)
44     else:
45         amount = (100 * 2.5) + (100 * 4.0) + ((units_consumed - 200) * 6.0)
46
47 else:
48     amount = 0
49
50 # Display details
51 print("\n----- Customer", i+1, "Details -----")
52 print("Previous Units :", prev_units)
53 print("Current Units :", curr_units)
54 print("Units Consumed :", units_consumed)
55 print("Customer Type :", cust_type)
56 print("Bill Amount : Rs.", amount)
57
```

OUTPUT:



```
PS C:\Users\Pranitha Rao\OneDrive\Desktop\AI ASSISTED CODING> & "C:\Users\Pranitha Rao\AppData\Local\Microsoft\WindowsApps\python3.13.exe" "c:/Users/Pranitha Rao/OneDrive/Desktop/AI ASSISTED CODING/Lab-3.py"
Electricity Billing System
-----

----- Customer 1 Details -----
Previous Units : 120
Current Units  : 180
Units Consumed : 60
Customer Type  : Domestic
Bill Amount    : Rs. 90.0

----- Customer 2 Details -----
Previous Units : 300
Current Units  : 450
Units Consumed : 150
Customer Type  : Commercial
Bill Amount    : Rs. 450.0

----- Customer 3 Details -----
Previous Units : 50
Current Units  : 120
Units Consumed : 70
Customer Type  : Domestic
Bill Amount    : Rs. 105.0

----- Customer 4 Details -----
Previous Units : 600
Current Units  : 750
```

JUSTIFICATION:

This program is built to figure out electricity bills by comparing a customer's previous and current meter readings. It works out how many units were used and then applies different price slabs depending on whether the customer is domestic or commercial. Domestic users pay lower rates for the first 100 units and gradually higher rates as usage increases, while commercial users start at a higher rate and also climb with more consumption. The logic ensures that heavier usage is charged more fairly, reflecting real-world billing systems. Finally, it prints a neat summary for each customer showing their usage, type, and the total bill.

Task 2: Energy Charges Calculation Based on Units Consumed

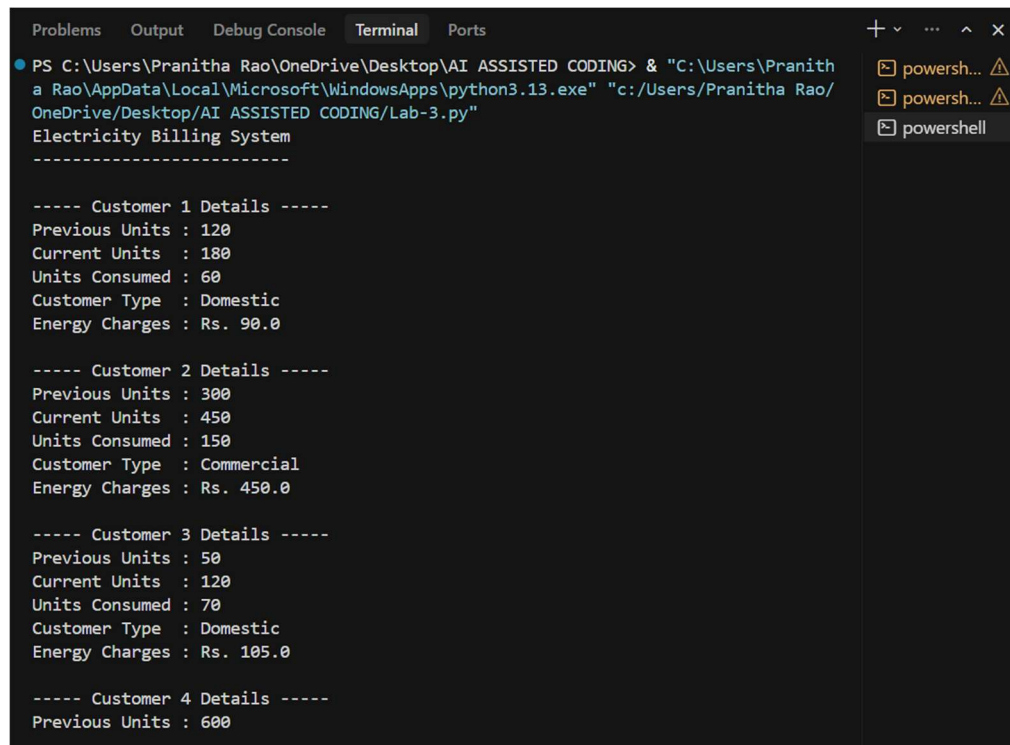
PROMPT: Write a Python program that stores data for 10 customers (Previous Units, Current Units, Customer Type: Domestic/Commercial/Industrial). Use a loop to calculate units consumed and Energy Charges (EC) based on customer type. Display all details for each customer with clear conditional logic.

CODE:

```
Lab-3.py > ...
60 #Write a Python program that stores data for 10 customers (Previous Units, Current Units,
61 # Electricity Billing System with Domestic, Commercial, and Industrial Consumers
62 print("Electricity Billing System")
63 print("-----")
64 # Data for 10 customers: (Previous Units, Current Units, Customer Type)
65 customers = [
66     (120, 180, "Domestic"),
67     (300, 450, "Commercial"),
68     (50, 120, "Domestic"),
69     (600, 750, "Industrial"),
70     (200, 280, "Domestic"),
71     (100, 250, "Commercial"),
72     (400, 500, "Industrial"),
73     (150, 220, "Commercial"),
74     (80, 160, "Domestic"),
75     (500, 700, "Industrial")
76 ]
77 # Loop through customers
78 for i in range(10):
79     prev_units = customers[i][0]
80     curr_units = customers[i][1]
81     cust_type = customers[i][2]
82     # Calculate units consumed
83     units_consumed = curr_units - prev_units
84     # Energy Charges Calculation
85     if cust_type.lower() == "domestic":
86         if units_consumed <= 100:
87             ec = units_consumed * 1.5
```

```
Lab-1.py X Lab-2.py Lab-3.py X
Close (Ctrl+F4)
Lab-3.py > ...
87         ec = units_consumed * 1.5
88     elif units_consumed <= 200:
89         ec = (100 * 1.5) + ((units_consumed - 100) * 2.5)
90     else:
91         ec = (100 * 1.5) + (100 * 2.5) + ((units_consumed - 200) * 4.0)
92 elif cust_type.lower() == "commercial":
93     if units_consumed <= 100:
94         ec = units_consumed * 2.5
95     elif units_consumed <= 200:
96         ec = (100 * 2.5) + ((units_consumed - 100) * 4.0)
97     else:
98         ec = (100 * 2.5) + (100 * 4.0) + ((units_consumed - 200) * 6.0)
99 elif cust_type.lower() == "industrial":
100     if units_consumed <= 100:
101         ec = units_consumed * 3.5
102     elif units_consumed <= 200:
103         ec = (100 * 3.5) + ((units_consumed - 100) * 5.0)
104     else:
105         ec = (100 * 3.5) + (100 * 5.0) + ((units_consumed - 200) * 7.5)
106 else:
107     ec = 0
108 # Display details
109 print("\n----- Customer", i+1, "Details -----")
110 print("Previous Units :", prev_units)
111 print("Current Units  :", curr_units)
112 print("Units Consumed :", units_consumed)
113 print("Customer Type  :", cust_type)
114 print("Energy Charges : Rs.", ec)
```

OUTPUT:



```
PS C:\Users\Pranitha Rao\OneDrive\Desktop\AI ASSISTED CODING> & "C:\Users\Pranitha Rao\AppData\Local\Microsoft\WindowsApps\python3.13.exe" "c:/Users/Pranitha Rao/OneDrive/Desktop/AI ASSISTED CODING/Lab-3.py"
Electricity Billing System
-----

----- Customer 1 Details -----
Previous Units : 120
Current Units  : 180
Units Consumed : 60
Customer Type  : Domestic
Energy Charges : Rs. 90.0

----- Customer 2 Details -----
Previous Units : 300
Current Units  : 450
Units Consumed : 150
Customer Type  : Commercial
Energy Charges : Rs. 450.0

----- Customer 3 Details -----
Previous Units : 50
Current Units  : 120
Units Consumed : 70
Customer Type  : Domestic
Energy Charges : Rs. 105.0

----- Customer 4 Details -----
Previous Units : 600
```

JUSTIFICATION :

This program prints an electricity billing system for 10 customers with different types. It calculates units consumed by subtracting previous readings from current readings. Depending on whether the customer is domestic, commercial, or industrial, it applies slab-based rates to compute energy charges. Domestic customers have the lowest rates, commercial higher, and industrial the highest, with charges increasing as usage grows. Finally, it displays each customer's details including units consumed, type, and total bill.

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

PROMPT: Write a Python program for an electricity billing system using modular design. Store data for 10 customers (Previous Units, Current Units, Customer Type: Domestic/Commercial/Industrial). Use user-defined functions to calculate Energy Charges (EC) and Fixed Charges (FC), return values, and display all details for each customer.

CODE:

```
Lab-1.py X Lab-2.py Lab-3.py X
Lab-1.py C:\Users\Pranitha Rao\OneDrive\Desktop\AI ASSISTED CODING\Lab-1.py
---
119 #Write a Python program for an electricity billing system using modular design. Store data
120 # Electricity Billing System using Modular Design (Functions)
121 # Function to calculate Energy Charges (EC)
122 def calculate_energy_charges(units, cust_type):
123     #Calculate energy charges based on units consumed and customer type.Domestic, Commercial
124     ec = 0
125     if cust_type.lower() == "domestic":
126         if units <= 100:
127             ec = units * 1.5
128         elif units <= 200:
129             ec = (100 * 1.5) + ((units - 100) * 2.5)
130         else:
131             ec = (100 * 1.5) + (100 * 2.5) + ((units - 200) * 4.0)
132     elif cust_type.lower() == "commercial":
133         if units <= 100:
134             ec = units * 2.5
135         elif units <= 200:
136             ec = (100 * 2.5) + ((units - 100) * 4.0)
137         else:
138             ec = (100 * 2.5) + (100 * 4.0) + ((units - 200) * 6.0)
139     elif cust_type.lower() == "industrial":
140         if units <= 100:
141             ec = units * 3.5
142         elif units <= 200:
143             ec = (100 * 3.5) + ((units - 100) * 5.0)
144         else:
145             ec = (100 * 3.5) + (100 * 5.0) + ((units - 200) * 7.5)
```

```
Lab-1.py X Lab-2.py Lab-3.py X
Lab-3.py C:\Users\Pranitha Rao\OneDrive\Desktop\AI ASSISTED CODING\Lab-1.py
144     else:
145         ec = (100 * 3.5) + (100 * 5.0) + ((units - 200) * 7.5)
146     return ec
147 # Function to calculate Fixed Charges (FC)
148 def calculate_fixed_charges(cust_type):
149     #Calculate fixed charges based on customer type.
150     if cust_type.lower() == "domestic":
151         return 50 # Rs. 50 fixed charge
152     elif cust_type.lower() == "commercial":
153         return 100 # Rs. 100 fixed charge
154     elif cust_type.lower() == "industrial":
155         return 200 # Rs. 200 fixed charge
156     else:
157         return 0
158 # ----- Main Program -----
159 print("Electricity Billing System (Function-Based)")
160 print("-----")
161 # Data for 10 customers: (Previous Units, Current Units, Customer Type)
162 customers = [
163     (120, 180, "Domestic"),
164     (300, 450, "Commercial"),
165     (50, 120, "Domestic"),
166     (600, 750, "Industrial"),
167     (200, 280, "Domestic"),
168     (100, 250, "Commercial"),
169     (400, 500, "Industrial"),
170     (150, 220, "Commercial"),
171     (80, 160, "Domestic"),
```

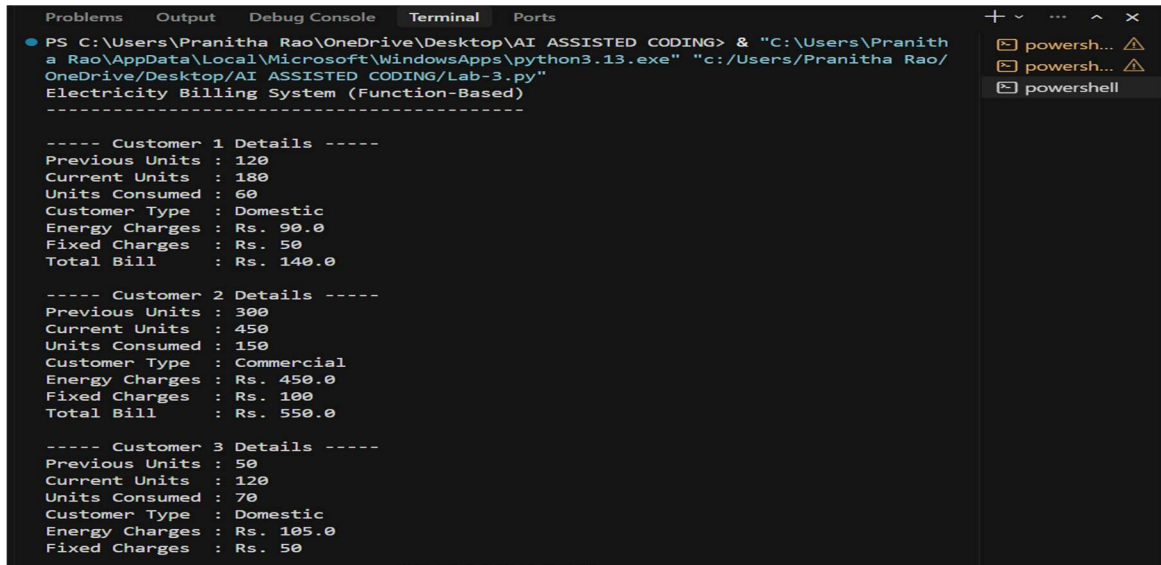


```

171     (80, 160, "Domestic"),
172     (500, 700, "Industrial")
173 ]
174 # Process each customer
175 for i, cust in enumerate(tuple[int, int, str]](customers, start=1):
176     prev_units, curr_units, cust_type = cust
177     units_consumed = curr_units - prev_units
178     # Calculate EC and FC using functions
179     ec = calculate_energy_charges(units_consumed, cust_type)
180     fc = calculate_fixed_charges(cust_type)
181     total_bill = ec + fc
182     # Display details
183     print(f"\n----- Customer {i} Details -----")
184     print("Previous Units :", prev_units)
185     print("Current Units  :", curr_units)
186     print("Units Consumed :", units_consumed)
187     print("Customer Type  :", cust_type)
188     print("Energy Charges  : Rs.", ec)
189     print("Fixed Charges   : Rs.", fc)
190     print("Total Bill      : Rs.", total_bill)
191

```

OUTPUT:



```

PS C:\Users\Pranitha Rao\OneDrive\Desktop\AI ASSISTED CODING> & "C:\Users\Pranitha Rao\AppData\Local\Microsoft\WindowsApps\python3.13.exe" "c:/Users/Pranitha Rao/OneDrive/Desktop/AI ASSISTED CODING/Lab-3.py"
Electricity Billing System (Function-Based)
-----

----- Customer 1 Details -----
Previous Units : 120
Current Units  : 180
Units Consumed : 60
Customer Type  : Domestic
Energy Charges : Rs. 90.0
Fixed Charges  : Rs. 50
Total Bill     : Rs. 140.0

----- Customer 2 Details -----
Previous Units : 300
Current Units  : 450
Units Consumed : 150
Customer Type  : Commercial
Energy Charges : Rs. 450.0
Fixed Charges  : Rs. 100
Total Bill     : Rs. 550.0

----- Customer 3 Details -----
Previous Units : 50
Current Units  : 120
Units Consumed : 70
Customer Type  : Domestic
Energy Charges : Rs. 105.0
Fixed Charges  : Rs. 50

```

JUSTIFICATION:

This program calculates electricity bills using a modular design with functions. One function computes energy charges based on units consumed and customer type, applying different slab rates for domestic, commercial, and industrial users. Another function adds fixed charges depending on customer type. The main program loops through customer data, finds units consumed, and calls both functions to calculate charges. Finally, it prints each customer's details including units, type, energy charges, fixed charges, and total bill

Task 4: Calculation of Additional Charges

PROMPT: Write a Python program for an electricity billing system using functions. For 10 customers, calculate Energy Charges (EC), Fixed Charges (FC), Customer Charges (CC), and Electricity Duty (ED) based on customer type (Domestic/Commercial/Industrial). Display all individual charges and the total bill clearly.

CODE:

```
Lab-1.py × Lab-2.py Lab-3.py × ▶ ▢ ...
Lab-3.py > ...
192
193 #Write a Python program for an electricity billing system using functions. For 10 custome
194 # Electricity Billing System using Functions
195 # Calculates EC, FC, CC, and ED for 10 customers
196 # Function to calculate Energy Charges (EC)
197 def calculate_energy_charges(units, cust_type):
198     #Calculate energy charges based on units consumed and customer type.Domestic, Commere
199     ec = 0
200     if cust_type.lower() == "domestic":
201         if units <= 100:
202             ec = units * 1.5
203         elif units <= 200:
204             ec = (100 * 1.5) + ((units - 100) * 2.5)
205         else:
206             ec = (100 * 1.5) + (100 * 2.5) + ((units - 200) * 4.0)
207     elif cust_type.lower() == "commercial":
208         if units <= 100:
209             ec = units * 2.5
210         elif units <= 200:
211             ec = (100 * 2.5) + ((units - 100) * 4.0)
212         else:
213             ec = (100 * 2.5) + (100 * 4.0) + ((units - 200) * 6.0)
214     elif cust_type.lower() == "industrial":
215         if units <= 100:
216             ec = units * 3.5
217         elif units <= 200:
218             ec = (100 * 3.5) + ((units - 100) * 5.0)
219         else:
220             ec = (100 * 3.5) + (100 * 5.0) + ((units - 200) * 7.5)
```

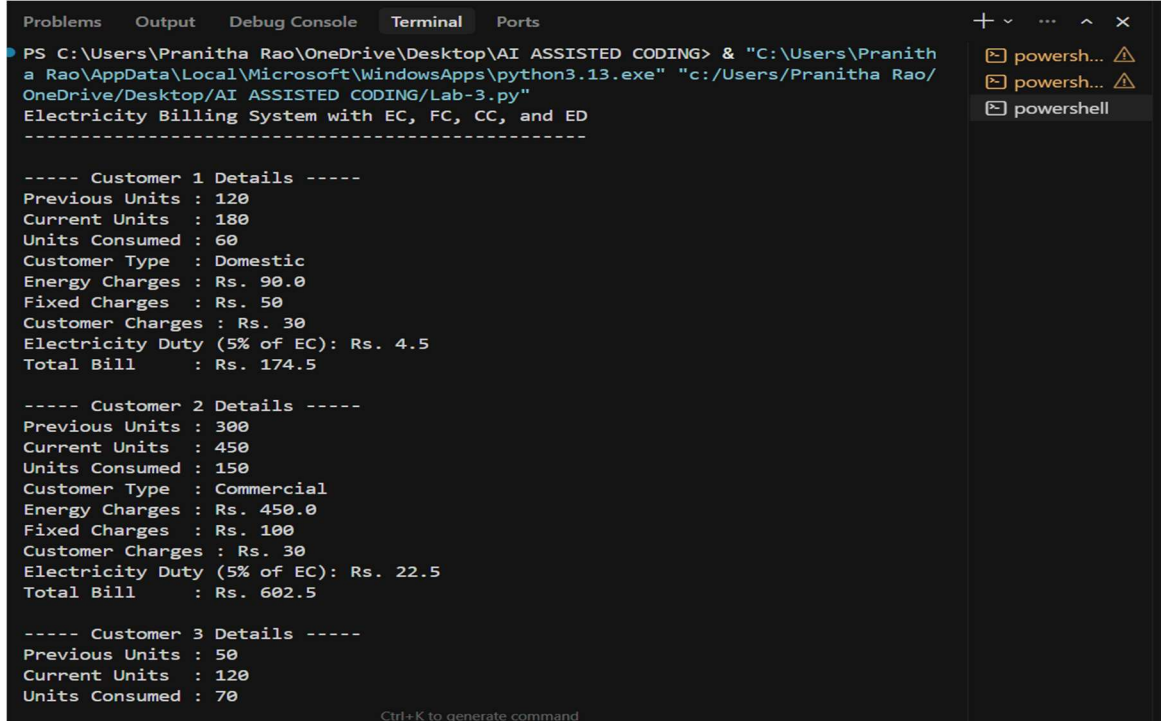
```
Lab-1.py X Lab-2.py Lab-3.py X
C:\Users\Pranitha Rao\OneDrive\Desktop\AI ASSISTED CODING\Lab-1.py

221     return ec
222 # Function to calculate Fixed Charges (FC)
223 def calculate_fixed_charges(cust_type):
224     # Calculate fixed charges based on customer type.
225     if cust_type.lower() == "domestic":
226         return 50 # Rs. 50 fixed charge
227     elif cust_type.lower() == "commercial":
228         return 100 # Rs. 100 fixed charge
229     elif cust_type.lower() == "industrial":
230         return 200 # Rs. 200 fixed charge
231     else:
232         return 0
233 # Function to calculate Customer Charges (CC)
234 def calculate_customer_charges():
235     # Customer charges are a fixed fee applied to all customers.
236     return 30 # Rs. 30 per customer
237 # Function to calculate Electricity Duty (ED)
238 def calculate_electricity_duty(ec):
239     # Electricity duty is calculated as a percentage of energy charges.
240     duty_rate = 0.05 # 5% of EC
241     return ec * duty_rate
242 # ----- Main Program -----
243 print("Electricity Billing System with EC, FC, CC, and ED")
244 print("-----")
245 # Data for 10 customers: (Previous Units, Current Units, Customer Type)
246 customers = [
247     (120, 180, "Domestic"),
248     (300, 450, "Commercial"),
249     (50, 120, "Domestic"),
```

```
Lab-1.py X Lab-2.py Lab-3.py X
C:\Users\Pranitha Rao\OneDrive\Desktop\AI ASSISTED CODING\Lab-1.py

250     (600, 750, "Industrial"),
251     (200, 280, "Domestic"),
252     (100, 250, "Commercial"),
253     (400, 500, "Industrial"),
254     (150, 220, "Commercial"),
255     (80, 160, "Domestic"),
256     (500, 700, "Industrial")
257 ]
258 # Process each customer
259 for i, cust in enumerate(tuple[int, int, str])(customers, start=1):
260     prev_units, curr_units, cust_type = cust
261     units_consumed = curr_units - prev_units
262     # Calculate charges using functions
263     ec = calculate_energy_charges(units_consumed, cust_type)
264     fc = calculate_fixed_charges(cust_type)
265     cc = calculate_customer_charges()
266     ed = calculate_electricity_duty(ec)
267     total_bill = ec + fc + cc + ed
268     # Display details
269     print(f"\n----- Customer {i} Details -----")
270     print("Previous Units :", prev_units)
271     print("Current Units :", curr_units)
272     print("Units Consumed :", units_consumed)
273     print("Customer Type :", cust_type)
274     print("Energy Charges : Rs.", ec)
275     print("Fixed Charges : Rs.", fc)
276     print("Customer Charges : Rs.", cc)
277     print("Electricity Duty (5% of EC): Rs.", ed)
278     print("Total Bill : Rs.", total_bill)
```


OUTPUT:



```
PS C:\Users\Pranitha Rao\OneDrive\Desktop\AI ASSISTED CODING> & "C:\Users\Pranitha Rao\AppData\Local\Microsoft\WindowsApps\python3.13.exe" "c:/Users/Pranitha Rao/OneDrive/Desktop/AI ASSISTED CODING/Lab-3.py"
Electricity Billing System with EC, FC, CC, and ED
-----

----- Customer 1 Details -----
Previous Units : 120
Current Units : 180
Units Consumed : 60
Customer Type : Domestic
Energy Charges : Rs. 90.0
Fixed Charges : Rs. 50
Customer Charges : Rs. 30
Electricity Duty (5% of EC): Rs. 4.5
Total Bill : Rs. 174.5

----- Customer 2 Details -----
Previous Units : 300
Current Units : 450
Units Consumed : 150
Customer Type : Commercial
Energy Charges : Rs. 450.0
Fixed Charges : Rs. 100
Customer Charges : Rs. 30
Electricity Duty (5% of EC): Rs. 22.5
Total Bill : Rs. 602.5

----- Customer 3 Details -----
Previous Units : 50
Current Units : 120
Units Consumed : 70
```

JUSTIFICATION:

This program calculates electricity bills for 10 customers using functions. It computes Energy Charges (EC) with slab rates, adds Fixed Charges (FC) by type, Customer Charges (CC) as a flat fee, and Electricity Duty (ED) at 5% of EC. The main loop processes each customer's data, finds units consumed, and applies these functions. All charges are summed to get the total bill. Finally, it prints a clear summary of each customer's usage and charges.

Task 5: Final Bill Generation and Output Analysis

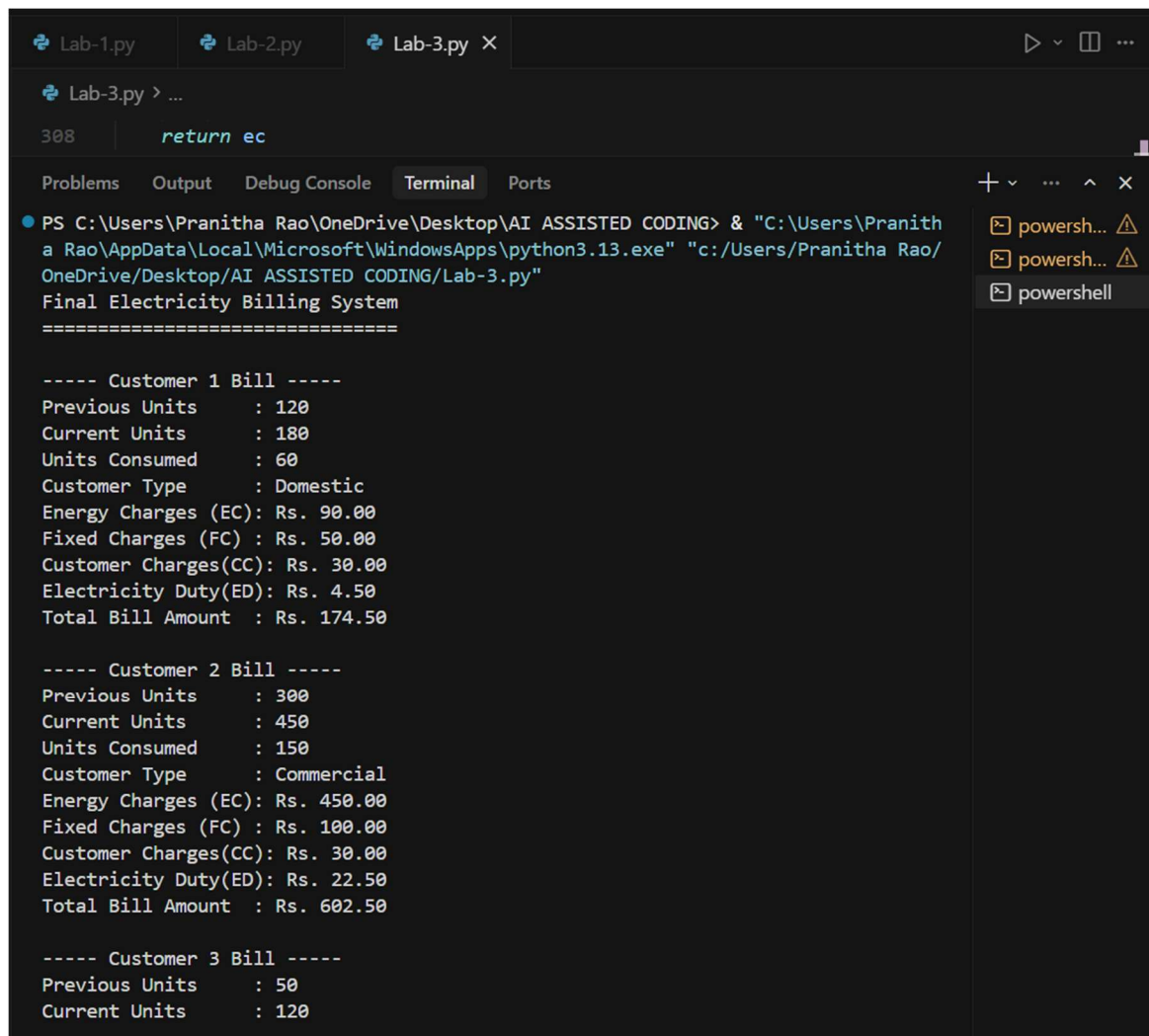
PROMPT: Write a Python program for an electricity billing system using functions. For 10 customers, calculate the Total Bill = EC + FC + CC + ED. Display all charges clearly: Energy Charges (EC), Fixed Charges (FC), Customer Charges (CC), Electricity Duty (ED), and Total Bill Amount. Provide neatly formatted output and include a short analysis of accuracy, readability, and real-world applicability.

CODE:

```
Lab-1.py X Lab-2.py Lab-3.py X
C:\Users\Pranitha Rao\OneDrive\Desktop\AI ASSISTED CODING\Lab-1.py
280
281 #Write a Python program for an electricity billing system using functions. For 10 custome
282 # Final Electricity Billing System with Output Analysis
283 # Function to calculate Energy Charges (EC)
284 def calculate_energy_charges(units, cust_type):
285     #Calculate energy charges based on units consumed and customer type. Domestic, Commer
286     ec = 0
287     if cust_type.lower() == "domestic":
288         if units <= 100:
289             ec = units * 1.5
290         elif units <= 200:
291             ec = (100 * 1.5) + ((units - 100) * 2.5)
292         else:
293             ec = (100 * 1.5) + (100 * 2.5) + ((units - 200) * 4.0)
294     elif cust_type.lower() == "commercial":
295         if units <= 100:
296             ec = units * 2.5
297         elif units <= 200:
298             ec = (100 * 2.5) + ((units - 100) * 4.0)
299         else:
300             ec = (100 * 2.5) + (100 * 4.0) + ((units - 200) * 6.0)
301     elif cust_type.lower() == "industrial":
302         if units <= 100:
303             ec = units * 3.5
304         elif units <= 200:
305             ec = (100 * 3.5) + ((units - 100) * 5.0)
306         else:
307             ec = (100 * 3.5) + (100 * 5.0) + ((units - 200) * 7.5)
```

```
Lab-1.py X Lab-2.py Lab-3.py X
C:\Users\Pranitha Rao\OneDrive\Desktop\AI ASSISTED CODING\Lab-1.py
308     return ec
309 # Function to calculate Fixed Charges (FC)
310 def calculate_fixed_charges(cust_type):
311     #Calculate fixed charges based on customer type.
312     if cust_type.lower() == "domestic":
313         return 50
314     elif cust_type.lower() == "commercial":
315         return 100
316     elif cust_type.lower() == "industrial":
317         return 200
318     else:
319         return 0
320 # Function to calculate Customer Charges (CC)
321 def calculate_customer_charges():
322     #Customer charges are a fixed fee applied to all customers.
323     return 30
324 # Function to calculate Electricity Duty (ED)
325 def calculate_electricity_duty(ec):
326     #Electricity duty is calculated as a percentage of energy charges.
327     duty_rate = 0.05 # 5% of EC
328     return ec * duty_rate
329 # ----- Main Program -----
330 print("Final Electricity Billing System")
331 print("=====")
332 # Data for 10 customers: (Previous Units, Current Units, Customer Type)
333 customers = [
334     (120, 180, "Domestic"),
335     (300, 450, "Commercial"),
```

OUTPUT:



```
Lab-1.py Lab-2.py Lab-3.py X
Lab-3.py > ...
308      return ec

Problems Output Debug Console Terminal Ports
PS C:\Users\Pranitha Rao\OneDrive\Desktop\AI ASSISTED CODING> & "C:\Users\Pranitha Rao\AppData\Local\Microsoft\WindowsApps\python3.13.exe" "c:/Users/Pranitha Rao/OneDrive/Desktop/AI ASSISTED CODING/Lab-3.py"
Final Electricity Billing System
=====

----- Customer 1 Bill -----
Previous Units      : 120
Current Units       : 180
Units Consumed      : 60
Customer Type       : Domestic
Energy Charges (EC): Rs. 90.00
Fixed Charges (FC) : Rs. 50.00
Customer Charges(CC): Rs. 30.00
Electricity Duty(ED): Rs. 4.50
Total Bill Amount   : Rs. 174.50

----- Customer 2 Bill -----
Previous Units      : 300
Current Units       : 450
Units Consumed      : 150
Customer Type       : Commercial
Energy Charges (EC): Rs. 450.00
Fixed Charges (FC) : Rs. 100.00
Customer Charges(CC): Rs. 30.00
Electricity Duty(ED): Rs. 22.50
Total Bill Amount   : Rs. 602.50

----- Customer 3 Bill -----
Previous Units      : 50
Current Units       : 120
```

JUSTIFICATION:

This program works out electricity bills for 10 customers using functions. It finds how many units were used, then calculates energy charges with slab rates, adds fixed charges by type, a small customer fee, and electricity duty at 5%. All these are added together to get the total bill, which is printed neatly for each customer.