

LAB ASSIGNMENT:9

HTNO: 2403A52408

Assignment Title: Lab 9 – Documentation Generation: Automatic Documentation and Code Comments

Task 1: Automatic Code Commenting

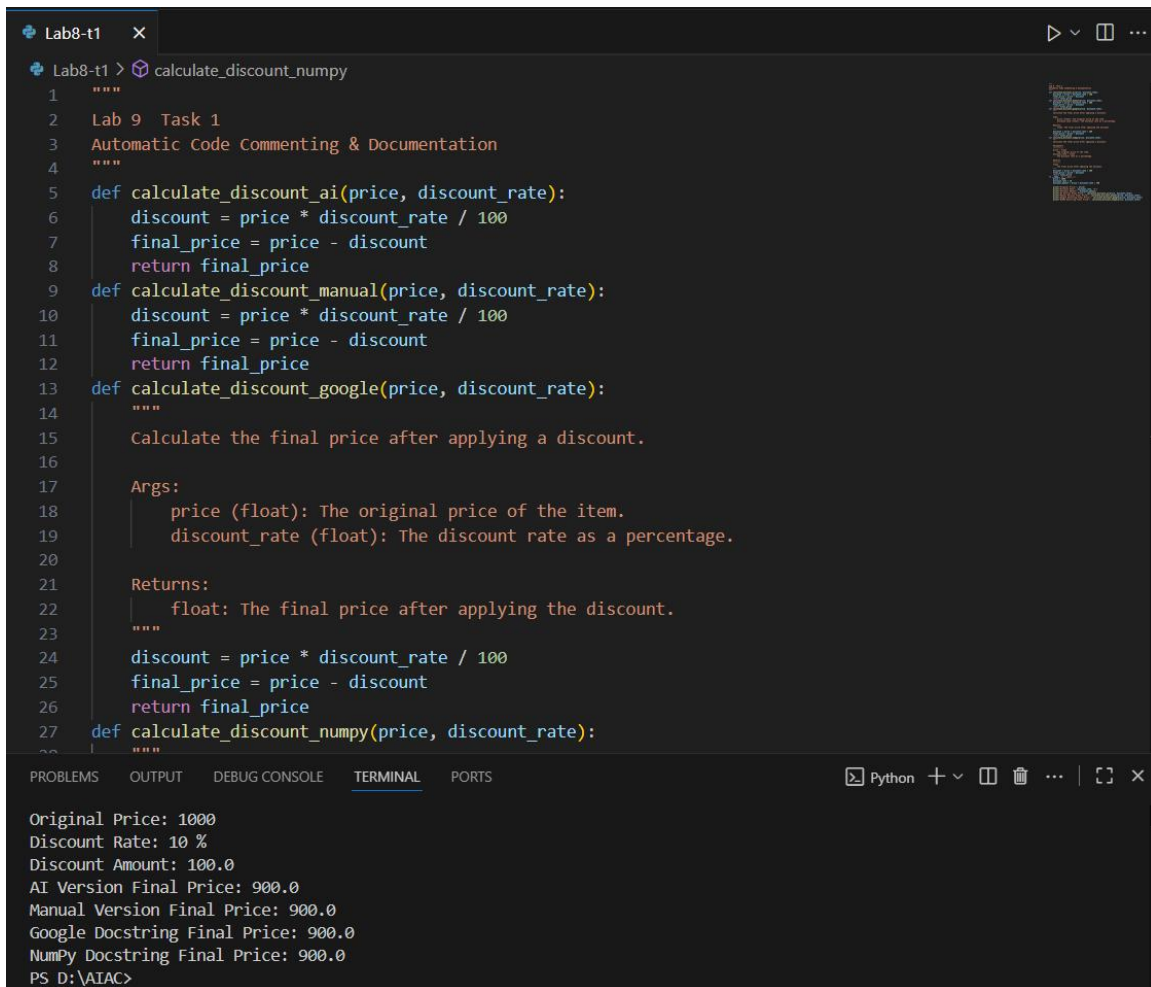
🔗 **Moto:** The main goal of Task 1 is to learn how to add inline comments and docstrings to explain code clearly, making it more understandable and maintainable. It also compares auto-generated vs manually written comments.

PROMPT:

Add clear inline comments and docstrings to the AI-generated code, explaining its purpose, inputs, and logic. Make the code easier to understand and maintain. Then compare your manual comments with the AI-generated ones, highlighting differences in clarity, detail, and usefulness.

EXPLANATION: involves adding inline comments and Python docstrings to explain the logic, parameters, and return values of functions. This improves code clarity and maintainability. You'll also compare manual documentation with AI-generated comments to assess which better supports code understanding and future development in Python projects.

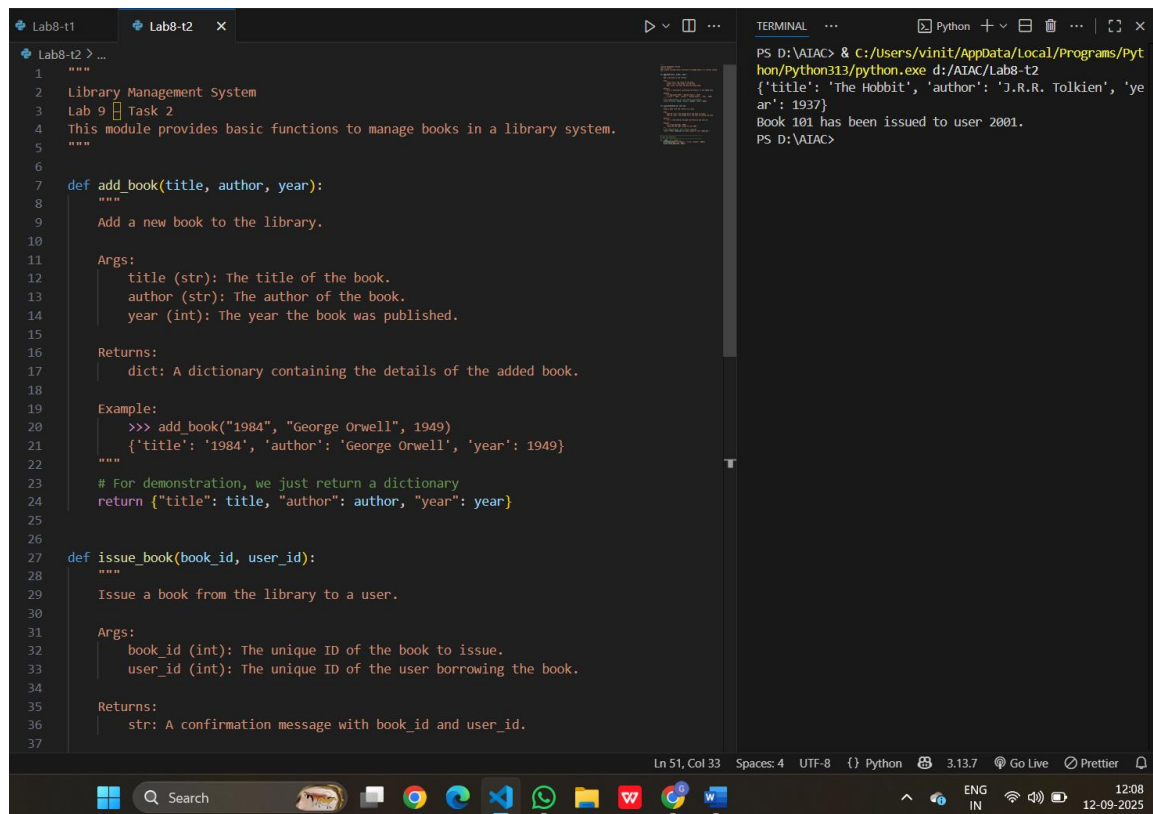
Code/Output:



```
Lab8-t1 X
Lab8-t1 > calculate_discount_numpy
1 """
2 Lab 9 Task 1
3 Automatic Code Commenting & Documentation
4 """
5 def calculate_discount_ai(price, discount_rate):
6     discount = price * discount_rate / 100
7     final_price = price - discount
8     return final_price
9 def calculate_discount_manual(price, discount_rate):
10     discount = price * discount_rate / 100
11     final_price = price - discount
12     return final_price
13 def calculate_discount_google(price, discount_rate):
14     """
15     Calculate the final price after applying a discount.
16
17     Args:
18         price (float): The original price of the item.
19         discount_rate (float): The discount rate as a percentage.
20
21     Returns:
22         float: The final price after applying the discount.
23     """
24     discount = price * discount_rate / 100
25     final_price = price - discount
26     return final_price
27 def calculate_discount_numpy(price, discount_rate):
28     """
29     """
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```

documentation from the source code, you ensure updates are easier to manage and reduce the risk of outdated or incomplete developer-facing documentation.


Code/Output:



```
1  """
2  Library Management System
3  Lab 9 Task 2
4  This module provides basic functions to manage books in a library system.
5  """
6
7  def add_book(title, author, year):
8      """
9      Add a new book to the library.
10
11      Args:
12          title (str): The title of the book.
13          author (str): The author of the book.
14          year (int): The year the book was published.
15
16      Returns:
17          dict: A dictionary containing the details of the added book.
18
19      Example:
20          >>> add_book("1984", "George Orwell", 1949)
21          {'title': '1984', 'author': 'George Orwell', 'year': 1949}
22      """
23      # For demonstration, we just return a dictionary
24      return {"title": title, "author": author, "year": year}
25
26
27  def issue_book(book_id, user_id):
28      """
29      Issue a book from the library to a user.
30
31      Args:
32          book_id (int): The unique ID of the book to issue.
33          user_id (int): The unique ID of the user borrowing the book.
34
35      Returns:
36          str: A confirmation message with book_id and user_id.
37  """
```

```
PS D:\AIAC> & C:/Users/vinit/AppData/Local/Programs/Python/Python313/python.exe d:/AIAC/Lab8-t2
{'title': 'The Hobbit', 'author': 'J.R.R. Tolkien', 'year': 1937}
Book 101 has been issued to user 2001.
PS D:\AIAC>
```

Task 3: AI-Assisted Code Summarization

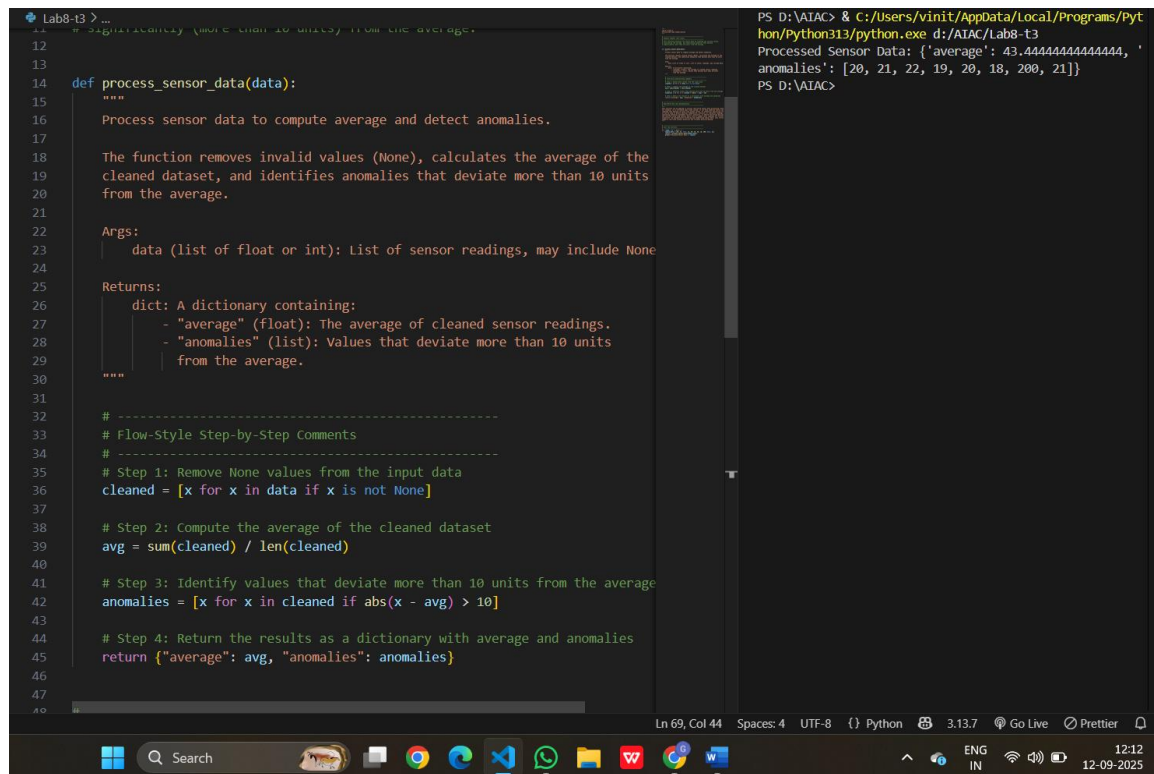
 **Moto:** The goal of Task 3 is to practice summarizing functions using concise comments, step-by-step flow explanations, and documenting real-world use cases.

PROMPT: Write brief comments summarizing each function's goal. Clearly explain each step, like reading data, cleaning it, or outputting results. Include real-world use cases—for example, how the function processes user data or generates reports. Keep it practical and easy for developers to follow

EXPLANATION: designed to improve code clarity by summarizing the purpose of functions using concise comments. You will explain the logic of each function step-by-step, helping

others follow the flow of execution easily. Additionally, you'll document real-world use cases to show how the function can be applied in practical scenarios, such as handling user input, automating tasks, or processing data. This practice strengthens your ability to write readable, maintainable code and produce documentation that supports collaboration, onboarding, and debugging. The goal is to make your code self-explanatory, practical, and valuable to developers and end users alike.

Code/Output:



The screenshot shows a code editor with a Python function `process_sensor_data` and its output in a terminal. The function is designed to process sensor data by removing invalid values, calculating the average, and identifying anomalies. The output shows the processed data with an average of 43.44444444444444 and a list of anomalies: [20, 21, 22, 19, 20, 18, 200, 21].

```
def process_sensor_data(data):  
    """  
    Process sensor data to compute average and detect anomalies.  
  
    The function removes invalid values (None), calculates the average of the  
    cleaned dataset, and identifies anomalies that deviate more than 10 units  
    from the average.  
  
    Args:  
        data (list of float or int): List of sensor readings, may include None  
  
    Returns:  
        dict: A dictionary containing:  
            - "average" (float): The average of cleaned sensor readings.  
            - "anomalies" (list): Values that deviate more than 10 units  
              from the average.  
    """  
  
    # -----  
    # Flow-Style Step-by-Step Comments  
    # -----  
    # Step 1: Remove None values from the input data  
    cleaned = [x for x in data if x is not None]  
  
    # Step 2: Compute the average of the cleaned dataset  
    avg = sum(cleaned) / len(cleaned)  
  
    # Step 3: Identify values that deviate more than 10 units from the average  
    anomalies = [x for x in cleaned if abs(x - avg) > 10]  
  
    # Step 4: Return the results as a dictionary with average and anomalies  
    return {"average": avg, "anomalies": anomalies}
```

```
PS D:\AIAC> & C:/Users/vinit/AppData/Local/Programs/Python/Python313/python.exe d:/AIAC/Lab8-t3  
Processed Sensor Data: {'average': 43.44444444444444, 'anomalies': [20, 21, 22, 19, 20, 18, 200, 21]}  
PS D:\AIAC>
```

Task 4: Real-Time Project Documentation

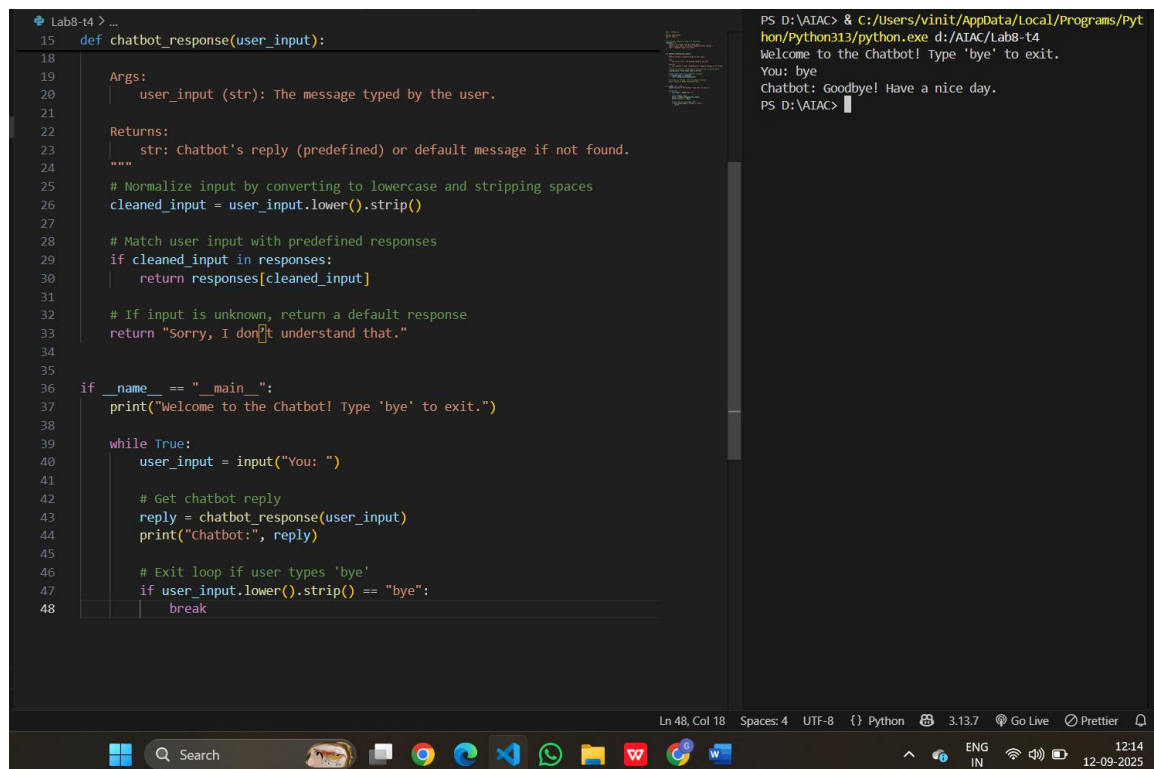
Moto: The main goal of Task 4 is to practice creating real-time project documentation with README, inline comments, AI-assisted guides, and reflection on automated documentation.

PROMPT: Produce real-time project documentation by creating a detailed README covering setup and usage, writing precise inline comments explaining complex code sections, and generating AI-assisted user guides. Evaluate the accuracy and completeness of automated documentation tools compared to manual documentation, emphasizing maintainability and developer onboarding.

EXPLANATION: involves creating comprehensive, real-time project documentation. This includes writing a clear README that covers project overview, installation steps, and usage

instructions. You'll also add inline comments to explain important code sections for better understanding. Using AI-assisted tools, you'll generate user guides to complement your manual documentation. Finally, you'll reflect on the quality and usefulness of automated documentation compared to your own efforts. This task emphasizes producing accessible, well-structured documentation that helps developers and users navigate the project, supports collaboration, and ensures maintainability over time.

Code/Output:



```
15 def chatbot_response(user_input):
16
17     Args:
18         user_input (str): The message typed by the user.
19
20     Returns:
21         str: Chatbot's reply (predefined) or default message if not found.
22     """
23     # Normalize input by converting to lowercase and stripping spaces
24     cleaned_input = user_input.lower().strip()
25
26     # Match user input with predefined responses
27     if cleaned_input in responses:
28         return responses[cleaned_input]
29
30     # If input is unknown, return a default response
31     return "Sorry, I don't understand that."
32
33 if __name__ == "__main__":
34     print("Welcome to the Chatbot! Type 'bye' to exit.")
35
36     while True:
37         user_input = input("You: ")
38
39         # Get chatbot reply
40         reply = chatbot_response(user_input)
41         print("Chatbot:", reply)
42
43         # Exit loop if user types 'bye'
44         if user_input.lower().strip() == "bye":
45             break
```

```
PS D:\AIAC> & C:/Users/vinit/AppData/Local/Programs/Python/Python313/python.exe d:/AIAC/Lab8-t4
Welcome to the Chatbot! Type 'bye' to exit.
You: bye
Chatbot: Goodbye! Have a nice day.
PS D:\AIAC>
```

Observation

In this lab, I learned the importance of inline comments, docstrings, and documentation tools. Automated documentation keeps code easy to maintain, while manual notes provide context. Combining both approaches helps in building reliable and maintainable projects.