Assignment: Python Programming for GUI Development

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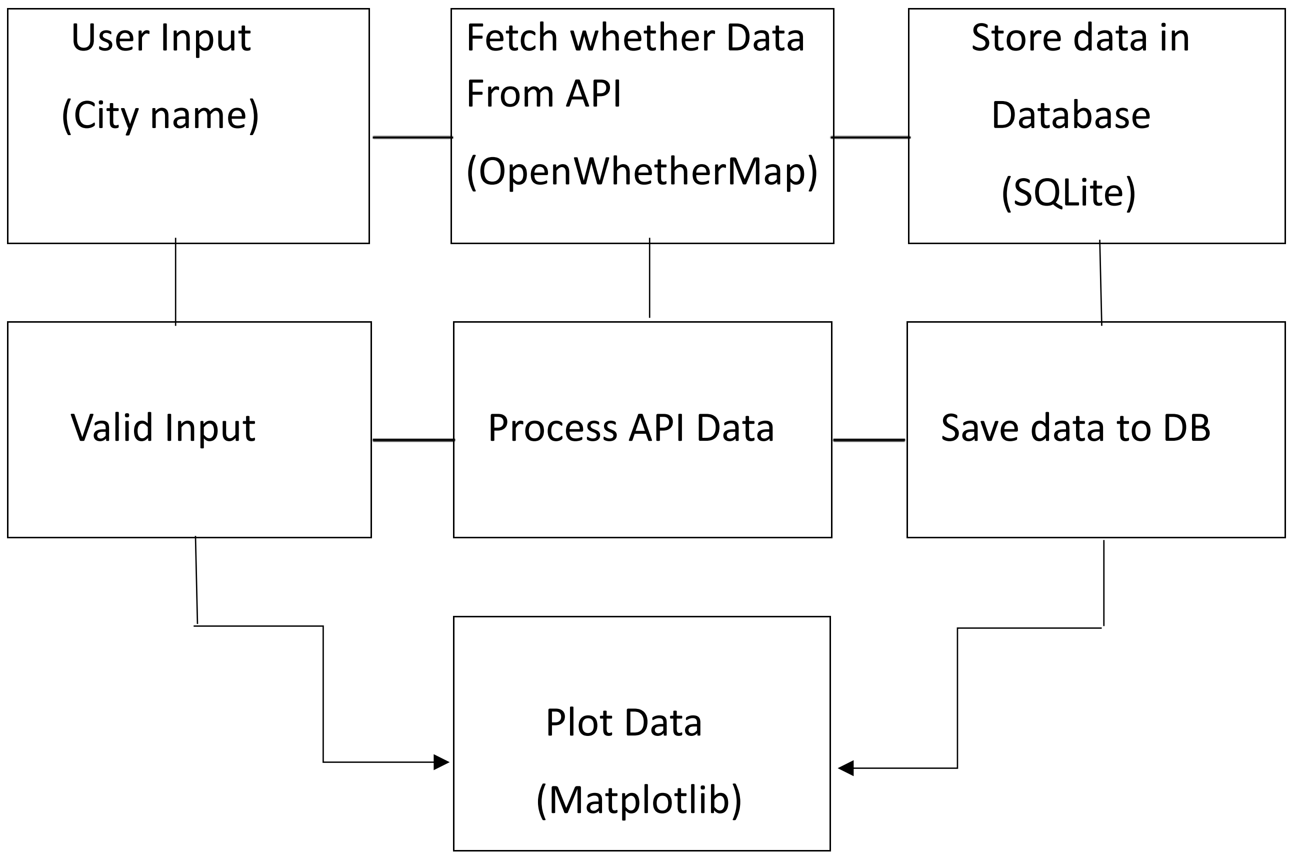
Problem 1: Real-Time Weather Monitoring System

1.Data Flow Diagram:



2. Implementation:

Here's the complete Python code for the real-time weather monitoring system. The application fetches weather data from the OpenWeatherMap API, processes it, and displays the current weather information.

Pseudocode:

1.Initialize:

- Set up API credentials.
- Create a function to fetch weather data from the API.
- Create a function to parse the API response and extract relevant information.
- Create a function to display the weather data to the user.

2.User Input:

- Prompt the user to input a city name.
- Call the API fetch function with the user's input.

3.Fetch and Display Data:

- Fetch the weather data from the API.
- Parse the data.
- Display the weather information to the user.
  import requests

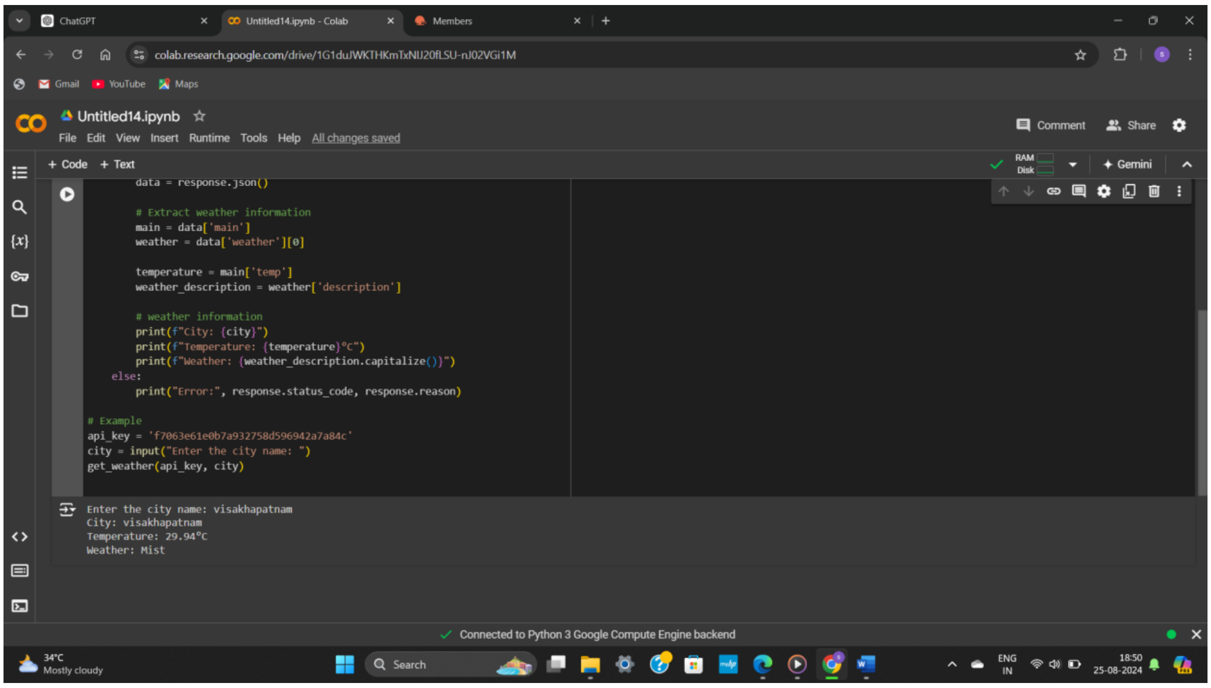
Python code implementation:

```
import requests

def get_weather(api_key, city):
    # Base URL for OpenWeatherMap API
    base_url =
"https://api.openweathermap.org/data/2.5/weather"
```

```
    # Parameters for the API request
    params = {
        'q': city,
        'appid': api_key,
        'units': 'metric'  # For temperature in Celsius; use 'imperial'
for Fahrenheit
    }

    # Send GET request to OpenWeatherMap
    response = requests.get(base_url, params=params)

    # Checking if the request was successful or not
    if response.status_code == 200:
        # Parse the JSON response
        data = response.json()

        # Extract weather information
        main = data['main']
        weather = data['weather'][0]

        temperature = main['temp']
        weather_description = weather['description']

        # weather information
        print(f"City: {city}")
        print(f"Temperature: {temperature}°C")
        print(f"Weather: {weather_description.capitalize()}")
    else:
        print("Error:", response.status_code, response.reason)

# Example
api_key = 'f7063e61e0b7a932758d596942a7a84c'
```

```
city = input("Enter the city name: ")
get_weather(api_key, city)
```

Working example from collab:



```
        data = response.json()

        # Extract weather information
        main = data['main']
        weather = data['weather'][0]

        temperature = main['temp']
        weather_description = weather['description']

        # weather information
        print(f"City: {city}")
        print(f"Temperature: {temperature}°C")
        print(f"Weather: {weather_description.capitalize()}")
    else:
        print("Error:", response.status_code, response.reason)

# Example
api_key = 'f7063e61e0b7a932758d596942a7a84c'
city = input("Enter the city name: ")
get_weather(api_key, city)
```

```
Enter the city name: visakhapatnam
City: visakhapatnam
Temperature: 29.94°C
Weather: Mist
```

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+ Code + Text
Connected to Python 3 Google Compute Engine backend

3.Display the Current weather information:

Enter the city name: Visakhapatnam

City: Visakhapatnam

Temperature: 29.94 C

Weather : Mist

4.User Input:

The code allows users to input the city name directly in the terminal. It then fetches and displays the corresponding weather data.

5.Documentation:

API Integration:

- **API Used:** OpenWeatherMap API
- **Endpoint: https://api.openweathermap.org/data/2.5/weather**
- **Parameters:**
    - **q**: City name (e.g., **q=visakhapatnam**)
    - **appid**: API key (e.g., **appid=YOUR_API_KEY_HERE**)
    - **units**: Metric (for temperatures in Celsius; use **imperial** for Fahrenheit)

Methods:

- **get_weather(api_key, city)**: Fetches weather data from the API, parses it, and displays it in a human-readable format.

Assumptions:

- The API key is valid and active.
- The city name input by the user is valid and correctly formatted.

Potential Improvements:

- **Error Handling:** Enhance error handling to manage network issues, invalid inputs, or API errors more gracefully.
- **GUI Interface:** Develop a graphical user interface (GUI) using a library like Tkinter or PyQt for a more user-friendly experience.
- **Unit Testing:** Add unit tests to verify the functionality of data fetching and parsing.

This implementation provides a straightforward approach to fetching and displaying real-time weather data, making it suitable for learning and further development.