**Problem 1: Real-Time Weather Monitoring System**

**Scenario:**

**You are developing a real-time weather monitoring system for a weather forecasting company. The system needs to fetch and display weather data for a specified location.**

**Tasks:**

1. **Model the data flow for fetching weather information from an external API and displaying it to the user.**
2. **Implement a Python application that integrates with a weather API (e.g., OpenWeatherMap) to fetch real-time weather data.**
3. **Display the current weather information, including temperature, weather conditions, humidity, and wind speed.**

**Allow users to input the location (city name or coordinates) and display the corresponding weather data.**

**Deliverables:**

* **Data flow diagram illustrating the interaction between the application and the API.**
* **Pseudocode and implementation of the weather monitoring system.**
* **Documentation of the API integration and the methods used to fetch and display weather data.**
* **Explanation of any assumptions made and potential improvements.**

**Answer:**

**Model Data flow:**

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| User |

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| (1) Input location (city name or coordinates)

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| Weather Monitoring System|

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| (2) Construct API request URL with user input and API key

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| External Weather API |

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| (3) HTTP GET request to API

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| External Weather API |

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| (4) JSON response with weather data

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| Weather Monitoring System|

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| (5) Parse JSON response and extract relevant weather data

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| User |

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| (6) Display weather data to user

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**Python Code:**

import requests

def get\_weather\_data(location):

api\_key = "b11f2fe52244a66eb93ee793f28c2d3b" # Your provided API key

base\_url = "http://api.openweathermap.org/data/2.5/weather?"

complete\_url = base\_url + "q=" + location + "&appid=" + api\_key

response = requests.get(complete\_url)

return response.json()

def display\_weather\_data(weather\_data):

if weather\_data['cod'] != '404':

main = weather\_data['main']

wind = weather\_data['wind']

weather\_description = weather\_data['weather'][0]['description']

print(f"Temperature: {main['temp']}K")

print(f"Humidity: {main['humidity']}%")

print(f"Weather Description: {weather\_description}")

print(f"Wind Speed: {wind['speed']} m/s")

else:

print("City Not Found")

if \_name\_ == "\_main\_":

location = input("Enter the city name: ")

weather\_data = get\_weather\_data(location)

display\_weather\_data(weather\_data)

**Pseudocode:**

**1.**Initialize the application

* Import necessary libraries
* Set up the API key and base URL for the weather API

**2.**Get user input

* Prompt the user to input a location (city name or coordinates)

**3.**Fetch weather data

* Build the request URL using the user input and API key
* Make an HTTP GET request to the weather API
* Parse the JSON response to extract relevant weather data

**4.**Display weather information

* Format and display the current weather information: temperature, weather conditions, humidity, and wind speed

**5.**Error handling

* Handle any errors that may occur during the API request or data parsing