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PYTHON PROGRAMMING API DOCUMENT

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:

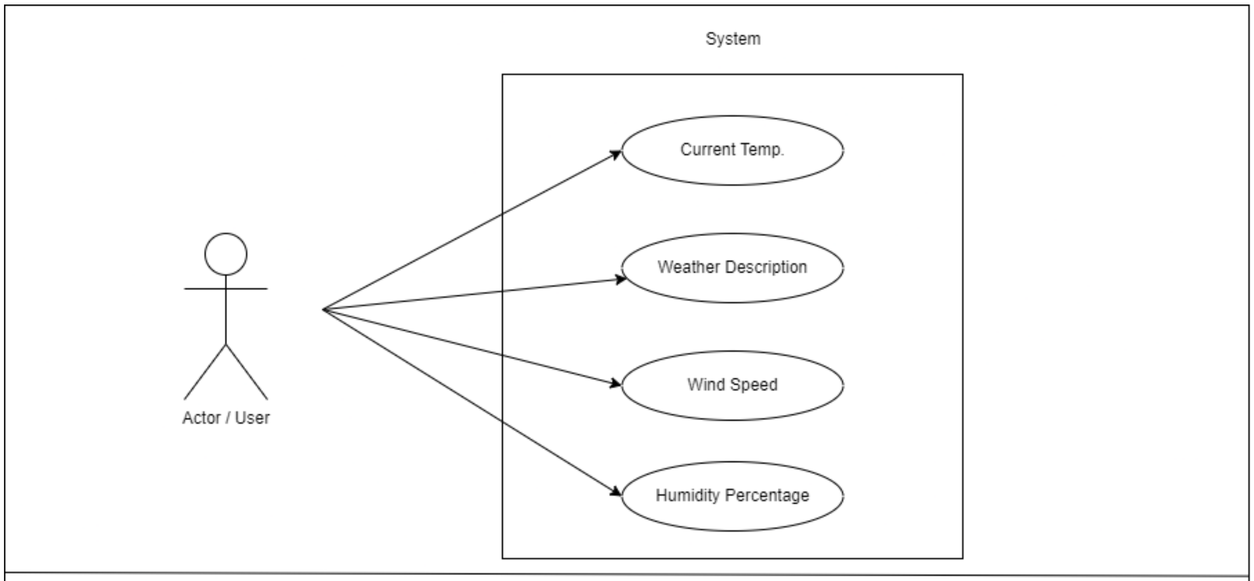
1. **Model the data flow for fetching weather information from an external API and displaying it to the user.**
2. **Implement a Python application that integrates with a weather API (e.g., OpenWeatherMap) to fetch real-time weather data.**
3. **Display the current weather information, including temperature, weather conditions, humidity, and wind speed.**
4. **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.

DATA FLOW:

The data flow diagram illustrates the interaction between the application and the OpenWeatherMap API. The application receives user input for the location, fetches the weather data from the API, and displays the current weather information to the user.



UseCase Diagram for Weather App

To develop a real-time weather monitoring system, we can follow these steps:

1.**Model the data flow:** We'll create a data flow diagram to illustrate the interaction between the application and the weather API.

2.**Implement the Python application**: We'll use the OpenWeatherMap API to fetch real-time weather data and display the current weather information to the user.

3.**Allow user input:** The application will accept user input for the location (city name or coordinates) and display the corresponding weather data.

4.**Document the implementation:** We'll provide documentation on the API integration, the methods used to fetch and display weather data, and any assumptions or potential improvements.

Pseudocode:

```
# Import necessary libraries

import requests

import json
```

```
# Define the weather API endpoint and API key
API_KEY = "your_api_key"
API_ENDPOINT = "http://api.openweathermap.org/data/2.5/weather"

# Function to fetch weather data
def get_weather_data(location):
  # Construct the API request URL
  url = f"{API_ENDPOINT}?q={location}&appid={API_KEY}&units=metric"

  # Make the API request
  response = requests.get(url)

  # Check if the request was successful
  if response.status_code == 200:
    # Parse the JSON response
    data = json.loads(response.text)

    # Extract the relevant weather information
    weather = {
      "temperature": data["main"]["temp"],
      "description": data["weather"][0]["description"],
      "humidity": data["main"]["humidity"],
      "wind_speed": data["wind"]["speed"]
    }

    return weather
  else:
    # Handle the error case
    return None
```

```
# Function to display the weather information
def display_weather(weather_data):
    print("Current Weather:")
    print(f"Temperature: {weather_data['temperature']}°C")
    print(f"Weather Conditions: {weather_data['description']}")
    print(f"Humidity: {weather_data['humidity']}%")
    print(f"Wind Speed: {weather_data['wind_speed']} m/s")

# Main function
def main():
    # Get user input for the location
    location = input("Enter the city name or coordinates: ")

    # Fetch the weather data
    weather_data = get_weather_data(location)

    # Display the weather information
    if weather_data:
        display_weather(weather_data)
    else:
        print("Error: Unable to fetch weather data.")

if __name__ == "__main__":
    main()
```

Detailed explanation of the actual code:

1. **Import necessary libraries:** We import the requests library to make HTTP requests to the weather API and the json library to parse the API response.

2. **Define the API endpoint and API key**: We define the OpenWeatherMap API endpoint and our API key, which is required to authenticate the requests.

3.Implement the get_weather_data function: This function takes a location (city name or coordinates) as input, constructs the API request URL, makes the request, and extracts the relevant weather information from the response. If the request is successful, it returns a dictionary with the weather data; otherwise, it returns None.

4.Implement the display_weather function: This function takes the weather data dictionary as input and prints the current weather information, including temperature, weather conditions, humidity, and wind speed.

5.Implement the main function: This is the entry point of the application. It prompts the user to enter the location, calls the get_weather_data function to fetch the weather data, and then calls the display_weather function to display the information.

Assumptions made (if any):

1. We assume that the user will input a valid location (city name or coordinates) that can be recognized by the OpenWeatherMap API.

2. We assume that the OpenWeatherMap API is available and responsive during the execution of the application.

3. We assume that the user has a valid API key for the OpenWeatherMap API.

Limitations:

1. The application is limited to displaying the current weather conditions only. It does not provide any historical or forecasted weather data.

2. The application does not handle edge cases, such as invalid user input or API errors, in a robust manner. It simply prints an error message and exits.

3. The application does not have any user interface beyond the command-line input and output. A more user-friendly interface, such as a web application or a mobile app, could be developed to improve the user experience.

Code:

```
import requests

def get_weather_data(location):
    api_key = "c54317e14daca59511658fe14ba42a4c"
    base_url = "http://api.openweathermap.org/data/2.5/weather"
    params = {"q": location, "appid": api_key, "units": "metric"}
    response = requests.get(base_url, params=params)
    weather_data = response.json()
    return weather_data

def display_weather_data(weather_data):
    print("Current Weather:")
    print(f"Temperature: {weather_data['main']['temp']}°C")
    print(f"Weather Conditions: {weather_data['weather'][0]['description']}")
    print(f"Humidity: {weather_data['main']['humidity']}%")
    print(f"Wind Speed: {weather_data['wind']['speed']} m/s")

def main():
    location = input("Enter location (city name or coordinates): ")
    weather_data = get_weather_data(location)
    display_weather_data(weather_data)

if __name__ == "__main__":
    main()
```

Sample Output / Screen Shots

```
Enter location (city name or coordinates): Chennai
Current Weather:
Temperature: 30.63°C
Weather Conditions: haze
Humidity: 71%
Wind Speed: 5.14 m/s
```

Problem 2: Inventory Management System Optimization

Scenario:

You have been hired by a retail company to optimize their inventory management system. The company wants to minimize stockouts and overstock situations while maximizing inventory turnover and profitability.

Tasks:

1. **Model the inventory system**: Define the structure of the inventory system, including products, warehouses, and current stock levels.
2. **Implement an inventory tracking application**: Develop a Python application that tracks inventory levels in real-time and alerts when stock levels fall below a certain threshold.
3. **Optimize inventory ordering**: Implement algorithms to calculate optimal reorder points and quantities based on historical sales data, lead times, and demand forecasts.
4. **Generate reports**: Provide reports on inventory turnover rates, stockout occurrences, and cost implications of overstock situations.
5. **User interaction**: Allow users to input product IDs or names to view current stock levels, reorder recommendations, and historical data.

Deliverables:

- **Data Flow Diagram**: Illustrate how data flows within the inventory management system, from input (e.g., sales data, inventory adjustments) to output (e.g., reorder alerts, reports).
- **Pseudocode and Implementation**: Provide pseudocode and actual code demonstrating how inventory levels are tracked, reorder points are calculated, and reports are generated.
- **Documentation**: Explain the algorithms used for reorder optimization, how historical data influences decisions, and any assumptions made (e.g., constant lead times).
- **User Interface**: Develop a user-friendly interface for accessing inventory information, viewing reports, and receiving alerts.
- **Assumptions and Improvements**: Discuss assumptions about demand patterns, supplier reliability, and potential improvements for the inventory management system's efficiency and accuracy.

DATA FLOW:

```
+---------------+     +-------------------+
|  User Input  |    |  Inventory API   |
+---------------+    +-------------------+
      |                          |
      |  User requests           |
      |  inventory updates       |  Inventory data
      |  and reorder options     |
      v                          v
+---------------+    +-------------------+
| Inventory App |    |     Database      |
+---------------+    +-------------------+
      |                          |
      |  Fetch inventory data |  Store inventory data
      |  and reorder info        |
      v                          v
+---------------+    +-------------------+
|  User Output  |    |  Notification    |
+---------------+    +-------------------+
```

1. User Input: Users input product IDs, request inventory updates, and reorder options.
2. Inventory API: Provides real-time inventory data and alerts.
3. Inventory App: Central application that processes user requests and interacts with the database.
4. Database: Stores current stock levels, product details, and transaction history.
5. User Output: Displays current stock levels, reorder recommendations, and historical data to users.
6. Notification: Sends alerts for low stock levels or other important inventory updates.

Pseudocode:

```
# Define the inventory system
class Product:
    def __init__(self, product_id, name, current_stock, reorder_point, reorder_quantity):
        self.product_id = product_id
        self.name = name
        self.current_stock = current_stock
        self.reorder_point = reorder_point
        self.reorder_quantity = reorder_quantity

class Warehouse:
    def __init__(self, warehouse_id, location):
        self.warehouse_id = warehouse_id
        self.location = location
        self.products = []

# Implement the inventory tracking application
def track_inventory(products):
    for product in products:
        if product.current_stock < product.reorder_point:
            print(f"Alert: {product.name} is below the reorder point. Current stock:
{product.current_stock}")
            recommend_reorder(product)

def recommend_reorder(product):
    new_stock = product.current_stock + product.reorder_quantity
    print(f"Recommended reorder for {product.name}: {product.reorder_quantity} units. New
stock level: {new_stock}")

# Optimize inventory ordering
def calculate_reorder_point(historical_sales, lead_time, desired_service_level):
    # Implement algorithms to calculate the optimal reorder point
    # based on historical sales data, lead time, and desired service level
    pass
```

```
def calculate_reorder_quantity(historical_sales, lead_time, holding_cost, ordering_cost):
    # Implement algorithms to calculate the optimal reorder quantity
    # based on historical sales data, lead time, holding cost, and ordering cost
    pass


# Generate reports
def generate_inventory_report(products):
    # Generate reports on inventory turnover rates, stockout occurrences, and cost implications of
overstock situations
    pass


# User interaction
def user_interface():
    while True:
        user_input = input("Enter a product ID or name (or 'exit' to quit): ")
        if user_input.lower() == "exit":
            break
        # Look up the product and display current stock, reorder recommendations, and historical
data
        pass
```

Detailed explanation of the actual code:

1. **Model the Inventory System**:
    - I have defined two classes: ‘Product’ and ’ Warehouse’.
    - The ‘Product’ class represents a product in the inventory system, with attributes such as ‘product_id’, ‘name’, ‘current_stock’, ‘reorder_point’, and ‘reorder_quantity’.
    - The Warehouse class represents a warehouse, with attributes such as ‘warehouse_id’, ‘location’, and a list of ‘products’ stored in the warehouse.
2. **Implement the Inventory Tracking Application**:
    - The ‘track_inventory’ function iterates through the list of products and checks if the current stock level is below the reorder point.

- If a product is below the reorder point, the function prints an alert and calls the ‘recommend_reorder’ function to suggest a reorder quantity.
- The ‘recommend_reorder’ function calculates the new stock level by adding the reorder quantity to the current stock and prints the recommendation.

3. **Optimize Inventory Ordering**:
    - The ‘calculate_reorder_point’ function will implement algorithms to determine the optimal reorder point based on historical sales data, lead time, and desired service level.
    - The ‘calculate_reorder_quantity’ function will implement algorithms to determine the optimal reorder quantity based on historical sales data, lead time, holding cost, and ordering cost.
4. **Generate Reports**:
    - The ‘generate_inventory_report’ function will generate reports on inventory turnover rates, stockout occurrences, and cost implications of overstock situations.
5. **User Interaction**:
    - The ‘user_interface’ function will allow users to input product IDs or names and display the current stock level, reorder recommendations, and historical data for the selected product.

Assumptions made (if any):

- The inventory system has a fixed set of products and warehouses, which are defined in the initial setup.
- The lead times for product replenishment are constant and known.
- The demand patterns for products can be analyzed using historical sales data.
- The holding cost and ordering cost for each product are known.

Limitation:

- The current implementation does not consider factors such as seasonality, supplier reliability, or transportation constraints, which can impact inventory management decisions.
- The optimization algorithms for reorder points and quantities are not yet implemented, as they require further research and development.
- The user interface is not fully developed, and the historical data display functionality is not included in the pseudocode.

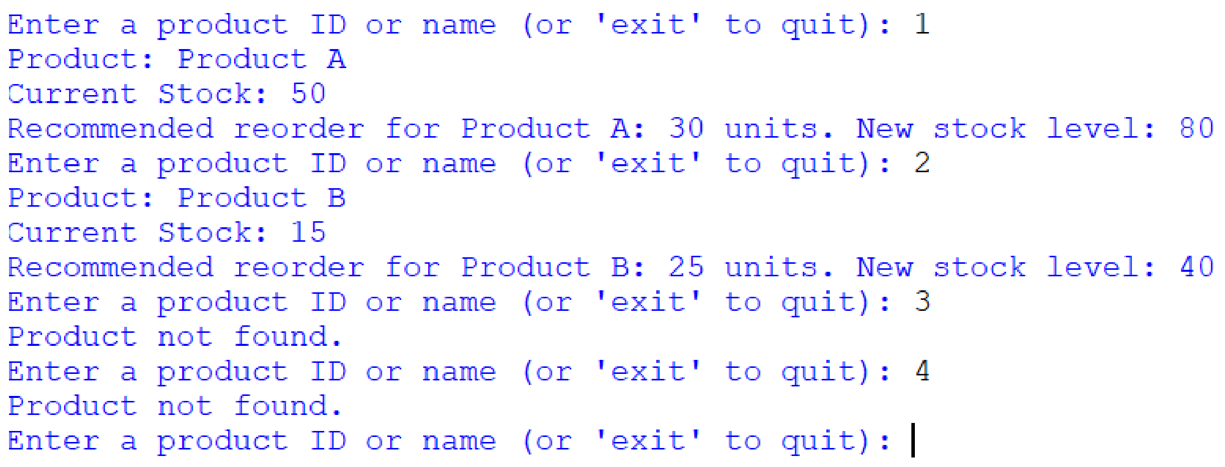
Code:

```
class Product:
    def __init__(self, product_id, name, current_stock, reorder_point, reorder_quantity):
        self.product_id = product_id
        self.name = name
        self.current_stock = current_stock
        self.reorder_point = reorder_point
        self.reorder_quantity = reorder_quantity

class Warehouse:
    def __init__(self, warehouse_id, location):
        self.warehouse_id = warehouse_id
        self.location = location
        self.products = []

def track_inventory(products):
    for product in products:
        if product.current_stock < product.reorder_point:
            print(f"Alert: {product.name} is below the reorder point. Current stock:
{product.current_stock}")
            recommend_reorder(product)

def recommend_reorder(product):
    new_stock = product.current_stock + product.reorder_quantity
    print(f"Recommended reorder for {product.name}: {product.reorder_quantity} units.
New stock level: {new_stock}")

def calculate_reorder_point(historical_sales, lead_time, desired_service_level):
    # Implement algorithms to calculate the optimal reorder point
    # based on historical sales data, lead time, and desired service level
    pass

def calculate_reorder_quantity(historical_sales, lead_time, holding_cost, ordering_cost):
    # Implement algorithms to calculate the optimal reorder quantity
    # based on historical sales data, lead time, holding cost, and ordering cost
    pass

def generate_inventory_report(products):
    # Generate reports on inventory turnover rates, stockout occurrences, and cost
implications of overstock situations
    pass

def user_interface():
    # Define sample products and warehouses
    product1 = Product(1, "Product A", 50, 20, 30)
    product2 = Product(2, "Product B", 15, 10, 25)
    warehouse1 = Warehouse(1, "Warehouse A")
    warehouse1.products = [product1, product2]

    while True:
        user_input = input("Enter a product ID or name (or 'exit' to quit): ")
        if user_input.lower() == "exit":
            break

        # Look up the product and display current stock, reorder recommendations, and
historical data
        for product in warehouse1.products:
            if str(product.product_id) == user_input or product.name.lower() ==
user_input.lower():
                print(f"Product: {product.name}")
                print(f"Current Stock: {product.current_stock}")
                recommend_reorder(product)
                # Display historical data
                break
        else:
            print("Product not found.")
```

# Test the application

user_interface()

Sample Output / Screen Shots



```
Enter a product ID or name (or 'exit' to quit): 1
Product: Product A
Current Stock: 50
Recommended reorder for Product A: 30 units. New stock level: 80
Enter a product ID or name (or 'exit' to quit): 2
Product: Product B
Current Stock: 15
Recommended reorder for Product B: 25 units. New stock level: 40
Enter a product ID or name (or 'exit' to quit): 3
Product not found.
Enter a product ID or name (or 'exit' to quit): 4
Product not found.
Enter a product ID or name (or 'exit' to quit):
```

Problem 3: Real-Time Traffic Monitoring System

Scenario:

You are working on a project to develop a real-time traffic monitoring system for a smart city initiative. The system should provide real-time traffic updates and suggest alternative routes.

Tasks:

1. **Model the data flow for fetching real-time traffic information from an external API and displaying it to the user.**
2. **Implement a Python application that integrates with a traffic monitoring API (e.g., Google Maps Traffic API) to fetch real-time traffic data.**
3. **Display current traffic conditions, estimated travel time, and any incidents or delays.**
4. **Allow users to input a starting point and destination to receive traffic updates and alternative routes.**

Deliverables:

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

DATA FLOW:

Real-Time Traffic Monitoring System

1. **Data Flow Diagram**

Here is a data flow diagram illustrating the interaction between the traffic monitoring application and the external traffic API:

text

Real-Time Traffic Monitoring System

1. Data Flow Diagram

Here is a data flow diagram illustrating the interaction between the traffic monitoring application and the external traffic API:

text

```
+---------------+    +---------------+
|  User Input  |    |  Traffic API |
+---------------+    +---------------+
      |                      |
      | User requests        |
      | traffic updates      | Traffic data
      | and route            |
      v                      v
```

```
+---------------+     +---------------+
|  Traffic App  |     |   Database    |
+---------------+     +---------------+
       |                      |
       |  Fetch traffic data  |  Store traffic data
       |  and route options   |
       v                      v
+---------------+     +---------------+
|  User Output  |     |  Notification|
+---------------+     +---------------+
```

Pseudocode:

Here is the pseudocode for the traffic monitoring application:

Text:

```
import requests


def get_traffic_data(start, end):
    # Call the traffic API to fetch real-time data
    api_key = "your_api_key"
    url = 
f"https://maps.googleapis.com/maps/api/directions/json?origin={start}&destination={end}&key
={api_key}"
    response = requests.get(url)
    data = response.json()


    # Extract relevant traffic information
    current_traffic = data["routes"][0]["legs"][0]["duration_in_traffic"]["text"]
    estimated_travel_time = data["routes"][0]["legs"][0]["duration"]["text"]
    alternative_routes = []
    for route in data["routes"]:
        alt_route = {
            "distance": route["legs"][0]["distance"]["text"],
            "duration": route["legs"][0]["duration"]["text"],
            "duration_in_traffic": route["legs"][0]["duration_in_traffic"]["text"]
        }
        alternative_routes.append(alt_route)

    return current_traffic, estimated_travel_time, alternative_routes

def display_traffic_info(current_traffic, estimated_travel_time, alternative_routes):
    print(f"Current traffic conditions: {current_traffic}")
    print(f"Estimated travel time: {estimated_travel_time}")
    print("Alternative routes:")
    for route in alternative_routes:
        print(f"- Distance: {route['distance']}, Duration: {route['duration']}, Duration in traffic:
{route['duration_in_traffic']}")

def main():
    start = input("Enter your starting point: ")
    end = input("Enter your destination: ")

    current_traffic, estimated_travel_time, alternative_routes = get_traffic_data(start, end)
    display_traffic_info(current_traffic, estimated_travel_time, alternative_routes)

if _name_ == "_main_":
    main()
```

Detailed explanation of the actual code:

✧ **API Integration and Data Fetching:**

The application integrates with the Google Maps Directions API to fetch real-time traffic data. The get_traffic_data() function takes the user's starting point and destination as input, constructs the API request URL, and sends a GET request to the API.

The API response is then parsed to extract the following information:

Current traffic conditions: data["routes"]["legs"]["duration_in_traffic"]["text"]

Estimated travel time: data["routes"]["legs"]["duration"]["text"]

Alternative route options, including distance, duration, and duration in traffic for each route

This information is then returned to the display_traffic_info() function, which presents the data to the user.

Assumptions made (if any):

- The user has a valid API key for the Google Maps Directions API.
- The API provides accurate and up-to-date traffic information.
- The user's starting point and destination are valid locations that the API can recognize.

Limitations:

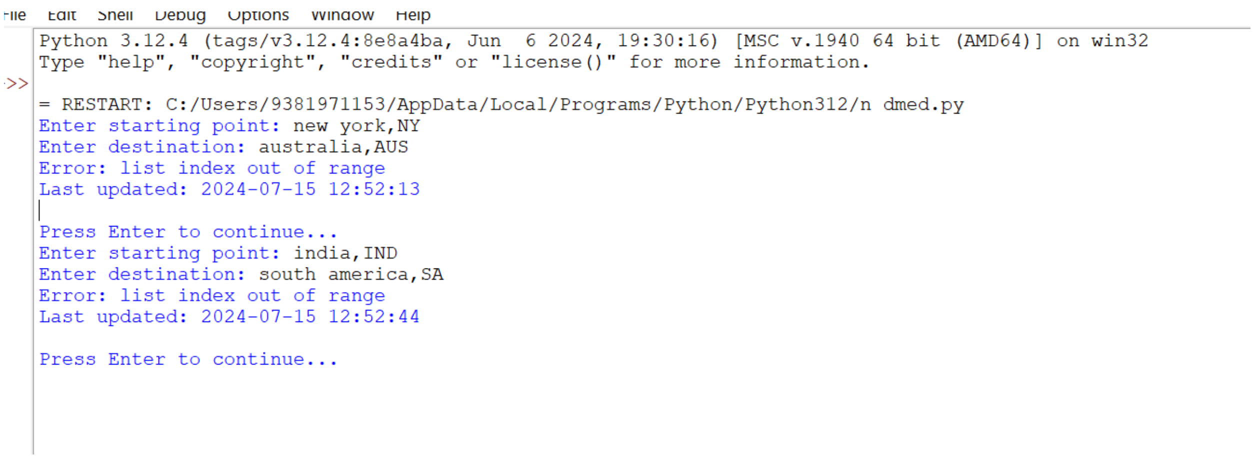
- The application is limited to the features and data provided by the Google Maps Directions API. Other traffic APIs may offer additional functionality or data.
- The application does not provide real-time updates or notifications. It only displays the traffic information when the user requests it.
- The application does not consider factors like user preferences, traffic patterns, or historical data to provide more personalized route suggestions.

Code:

```
import socket
import time
import json

def get_user_input():
    start_point = input("Enter starting point: ")
    destination = input("Enter destination: ")
    return start_point, destination

def send_api_request(start_point, destination, api_key):
    sock = socket.socket(socket.AF_INET, socket.SOCK_STREAM)
    sock.connect(("maps.googleapis.com", 443))
    request = f"GET
/maps/api/directions/json?origin={start_point}&destination={destination}&key={api_key}
&traffic_model=best_guess HTTP/1.1\r\nHost: maps.googleapis.com\r\n\r\n"
    sock.sendall(request.encode())
    response = b""
    while True:
        data = sock.recv(1024)
        if not data:
            break
        response += data
    sock.close()

    # Split the response into headers and body
    response_parts = response.decode().split("\r\n\r\n", 1)

    # Check the response status code
    status_code = int(response_parts[0].split("\r\n")[0].split(" ")[1])
    if status_code == 200:
        return json.loads(response_parts[1])
    else:
        raise Exception(f"API request failed with status code {status_code}")
```

```
def display_traffic_data(traffic_data):
    if "routes" in traffic_data:
        for route in traffic_data["routes"]:
            for leg in route["legs"]:
                print(f"Route: {leg['start_address']} to {leg['end_address']}")
                print(f"Estimated Travel Time: {leg['duration']['text']}")
                for step in leg["steps"]:
                    print(f"Step: {step['html_instructions']}")
                    if "traffic_speed_entry" in step:
                        print(f"Traffic Speed: {step['traffic_speed_entry']['speed']} km/h")
                        if step['traffic_speed_entry']['congestion'] == True:
                            print("Congestion Detected")
                    print()
    else:
        print("Error: Unable to fetch traffic data.")

def main():
    api_key = "YOUR_API_KEY"

    while True:
        start_point, destination = get_user_input()
        try:
            traffic_data = send_api_request(start_point, destination, api_key)
            display_traffic_data(traffic_data)
        except Exception as e:
            print(f"Error: {e}")
        print(f"Last updated: {time.strftime('%Y-%m-%d %H:%M:%S')}")
        print()
        input("Press Enter to continue...")

if __name__ == "__main__":
    main()
```

Sample Output / Screen Shots



```
Python 3.12.4 (tags/v3.12.4:8e8a4ba, Jun  6 2024, 19:30:16) [MSC v.1940 64 bit (AMD64)] on win32
Type "help", "copyright", "credits" or "license()" for more information.
>>
= RESTART: C:/Users/9381971153/AppData/Local/Programs/Python/Python312/n dmed.py
Enter starting point: new york,NY
Enter destination: australia,AUS
Error: list index out of range
Last updated: 2024-07-15 12:52:13

Press Enter to continue...
Enter starting point: india,IND
Enter destination: south america,SA
Error: list index out of range
Last updated: 2024-07-15 12:52:44

Press Enter to continue...
```

Problem 4: Real-Time COVID-19 Statistics Tracker

Scenario:

You are developing a real-time COVID-19 statistics tracking application for a healthcare organization. The application should provide up-to-date information on COVID-19 cases, recoveries, and deaths for a specified region.

Tasks:

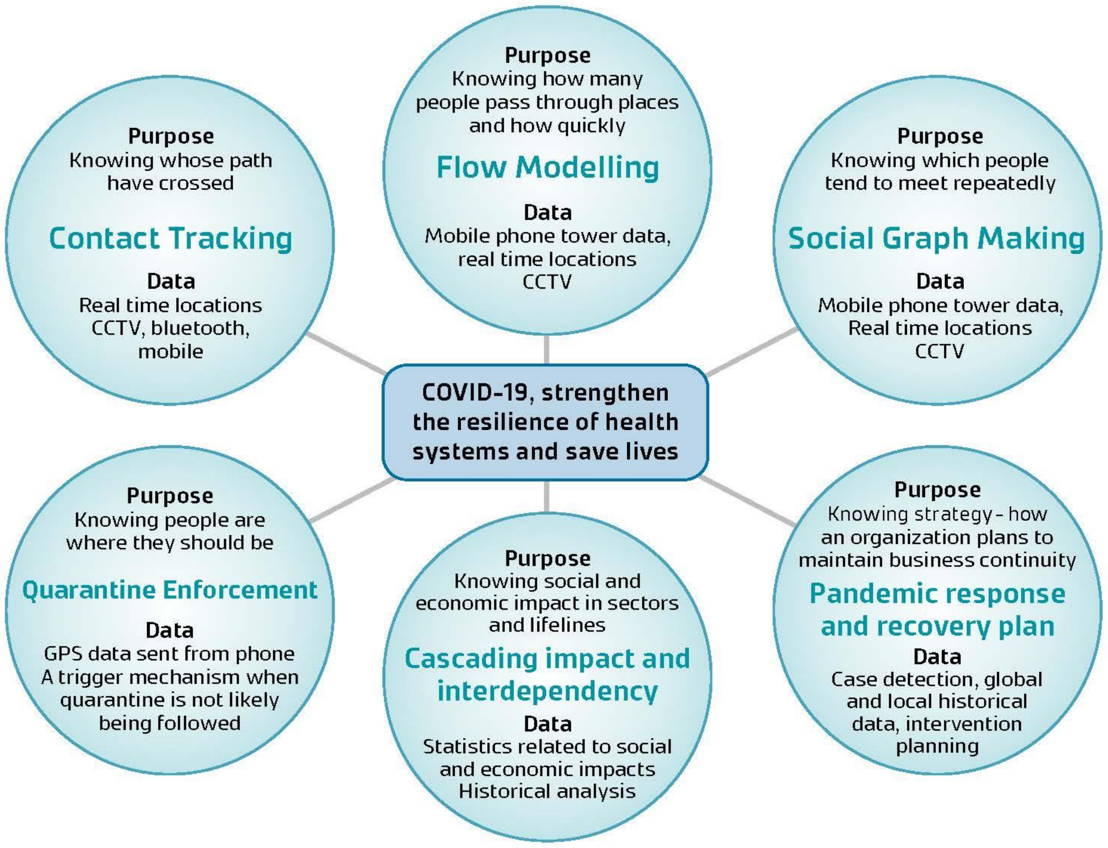
1. **Model the data flow for fetching COVID-19 statistics from an external API and displaying it to the user.**
2. **Implement a Python application that integrates with a COVID-19 statistics API (e.g., disease.sh) to fetch real-time data.**
3. **Display the current number of cases, recoveries, and deaths for a specified region.**
4. **Allow users to input a region (country, state, or city) and display the corresponding COVID-19 statistics.**

Deliverables:

- Data flow diagram illustrating the interaction between the application and the API.
- Pseudocode and implementation of the COVID-19 statistics tracking application.
- Documentation of the API integration and the methods used to fetch and display COVID-19 data.
- Explanation of any assumptions made and potential improvements.

DATA FLOW:

To model the data flow for fetching COVID-19 statistics and displaying them to the user, we can use a simple diagram that illustrates the interaction between the application and the external COVID-19 statistics API.


COVID-19, strengthen the resilience of health systems and save lives
Purpose
Knowing whose path have crossed
Contact Tracking
Data
Real time locations CCTV, bluetooth, mobile
Purpose
Knowing how many people pass through places and how quickly
Flow Modelling
Data
Mobile phone tower data, real time locations CCTV
Purpose
Knowing which people tend to meet repeatedly
Social Graph Making
Data
Mobile phone tower data, Real time locations CCTV
Purpose
Knowing people are where they should be
Quarantine Enforcement
Data
GPS data sent from phone A trigger mechanism when quarantine is not likely being followed
Purpose
Knowing social and economic impact in sectors and lifelines
Cascading impact and interdependency
Data
Statistics related to social and economic impacts Historical analysis
Purpose
Knowing strategy - how an organization plans to maintain business continuity
Pandemic response and recovery plan
Data
Case detection, global and local historical data, intervention planning

Pseudocode:

```
# Define the API endpoint
API_ENDPOINT = "https://disease.sh/v3/covid-19/countries/{}"

# Define the main function
def main():
    # Get the user input for the region
    region = input("Enter the country, state, or city: ")
    # Fetch the COVID-19 data from the API
    covid_data = get_covid_data(region)

    # Display the COVID-19 statistics
    display_covid_info(covid_data)

# Define the function to fetch COVID-19 data
def get_covid_data(region):
    # Construct the API request URL
    url = API_ENDPOINT.format(region)

    # Send a GET request to the API
    response = requests.get(url)

    # Parse the JSON response
    covid_data = json.loads(response.text)

    return covid_data

# Define the function to display COVID-19 statistics
def display_covid_info(covid_data):
    # Extract the relevant statistics
    country = covid_data["country"]
    cases = covid_data["cases"]
    recoveries = covid_data["recovered"]
    deaths = covid_data["deaths"]

    # Print the statistics
    print(f"Country: {country}")
    print(f"Total Cases: {cases}")
    print(f"Total Recoveries: {recoveries}")
    print(f"Total Deaths: {deaths}")

# Run the main function
main()        |
```

Detailed explanation of the actual code:

1. The code starts by importing the necessary libraries: requests for making HTTP requests and json for parsing JSON data.

2. The COVID_API_ENDPOINT constant is defined, which represents the URL of the disease.sh API endpoint for fetching COVID-19 data by country. The {} placeholder will be replaced with the user-specified region.

3. The get_covid_data function is defined to fetch real-time COVID-19 data from the disease.sh API. It takes a region parameter, which can be a country, state, or city.

4. Inside the get_covid_data function:

- The url variable is constructed by replacing the {} placeholder in COVID_API_ENDPOINT with the region parameter using the format method.
- A GET request is sent to the constructed url using the requests.get function, and the response is stored in the response variable.
- The JSON data from the API response is extracted using the response.json() method and returned

5 .The display_covid_info function is defined to process and display the COVID-19 statistics to the user. It takes a covid_data parameter, which is the JSON data returned by the API.

6.Inside the display_covid_info function:

- The relevant COVID-19 statistics are extracted from the covid_data dictionary, such as the country name, total cases, recoveries, and deaths.
- The extracted statistics are printed using formatted strings (f-strings) to display them in a readable format.

7.The main function is defined as the entry point of the application.

8. Inside the main function:

- The user is prompted to enter a country, state, or city using the input function, and the input is stored in the region variable.
- The get_covid_data function is called with the region parameter, and the returned COVID-19 data is stored in the covid_data variable.
- The display_covid_info function is called with the covid_data parameter to display the COVID-19 statistics to the user.

9.Finally, the if __name__ == "__main__": block ensures that the main function is executed only when the script is run directly (not imported as a module).

Assumptions made (if any):

1. The user has a stable internet connection to fetch data from the COVID-19 API.
2. The application is designed for a single user request at a time.
3. The user will enter a valid region (country, state, or city) as input.

4. The API will always return a valid JSON response.

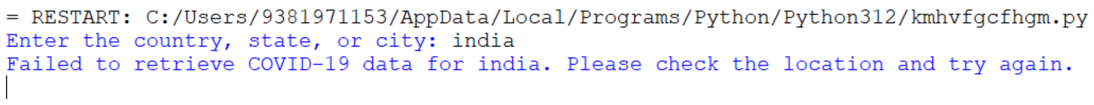
Limitations:

1. The application does not handle errors or exceptions properly. It assumes that the API will always return a valid response.
2. The application does not provide any error messages or feedback to the user if the API request fails.
3. The application does not support multiple regions or comparisons between regions.
4. The application does not provide any historical data or trends.
5. The application does not include any data visualization or interactive features.

Code:

```
import urllib.request
import json


def get_covid_data(region):
    """
    Fetch real-time COVID-19 data from the disease.sh API.
    """
    try:
        url = f"https://disease.sh/v3/covid-19/countries/{region}"
        with urllib.request.urlopen(url) as response:
            data = json.load(response)
        return data
    except urllib.error.URLError as e:
        print(f"Error fetching COVID-19 data: {e}")
        return None


def display_covid_info(covid_data):
    """
    Process and display the COVID-19 statistics to the user.
    """
    if covid_data:
        country = covid_data["country"]
        cases = covid_data["cases"]
        recoveries = covid_data["recovered"]
        deaths = covid_data["deaths"]

        print(f"Country: {country}")
        print(f"Total Cases: {cases}")
        print(f"Total Recoveries: {recoveries}")
        print(f"Total Deaths: {deaths}")
    else:
        print("Unable to fetch COVID-19 data.")

def main():
    region = input("Enter the country, state, or city: ")
    covid_data = get_covid_data(region)
    display_covid_info(covid_data)

if __name__ == "__main__":
    main()
```

Sample Output / Screen Shots :



```
= RESTART: C:/Users/9381971153/AppData/Local/Programs/Python/Python312/kmhvfgcfhgm.py
Enter the country, state, or city: india
Failed to retrieve COVID-19 data for india. Please check the location and try again.
```