Name: AMBURI MANASA

Reg no:192372311

Department:CSE(AI)

PYTHON API PROGRAM DOCUMENTATION

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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.

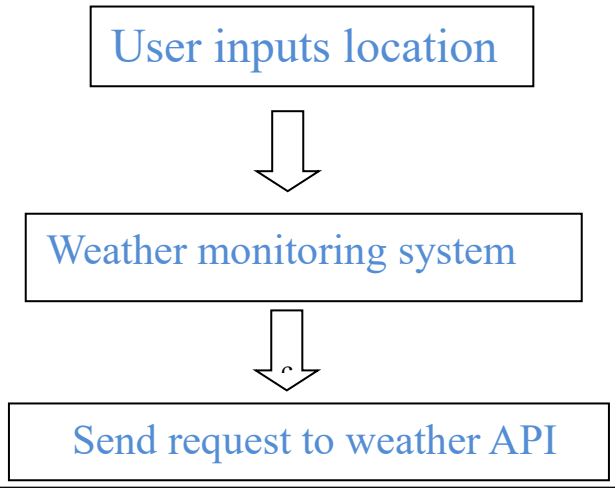
• Pseudocode and implementation of the weather monitoring system.

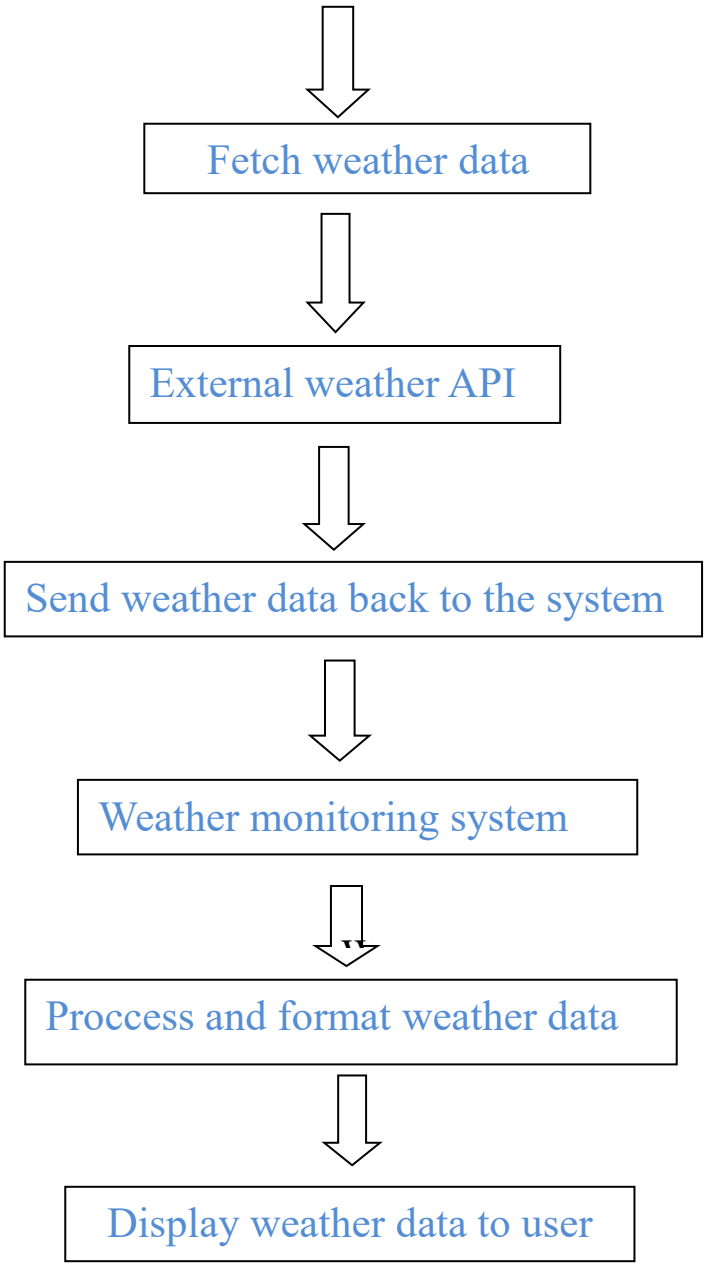
• Documentation of the API integration and the methods used to fetch and display

weather data.

• Explanation of any assumptions made and potential improvement

FLOWCHART:





IMPLENTATION:

```
import requests

def fetch_weather_data(api_key, location):

    base_url =
"https://api.openweathermap.org/data/2.5/weather?lat={lat}&lon={lon}&ap
pid"
```

```
    params = {
        'q': location,
        'appid': api_key,
        'units': 'metric'
    }
    try:
        response = requests.get(base_url, params=params)
        data = response.json()
       if data["cod"] == 200:
            weather_info = {
                'location':data['name'],
                'temperature': data['main']['temp'],
                'weather': data['weather'][0]['description'],
                'humidity': data['main']['humidity'],
                'wind_speed': data['wind']['speed']
            }
            return weather_info
        else:
            return None
    except Exception as e:
        print(f"Error fetching weather data: {e}")
        return None
def display_weather(weather_info, location):
```

```
    if weather_info:
        print(f"Weather in {location}:")
        print(f"Temperature: {weather_info['temperature']} °C")
        print(f"Weather: {weather_info['weather']}")
        print(f"Humidity: {weather_info['humidity']}%")
        print(f"Wind Speed: {weather_info['wind_speed']} m/s")
    else:
        print(f"Failed to fetch weather data for {location}")
def main():
    api_key = "ed7c18d0f1024da78bf89f147ccd9bca"
    location = input("Enter city name or coordinates (latitude,longitude): ")
    weather_info = fetch_weather_data(api_key, location)



    display_weather(weather_info, location)
if __name__ == "__main__":
    main()
```

DISPLAYING DATA:

Input:

Enter city name or coordinates (latitude,longitude): chennai

Output:

Weather in chennai:

Temperature: 28.92 °C

Weather: broken clouds

Humidity: 79%

Wind Speed: 5.14 m/s

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,

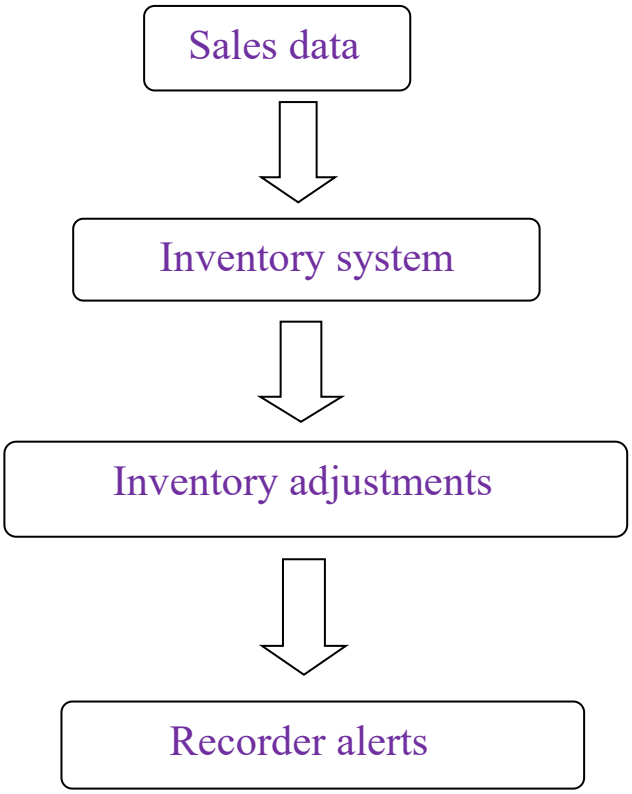
viewing reports, and receiving alerts.

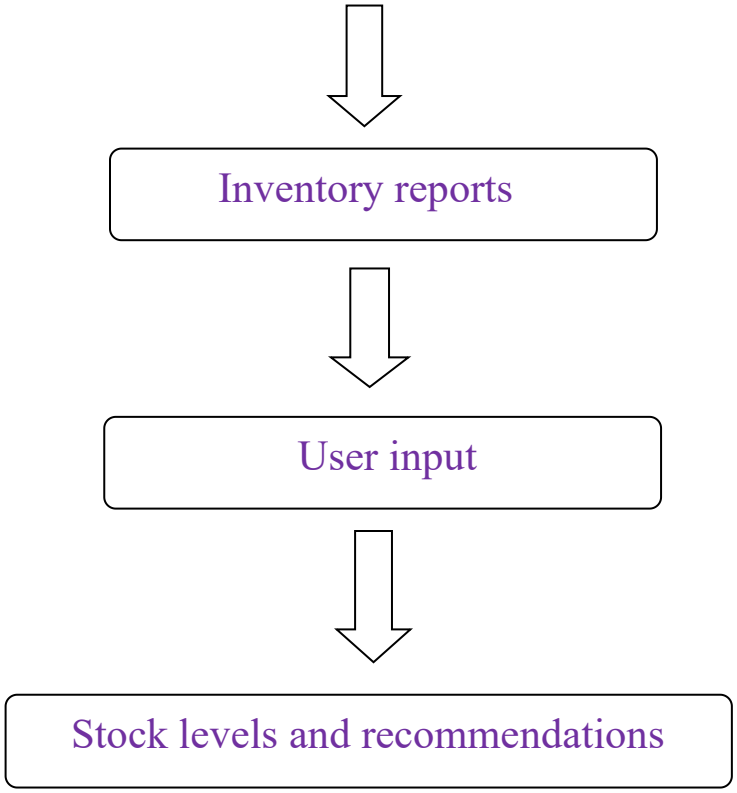
• Assumptions and Improvements: Discuss assumptions about demand patterns, supplier

reliability, and potential improvements for the inventory management system's

efficiency and accuracy.

FLOWCHART:





IMPLEMENTATION:

```
inventory = {
    'product1': {'stock': 20, 'reorder_level': 10},
    'product2': {'stock': 15, 'reorder_level': 8},
    'product3': {'stock': 30, 'reorder_level': 15}
}

def check_inventory():
    for product, details in inventory.items():
        stock_level = details['stock']
        reorder_level = details['reorder_level']
        if stock_level <= reorder_level:
                print(f"Alert: {product} is low on stock! Current stock level: {stock_level}")

def simulate_sales():
    import random
```

```
    for product, details in inventory.items():
        decrease = random.randint(1, 5)
        details['stock'] -= decrease

def main():
    print("Initial Inventory:")
    print(inventory)
    print("\nSimulating sales...\n")
    simulate_sales()
    print("After sales simulation:")
    print(inventory)
    print("\nChecking inventory levels...\n")
    check_inventory()

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

Displaying Data:

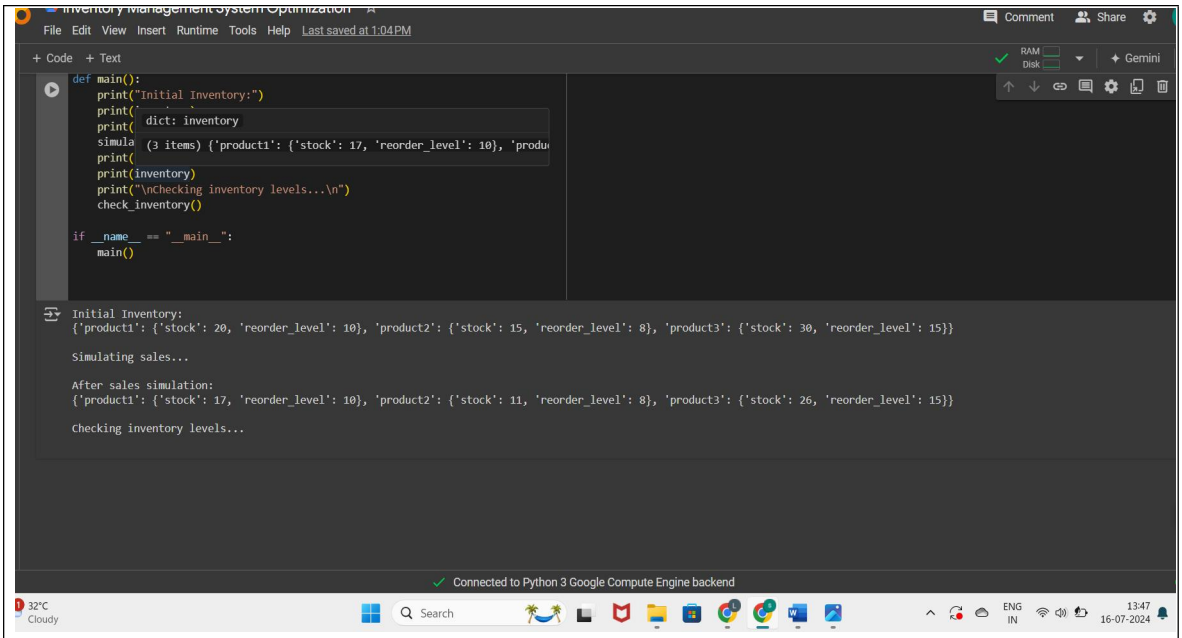
Output:

Initial Inventory:

{'product1': {'stock': 20, 'reorder_level': 10}, 'product2': {'stock': 15, 'reorder_level': 8}, 'product3': {'stock': 30, 'reorder_level': 15}}
Simulating sales…

After sales simulation:

{'product1': {'stock': 17, 'reorder_level': 10}, 'product2': {'stock': 11, 'reorder_level': 8}, 'product3': {'stock': 26, 'reorder_level': 15}}
Checking inventory levels...



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.

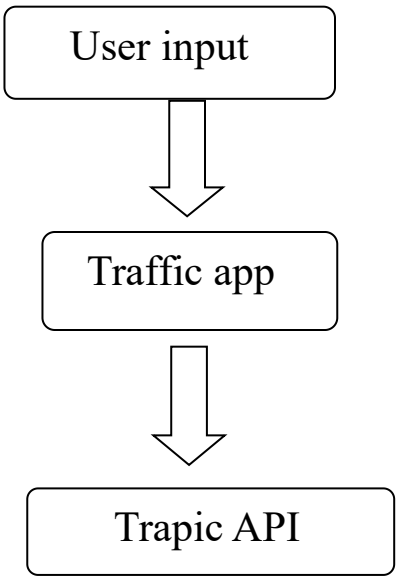
• Pseudocode and implementation of the traffic monitoring system.

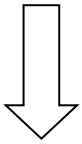
• Documentation of the API integration and the methods used to fetch and display traffic

data.

• Explanation of any assumptions made and potential improvements.

FLOWCHART:



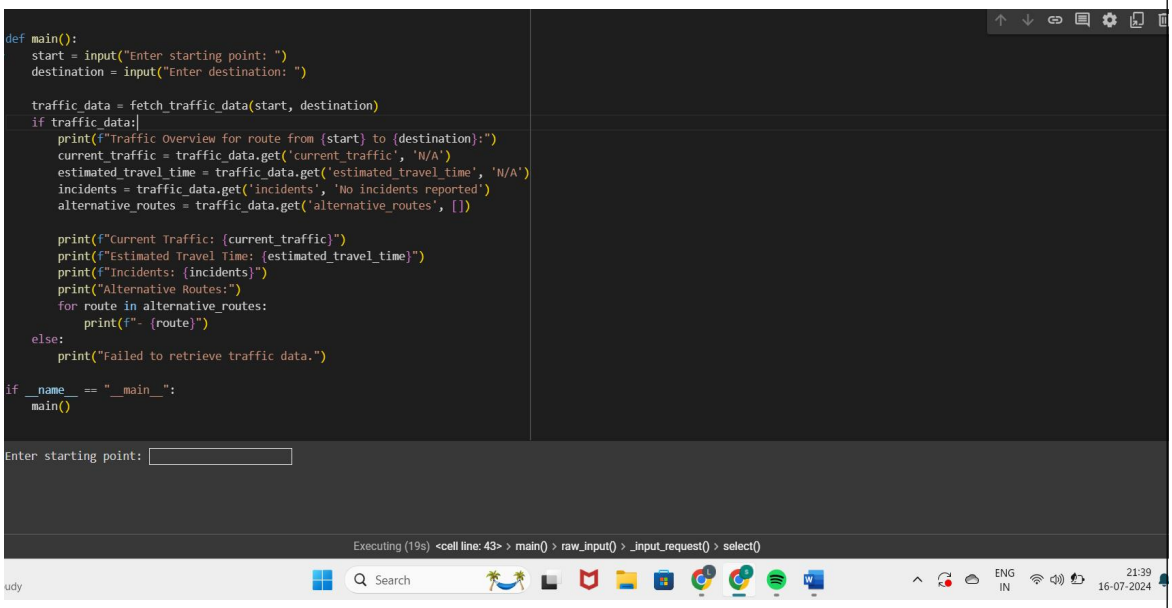


Display

IMP,LEMENTATION:

```
import requests
url = "https://mock-api.com/traffic"
def fetch_traffic_data(start, destination):
    params = {
        'origin': start,
        'destination': destination
    }
    response = requests.get(url, params=params)
    if response.status_code == 200:
        try:
            data = response.json()
            return data
        except ValueError:
            print("Error: Unable to parse JSON response.")
            return None
    else:
                    print(f"Error fetching data: {response.status_code} -
{response.text}")
        return None

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

    traffic_data = fetch_traffic_data(start, destination)
    if traffic_data:
        print(f"Traffic Overview for route from {start} to {destination}:")
        current_traffic = traffic_data.get('current_traffic', 'N/A')
```

```
            estimated_travel_time = traffic_data.get('estimated_travel_time',
'N/A')
            incidents = traffic_data.get('incidents', 'No incidents reported')
            alternative_routes = traffic_data.get('alternative_routes', [])

            print(f"Current Traffic: {current_traffic}")
            print(f"Estimated Travel Time: {estimated_travel_time}")
            print(f"Incidents: {incidents}")
            print("Alternative Routes:")
            for route in alternative_routes:
                print(f"- {route}")
        else:
            print("Failed to retrieve traffic data.")

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



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:

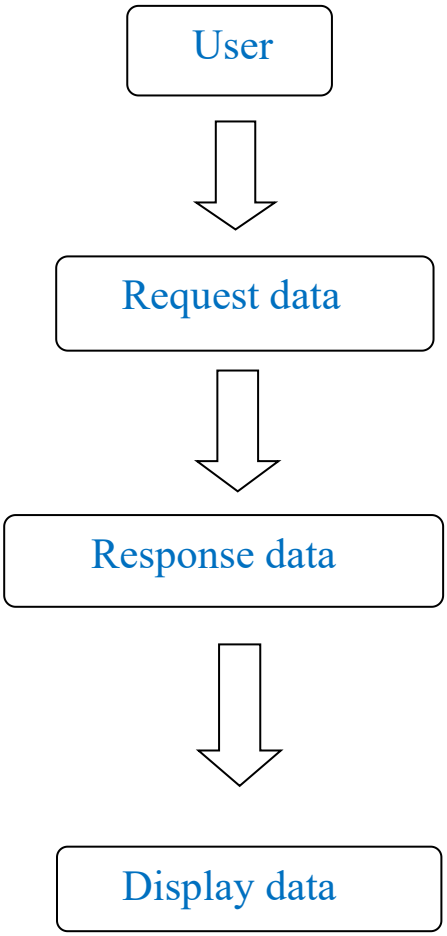
• Data flow diagram illustrating the interaction between the application and the API.

• 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.

FLOWCHART:



IMPLEMENTATION:

```
import requests
def fetch_covid_stats(region, api_key):
    base_url = "https://disease.sh/v3/covid-19"
    headers = {"Authorization": f"Bearer {api_key}"}
        response = requests.get(f"{base_url}/all" if region == "world" else
f"{base_url}/countries/{region}", headers=headers)
    if response.status_code == 200:
        return response.json()
```

```
    else:
        return None

def main():
    region = input("Enter the region (e.g., world, USA, Germany): ").strip()
    api_key = "https://disease.sh/v3/covid-19/historical/all?lastdays=all"
    stats = fetch_covid_stats(region, api_key)
    if stats:
        print(f"COVID-19 Statistics for {region}:")
        print(f"Cases: {stats['cases']}")
        print(f"Recovered: {stats['recovered']}")
        print(f"Deaths: {stats['deaths']}")
    else:
        print("Failed to retrieve data. Please check the region and try again.")

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

Displaying Data:

Input:

Enter a region(eg,world,USA,Germany): Hungary

Output:

COVID-19 Statistics for hungary:
Cases: 2230232
Recovered: 2152155
Deaths: 49048

```
        deaths = data['deaths']
        return cases, recoveries, deaths
    else:
        return None

def main():
    region = input("Enter a region (country, state, or city): ")
    stats = fetch_covid_stats(region)
    if stats:
        cases, recoveries, deaths = stats
        print(f"COVID-19 Statistics for {region}:")
        print(f"Cases: {cases}")
        print(f"Recoveries: {recoveries}")
        print(f"Deaths: {deaths}")
    else:
        print("Unable to fetch data for the specified region.")

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

```
Enter a region (country, state, or city): india
COVID-19 Statistics for india:
Cases: {'1/22/20': 557, '1/23/20': 657, '1/24/20': 944, '1/25/20': 1437, '1/26/20': 2120, '1/27/20': 2929, '1/28/20': 5580, '1/29/20': 6169, '1/30/20': 8237, '1/
Recoveries: {'1/22/20': 30, '1/23/20': 32, '1/24/20': 39, '1/25/20': 42, '1/26/20': 56, '1/27/20': 65, '1/28/20': 108, '1/29/20': 127, '1/30/20': 145, '1/31/20':
Deaths: {'1/22/20': 17, '1/23/20': 18, '1/24/20': 26, '1/25/20': 42, '1/26/20': 56, '1/27/20': 82, '1/28/20': 131, '1/29/20': 133, '1/30/20': 172, '1/31/20': 214
```