REAL TIME WEATHER USING PYTHON API

ABSTRACT

The aim of the project is to develop a python app that will collect weather information such as current temperature, pressure, humidity, wind speed, weather description and many others, of any place on the earth, using OpenWeatherMap API. This project is going to be very short and simple. You need to invest 30 min to understand everything.You can find these weather information in real time by just typing the city name. We will be able to get the data about only those places which are listed (or supported) by OpenWeather Map website.

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1. PROJECT INTRODUCTION

WEATHER API IS :

A weather API is an Application Programming Interface that allows weather data to be queried from scripts and code. Good weather APIs provide both historical weather data and forecast data via an easy-to-use,well-defined programming interface.The best APIs have dozens of weather measures, near-real-time current conditions reporting, and decades of worldwide historical weather reports.

Ideally both historical and forecast look-ups would be combined into the same API entry point with the addition of an ultra-long-range forecast based on climate statistics.

This single entry point makes it easy for anyone writing a script, coding and app, or loading a database to get instant access to the exact weather data that they need from a global database containing hundreds of millions of records.

Of course, the pricing for this API should be cheap enough that anyone can get access and initial users should be able to start their weather project entirely for free.

Weather forecasting is the application of science and technology to predict the conditions of the atmosphere for a given location and time.Weather forecasts are made by collecting quantitative data about the current state of the atmosphere at a given place and using meteorology to project how the atmosphere will change. The role of Technology has been remarkable in the field of weather forecasting.

Weather data is not only necessary for researchers or scientists, ordinary people can be benefited from it as well. People nowadays are feeling the necessity of weather data as well.There are a variety of weather mobile apps in Google Play and the App store. Those apps have great features and functionalities to satisfy users.

However, only a few of them have friendly user interface and human centered interactions, which means that a lot of them might be difficult to be navigated even though they provide enough functionalities. It is not convenient for new users. Therefore, we would like to do improvements on weather mobile apps. . It is basically for Apple smart phones and tablets.

2.PROBLEM STATEMENT

A weather API is ideally suited for use cases that need large volumes of weather data or need to access weather data in an automated way. For example, if you want to make a script that loads weather data into a corporate data warehouse to match against historical sales metrics, using a weather API in your ETL script is the perfect solution.

If you are creating an app that needs to combine user activity and weather conditions at the time of that activity, a weather API allows you to retrieve that exact weather conditions at any given time and location directly in your code. If you are planning the inventory, marketing, and staffing levels at your small business locations, a weather API can be used from within Excel or Google Sheets so then you can dynamically adapt your business based on the forecast conditions and how they apply in your specific case.

The use cases for a weather API are only limited by your business needs and imagination. There are thousands of ways to use weather data ranging from solar energy production to shipping to vacation planning. And the power of a weather API means that you can use code or script to automate these tasks easily for your business, organization, or hobby.

PURPOSE:

The purpose of REAL TIME WEATHER API USING PYTHON is to calculate the different parameters of weather like humidity,tempareature,weather description etc.. at different locations at different times.

FEATURES:

- This application is easily supported in mobile phones,PCS etc.

- It is easy to maintain.

- It Provides the information about weather conditions so that it helps to tourists, passengers, weather forecast department etc.

- It reduces space complexity.

- Weather data of different places can be retrieved easily.

- It supports user - friendly environment.

3.FINDING A HIGH-QUALITY WEATHER API

A weather API is only as good as the data an infrastructure behind it. Visual Crossing Weather offers global historical weather reports over more than the last 50 years. It also provides worldwide 16-day forecasts from the best forecasting models. If your use case requires an even longer-term view, statistical forecasts can take decades of raw historical data and calculate the normal and extreme weather predictions for any day of the year at any point on Earth.

Visual Crossing Weather provides not only common weather measures such as temperature, precipitation, and wind data but also less common measures including solar energy, snow depth, and precipitation coverage. These can be retrieved in CSV or JSON format using an industry-standard RESTful, URL API.

The weather API is embeddable in any scripting or coding language including JavaScript, Python, Java, and even usable from the command line. In addition, anyone can get started using the API for free. Paid usage starts at only $0.0001 per record with no minimum while monthly access plans start at $35 per month. This means that anyone can get 1000 records per day for free and hundreds of thousands of records for only a few dollars. And the entire system is built on a highly scalable Amazon Web Services infrastructure that can scale from the smallest home personal home automation use case to the largest consumer websites

4.SCENARIO ANALYSIS

A.SCREEN AND INTERACTION ANALYSIS:

The users will use this mobile app on iOS smart phones and tablets. All the information of this mobile app will be displayed full screen. Basically, the interactions include touch and click and scroll. For example, when users would like to view weather information, they click the icon to open this app; when they want to add a new city, they click the add icon and type in the city that they want.

B.USAGE ANALYSIS:

Users can use this mobile app whenever they want, every day at home, on their way to travel, and other situations as long as they want to know weather information.User must be connected to the internet,being offline is not an option.Tip of the day is assumed to be useful for the user.

C.ENVIRONMENT ANALYSIS:

This mobile app only can be used on iOS smart phones and tablet devices. It will be using the Openweather API to get the weather information. It sends requests, and then get responses from the API through the internet.Uses Google APIs for geolocation and keyword based search purposes(Citydetails).

5.WORK PLAN

A. LITERATURE SEARCH AND REVIEW:

We will study about SWIFT programming, iOSdevelopment, XCode environment & features, network requests,use of APIsand JSON formatting the fetched data.

B. ANALYSIS AND MODELING:

Based on our gathered knowledge base, we will analyze the processes and make a prototype of the application.

C. NAVIGATION AND UI DESIGN:

We will design application layout and application flow.Also, we will design the splash screen.

D. IMPLEMENTATION:

From prototype we will start to integrate the modules together and we will finish all the features enlisted.The program must be proper functioning and error free.
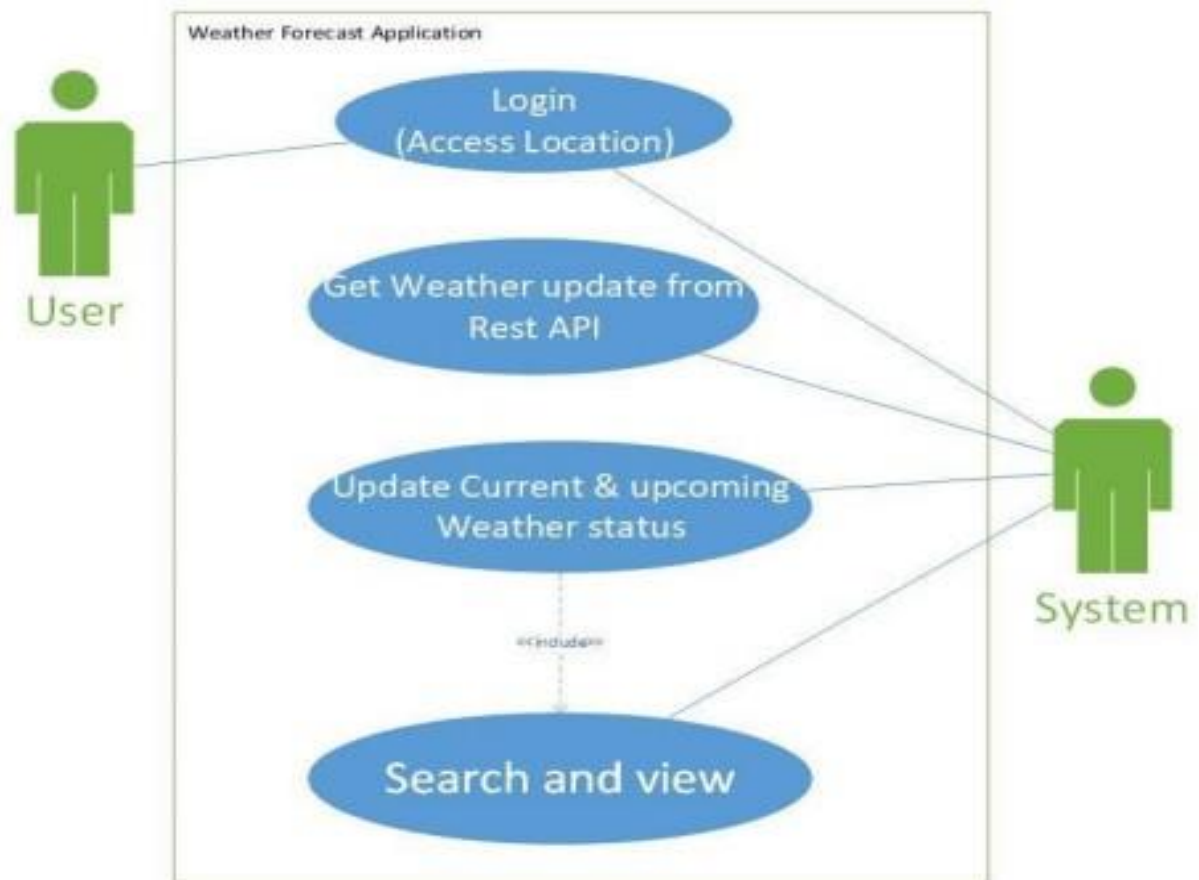
E. TESTING AND DEBUGGING:

Testing and debugging will be a challenging job for us, as we will let some people use the app and note suggestions from them.Also,we always need to emphasize on the comprehensiveness of our data and the magnificence of our UI.
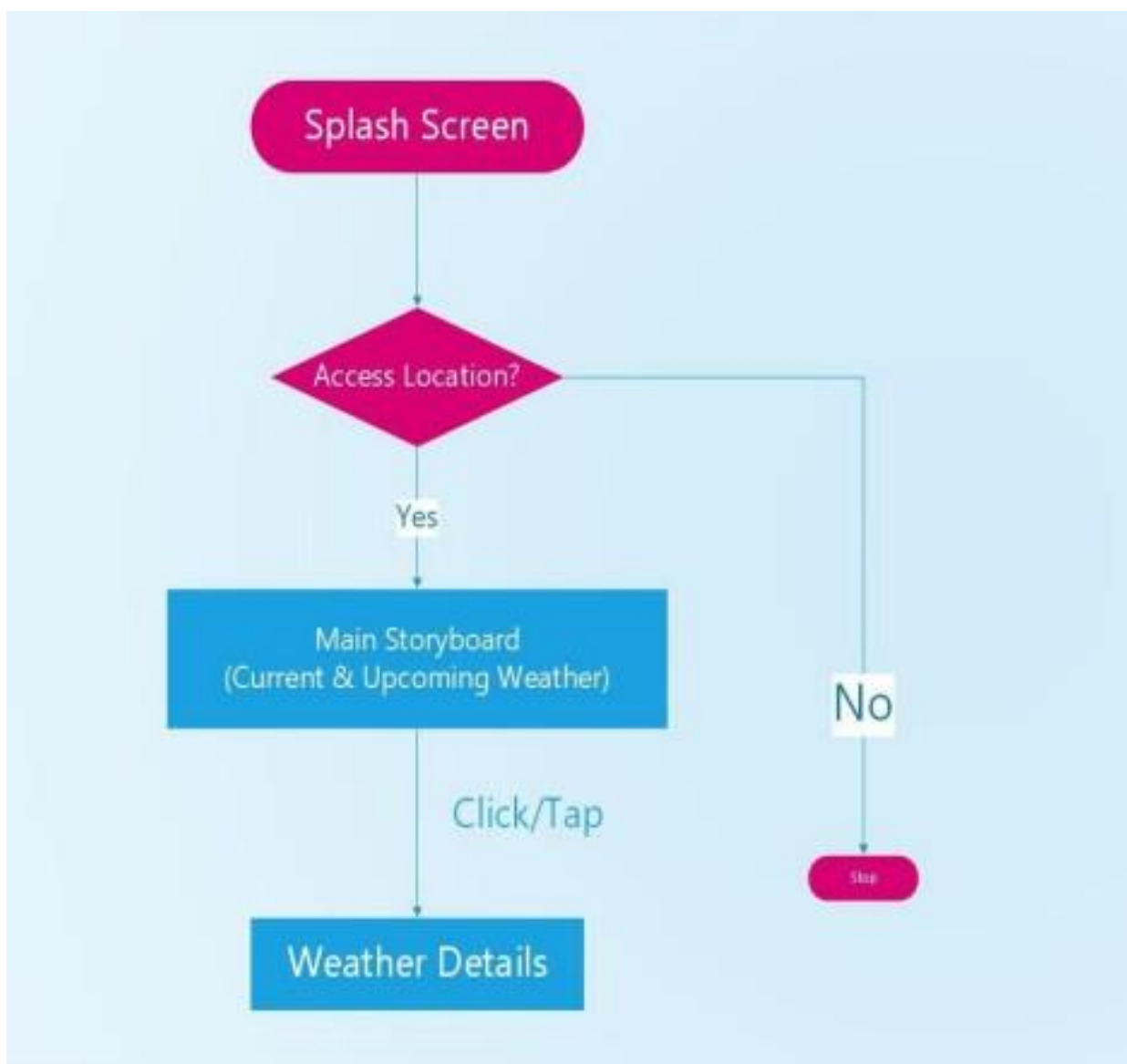
F. WORK ON FINAL REPORT AND DOCUMENTATION:

We worked on the final report and software documentations in the last week.A proper functioning copy of the software(written on CD/DVD preferably) shall be provided at the end of the assigned time period.We also kept track of our limitations and enlisted some unimplemented features that we intend to work on in the near future.

6. USE CASE DIAGRAM

7. UI DIAGRAM

Splash Screen

Access Location?

Yes → **Main Storyboard (Current & Upcoming Weather)**

Click/Tap → **Weather Details**

No → Stop

8. IMPLEMENTATION

8.1 EXECUTION FLOW STEPWISE:

STEP 1:

WE need to set API keys by creating a free account @https://openweathermap.org/api . . . . .

STEP 2:

Then generate one of the API key to us in the program so that it helps in providing information about weather app.

STEP 3:

Now import requests module in the particular application where you are running the program.

STEP 4:

Then specify city after by using json() specify the parameters like temperature,humidity etc you want to know..

STEP 5:

Based on the calculation, it prints the message to retriever in two different formats

1. If the city exists then it sends a message as "enter city .. and returns output"

2. If the city doesn't exist then it prints a message as "city not found"

9.SOURCE CODE:

```
import requests

api_key = '30d4741c779ba94c470ca1f63045390a'

user_input = input("Enter city: ")

weather_data = requests.get(

f"https://api.openweathermap.org/data/2.5/weather?q={user_input}&units=imperial&APPID={api_key}")

if weather_data.json()['cod'] == '404':

    print("NoCityFound")

else:

    weather = weather_data.json()['weather'][0]['main']

    temp = round(weather_data.json()['main']['temp'])

    print(f"The weather in {user_input} is: {weather}")

    print(f"The temperature in {user_input} is: {temp}ºF")
```
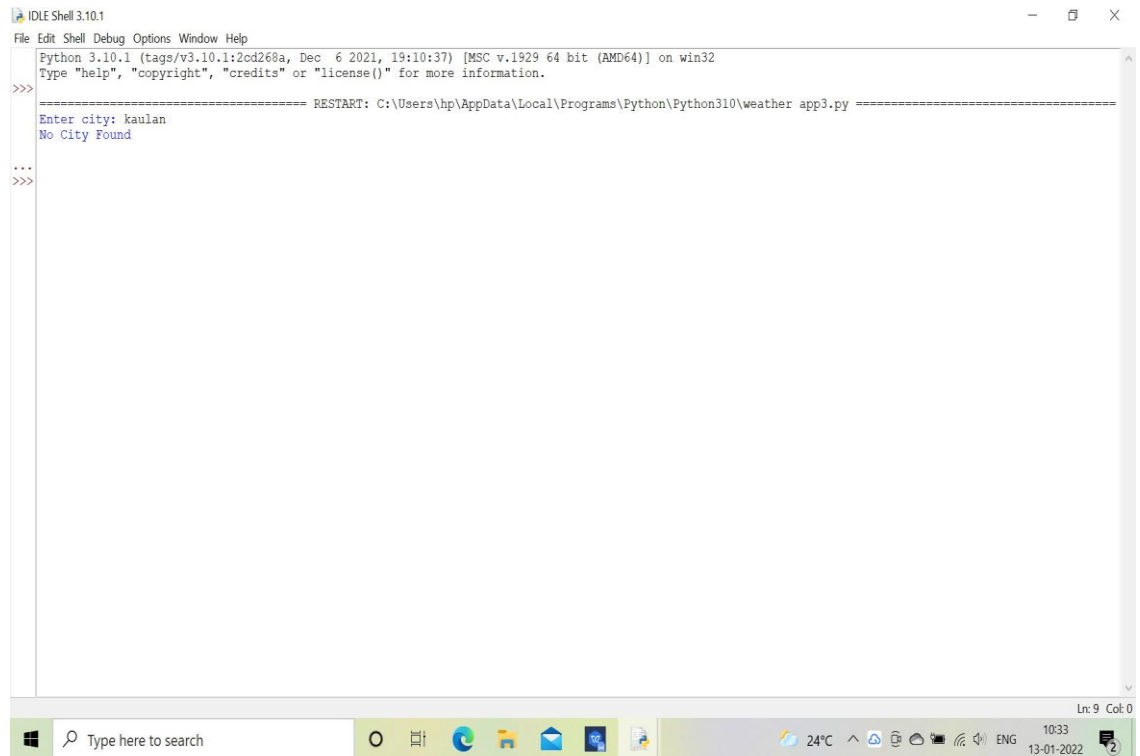
9.1. OUTPUT SCREENSHOT:

IF CITY IS FOUND


```
IDLE Shell 3.10.1                                                                          —    □
File Edit Shell Debug Options Window Help
    Python 3.10.1 (tags/v3.10.1:2cd268a, Dec  6 2021, 19:10:37) [MSC v.1929 64 bit (AMD64)] on win32
    Type "help", "copyright", "credits" or "license()" for more information.
>>>
    = RESTART: C:\Users\hp\AppData\Local\Programs\Python\Python310\weather app2.py =
    Enter city: hyderabad
    The weather in hyderabad is: Mist
    The temperature in hyderabad is: 68°F
>>>
```

IF CITY IS NOT FOUND:

10. ADVANTAGES:

1. HIGH QUALITY OF DATA:

One of the main advantages of weather radar is the fact that the data collected by the radar is of high quality and can be used to determine various aspects of the weather reliably.

2. REALIABLE WEATHER FORECASTS:

The forecasting of the weather is one of the most important uses of weather radar. Through radar technology, experts have been able to reliably predict the weather and sometimes even measure the exact amount of rainfall or precipitation.

3. MORE ACCURATE RESULTS:

Using weather radar to determine the weather and even to predict the weather results in much more accurate results. Radar can easily measure the exact amount or quantity of a particular weather element and use this to determine the expected forecasts.

4. LOCATE PRECIPITATION:

Weather radar can also be used to locate precipitation in any given area of the earth. This information comes in handy when determining the exact amount of rainfall that is expected.

5. CAN CALCULATE THE SPEED OF PRECIPITATION:

Besides locating precipitation, weather radar can also be used to calculate the exact speed of precipitation, a feat that was previously impossible using conventional means.

6. CAN DETERMINE THE STRUCTURE OF STORMS:

Weather radar has been used extensively by experts to determine the structure of storms. This information is then used to build the profile of expected storms and put in place mitigating measures.

7. HAIL DETECTION:

We can also use weather radar to detect hailstorms that are expected within a particular locality. This information is important in determining the exact nature of the hailstorms and helps prevent their effects.

8. RESEARCH:

Weather radar also comes in handy in the field of research where experts can use it to profile the weather of a given area and use the patterns to predict the climate of that area and help people in planning.

9. Farmers can known when to plant or harvest their crops.

10. People came choose where and when to take their holidays to take advantages of good weather.

11. Surfers known when large waves are expected.

12. Regions can be evacuated if hurricanes or floods are expected.

13. Aircraft and shipping rely heavily on accurate weather forecasting.

11. DISADVANTAGES:

1. CANNOT DETECT FOG:

Weather radar has the limitation of not being able to detect fog. This creates a gap in weather forecasting where an area that is likely to receive fog is not properly profiled.

2. CANNOT DETECT WIND INDEPENDENTLY:

A weather radar is not known to detect wind independently unless with the use of additional remote sensing. This also creates a gap in weather forecasting.

3. NOT ENTIRELY RELIABLE:

Weather radar has a variety of limitations that makes it lack some of the most important forecasting principles. This means the radar is not entirely reliable in terms of weather forecasting.

4. REQUIRES EXPERTISE TO ANALYZE:

The usage of weather radar to forecast the weather is not an easy thing and requires some level of expertise to analyze the data that comes through it.

5. RELIES ON INTENSE DATASETS:

There is a huge dataset associated with the weather radar that needs to be analyzed before any decision is made. This data is so big that it may take a considerable amount of time to analyze fully.

6. THE ANALYSIS IS NOT INSTANT:

The weather analysis done through weather radar is not always instant and therefore the information is not real-time.

7. WEATHER CHANGES ALL THE TIME :

The weather is a phenomenon that changes all the time. This means that any delay in data collection may sometimes result in useless data.

8. THE ESTIMATES CAN BE WRONG:

The estimates obtained from weather radar are not 100 percent accurate. This means that the data may be wrong in some cases and this may impact the final decision making.

9. Weather is extremely difficult to forecast

12. LIMITATIONS

a) Unpaid APIs provide incomplete services.Many details cannot be fetched.

b) Often,tuples of upcoming days remain empty once again due to free APIs

c) The GMS API (Google Manual Search) is actually keyword based that might only provide data of few discrete locations.The data might not be precise and continuous.

d) Language diversity could have been implemented.Multilingual apps make it easy for users worldwide.

13. UNIMPLEMENTED FEATURES

FUTURE DEVELOPMENTS:

a)   We intend to provide more detailed tips based on the age,gender,region and health conditions(Dust allergy,heatstroke tendency etc.) of the user.

b)   FAQ section based on detailed data might be quite handy.It will save the user's efforts and make it more convenient.

c)   Using paid APIs to fetch more details might make the application more comprehensive and appealing.For example wind speed,precipitation & sea level values can be used to provide more intellectual tips.

d)   Mobility of the traveler,their start & end points of the journey,their route of traveling(road,waterway,aerial) shall be strongly focused.The application needs to be an aid for traveling users.

e)   Recording User inputs to understand the user preferences and providing them necessary notifications needs to be kept in mind.

f)   Maybe someday in the near future,we will use AIs for more precision and accuracy.

14. CONCLUSION

This project is used to detect the weather condition of a particular place.The design and development of this application enhances the nature of farming,tourism and agriculture.

This project is implemented with advanced technology of python using JSON which we can run in any suitable platform means in any python apps which reduces execution complexity and its's user friendly so that every user can handle it with ease .

This application is developed such that it will not use much of phone RAM and memory space.It's very much useful to know weather reports using API.

15. REFERENCES

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