DATA SCIENCE

DREAM JOB

Python Web APIs

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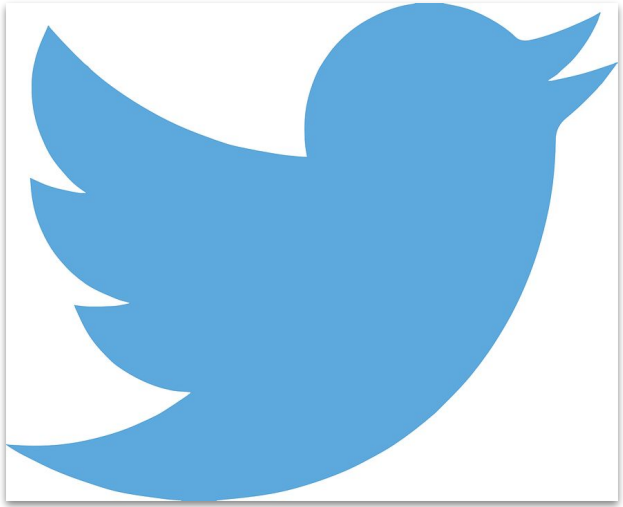
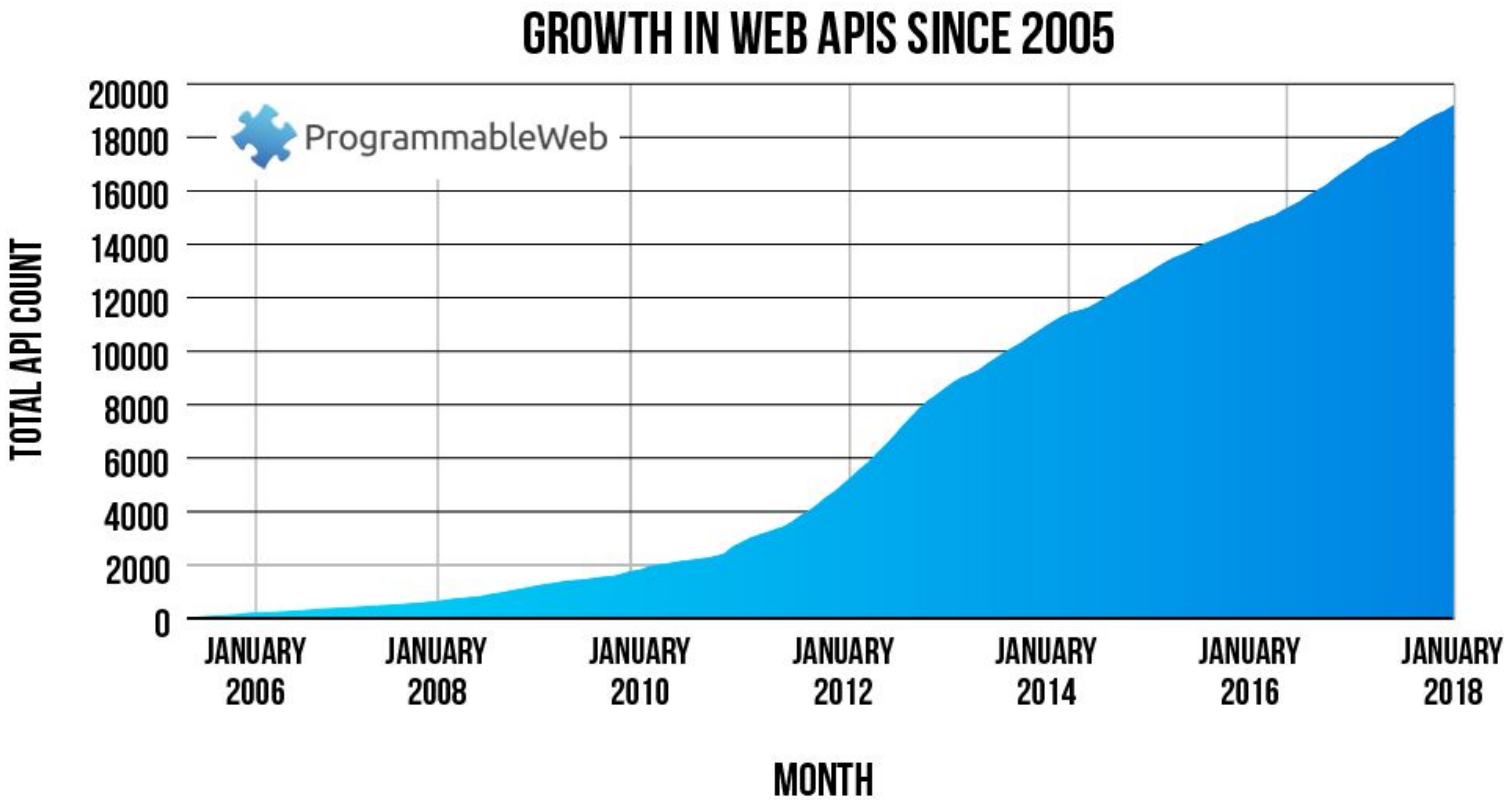
Why are APIs so Important?



Growth of Web APIs



Source: https://www.programmableweb.com/sites/default/files/growth-in-web-apis-since-2005_0.png

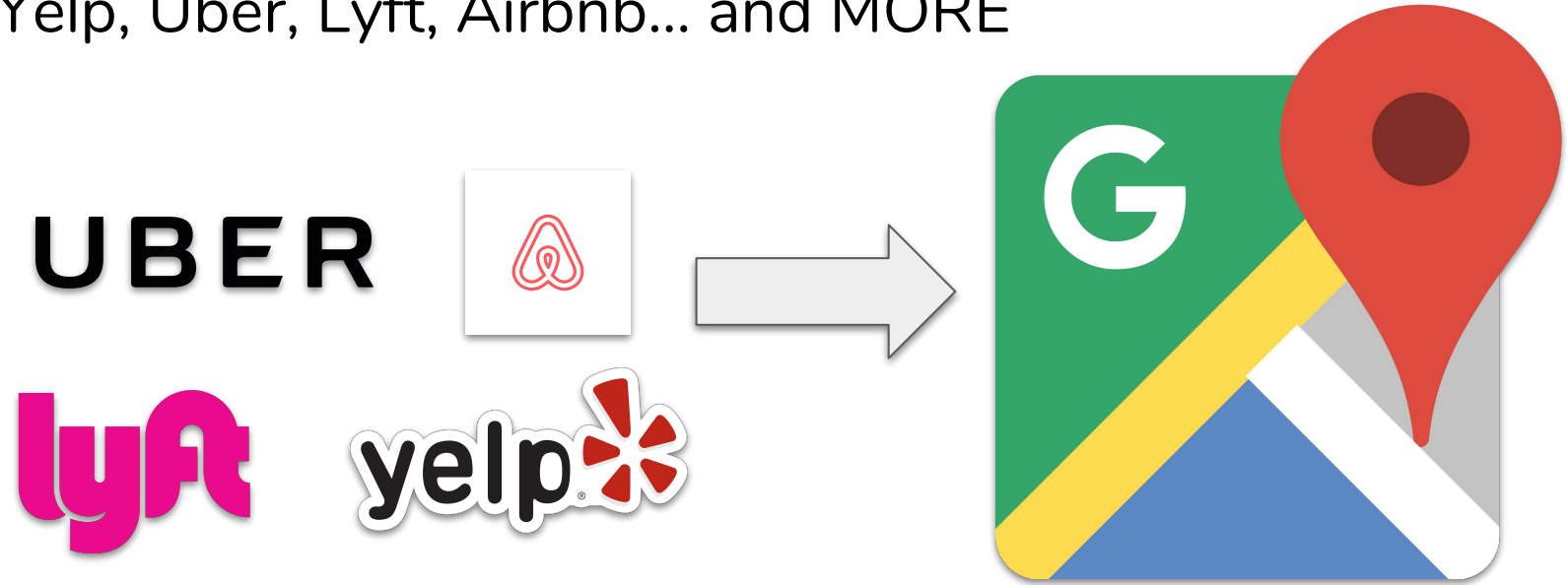
API Application Programming Interface

It's a way for two pieces of software to talk to each other

Example of API Use Case

Google Maps API have been used by:

Yelp, Uber, Lyft, Airbnb... and MORE



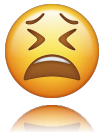
Example: Yelp API

All of these APIs can help provide a service

API Pros/Cons

Pros: 

- Time - Saves companies lots of time because they don't have to build anything in house
- Cost - It can save companies lots of money by using APIs
- Focus - Using an API allows companies to focus on their main product
- Accessibility - Nearly any programming language can access it with its libraries (Python, R, Java, Ruby, JavaScript...)

Cons: 

- Security - Since you're using another company's data, there is always a chance for security issues
- Reliability - Your product/service is accountable to the usage of their API. If it fails, then you're at risk of failing as well.

What is REST?

REpresentational

These are the **resources** being provided and can be **represented** in different forms (JSON, XML, etc..)

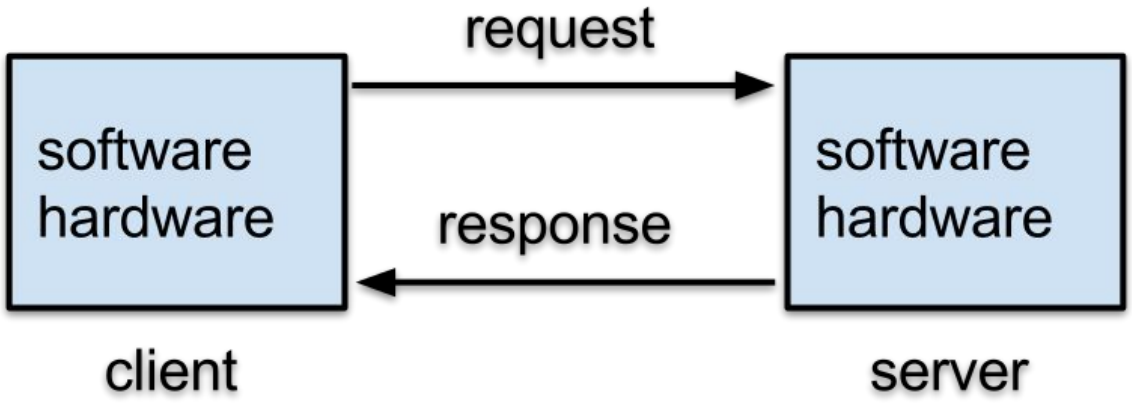
State

State transfer refers to a type of **transaction** on the resource (e.g. GET request)

Transfer

REST Client and Server Architecture

- **REQUEST** - Client is the application/device that ***requests*** for information.
- **RESPONSE** - Server is a computer that ***provides or responds back*** the information to the client.



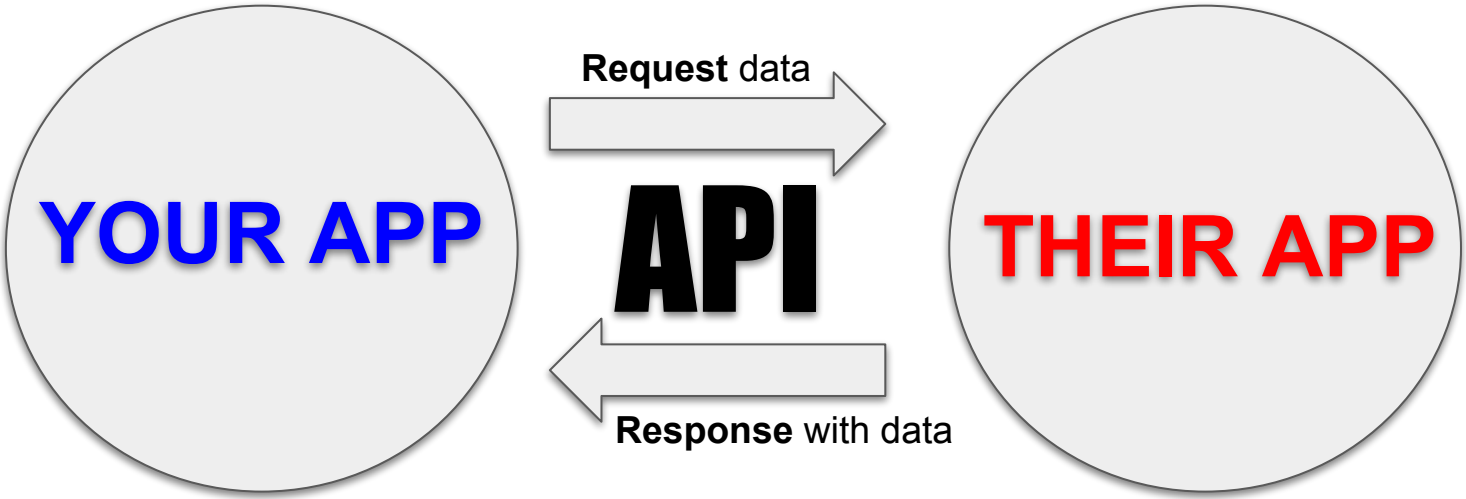
REST Client and Server Example

- The **doctors (client)** ask for patient medical records.
- The **hospital (server)** provides the necessary **information (data)**

Request data

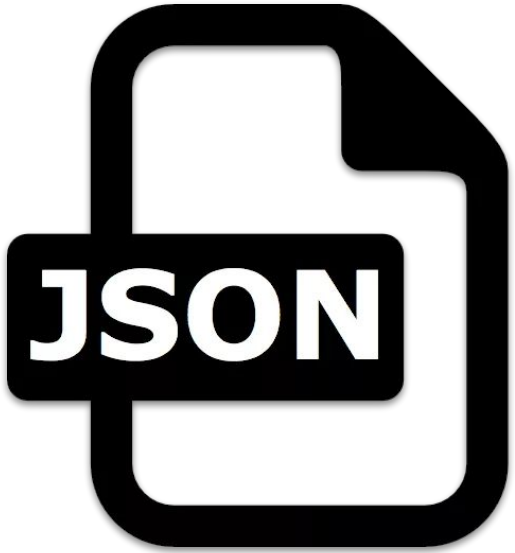
Response with data

REST APIs Can Use Request and Response



Python API - JSON Response

- When we want to interact with an API in Python (like accessing web services), it is very common to get the **responses** in a form called **JSON**.



Request & Response

Request

```
# Perform a Request Call on our search query
response = req.get(query_url)
response
```

```
<Response [200]>
```

Response

In [77]:
```
# Using json.dumps() allows you to easily read the response output
print(json.dumps(response, indent=4, sort_keys=True))
```


```
{
    "base": "stations",
    "clouds": {
        "all": 75
    },
    "cod": 200,
    "coord": {
        "lat": 34.05,
        "lon": -118.24
    },
    "dt": 1545076200,
    "id": 5368361,
    "main": {
        "humidity": 51,
        "pressure": 1023,
        "temp": 17.41,
        "temp_max": 18.3,
        "temp_min": 16.7
    },
```


JSON

JSON Format

- **Similar to Key/Value Pair (Key : Value)**
- It's just like a **dictionary** in Python

```
In [77]: # Using json.dumps() allows you to easily read the response output
         print(json.dumps(response, indent=4, sort_keys=True))
```


```
{
    "base": "stations",
    "clouds": {
        "all": 75
    },
    "cod": 200,
    "coord": {
        "lat": 34.05,
        "lon": -118.24
    },
    "dt": 1545076200,
    "id": 5368361,
    "main": {
        "humidity": 51,
        "pressure": 1023,
        "temp": 17.41,
        "temp_max": 18.3,
        "temp_min": 16.7
    },
```


Value

Key

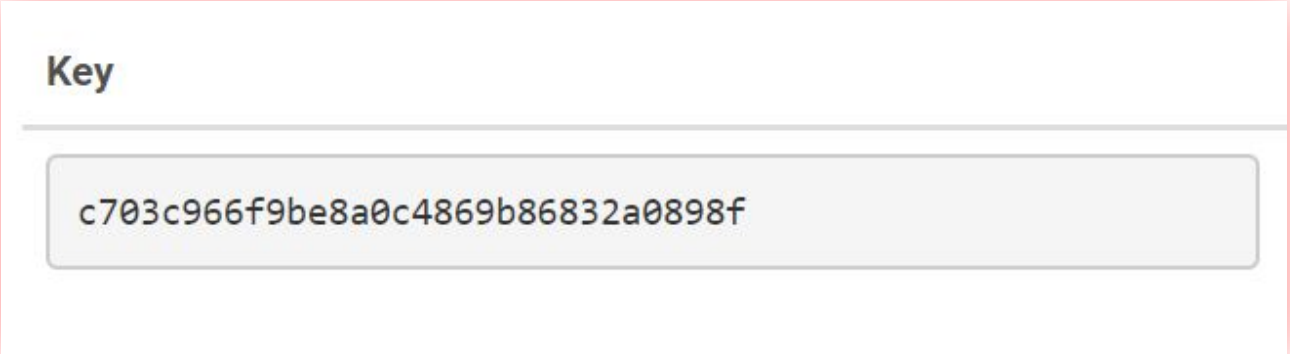
JSON

What is an API Key?

- API Keys helps *identify* your app & your requests
- Used for *authorization* and *authentication*

How do I get one?

- You need to register & sign up for an API Key



Three Parts of API Requests

1. API Key - This key acts as a form of authentication, which can lead to access control

2. Base URL- This is the URL that you can make a request to the website's API with.

3. Search Query - This is the query that is used to get back any information of a particular API

Complete Query = Base URL + API Key + Search Query

Example of API Request

- Start with the **base_url** and add in the query parameters
- Queries always begin with a question mark (**?**)
- Additional queries are followed by an ampersand (**&**)

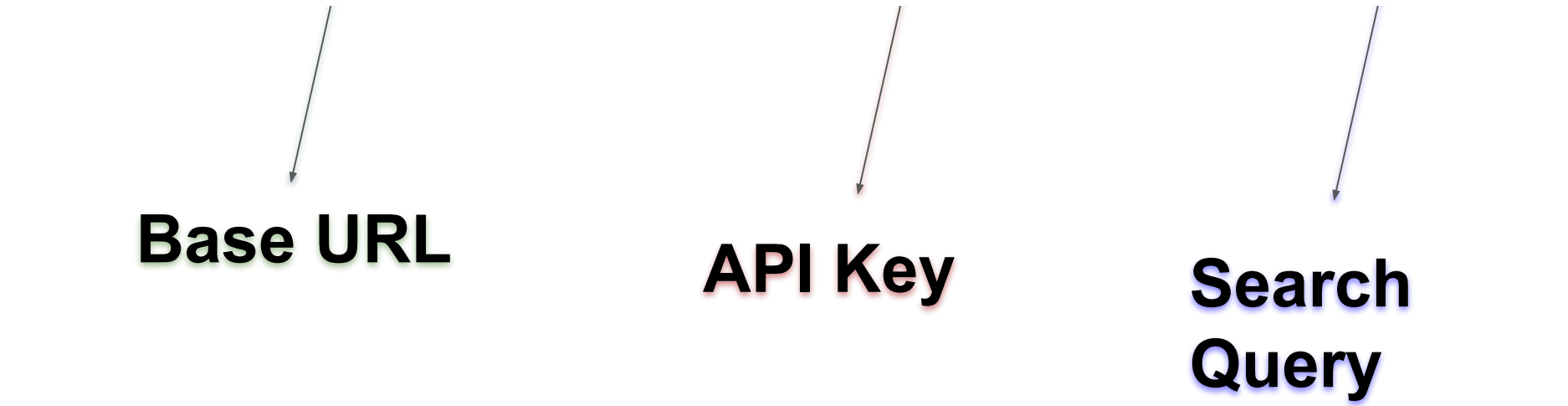
Base Url

Query Parameters

```
?query1=value1&query2=value2
```

Example of API Request

http://api.openweathermap.org/data/2.5/weather?apikey=ada32f6f2c68d7b9107ab5982777180d&q=Cypress&units=metric



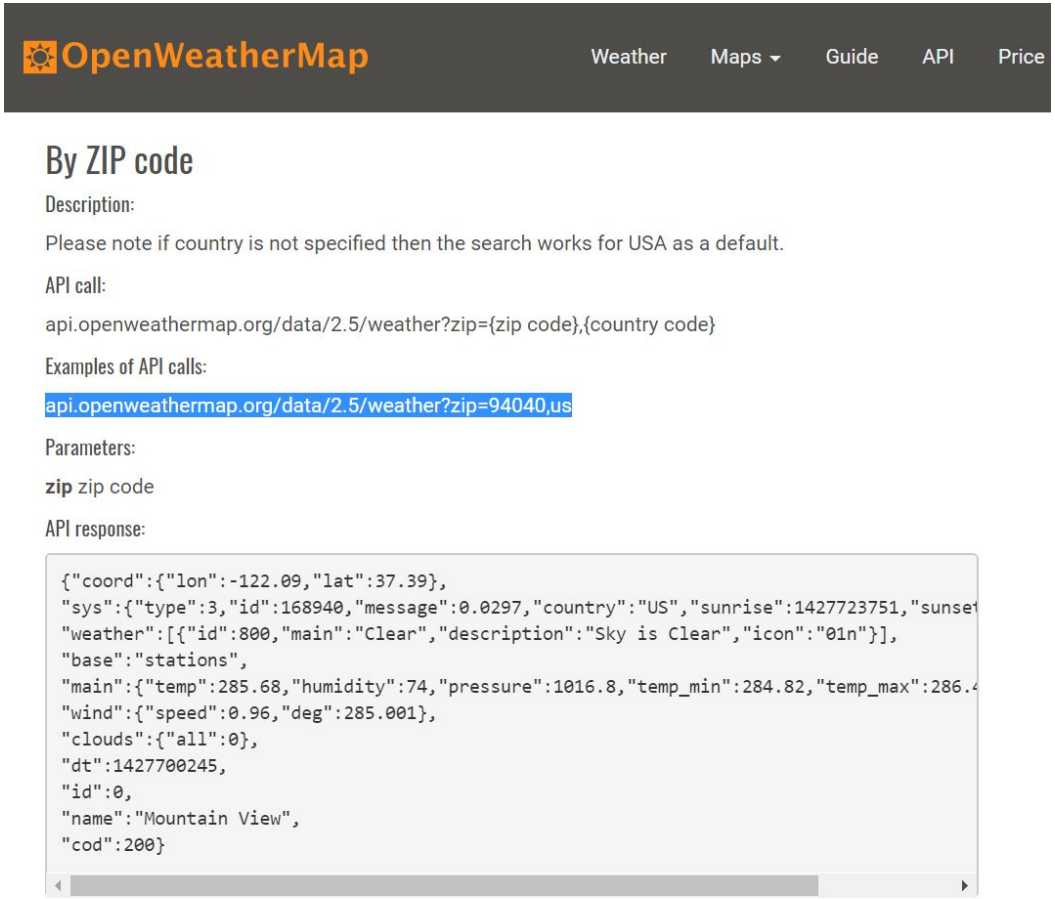
Question: How many query parameter(s) do we have here?

Documentation

OpenWeatherMap Example:

Each Web API will have its own

Documentation for you to follow.



Documentation
DEMO

Run this code:

Example of API Call:
http://api.openweathermap.org/data/2.5/weather?zip=94040,us

Does it work?

Documentation
DEMO

REMEMBER:
You need to have another query for your **api_key**

Example of API Call:
http://api.openweathermap.org/data/2.5/weather?zip=94040,us&apikey=c703c966f9be8a0c4869b86832a0898f

Documentation DEMO

TA-DA!


```
{"coord":{"lon":-122.08,"lat":37.39},"weather":
[{"id":500,"main":"Rain","description":"light
rain","icon":"10d"}],"base":"stations","main":
{"temp":286.67,"pressure":1010,"humidity":61,"temp_min":284.15,"temp_max":288.75}
,"visibility":16093,"wind":{"speed":4.6,"deg":140,"gust":10.3},"rain":
{"1h":0.25},"clouds":{"all":75},"dt":1547504100,"sys":
{"type":1,"id":5122,"message":0.0049,"country":"US","sunrise":1547479296,"sunset"
:1547514849},"id":420006353,"name":"Mountain View","cod":200}
```

API Request → Data

```
Out[67]: [{'coord': {'lon': -0.13, 'lat': 51.51},
           'weather': [{'id': 802,
             'main': 'Clouds',
             'description': 'scattered clouds',
             'icon': '03n'}],
           'base': 'stations',
           'main': {'temp': 281.15,
            'pressure': 1019,
            'humidity': 81,
            'temp_min': 279.15,
            'temp_max': 283.15},
           'visibility': 10000,
           'wind': {'speed': 3.6},
           'clouds': {'all': 36},
           'dt': 1545067200,
           'sys': {'type': 1,
            'id': 1414,
            'message': 0.006,
            'country': 'GB',
```

REQUEST

	City	Temperature	Weather Description
0	London	281.15	scattered clouds
1	Paris	279.15	mist
2	Las Vegas	281.50	clear sky
3	Stockholm	271.84	broken clouds
4	Sydney	295.15	broken clouds
5	Hong Kong	288.41	clear sky

DATA

REST API Summary

- **API - Application Programming Interface**
- It’s when two applications *talk* together
- APIs simply provide data
- API's are part of a company's server that receives requests and sends responses