

# CVID19 TRACKER

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# The Big Picture



Retrieve APIs  
Convert to DF  
Explore Data  
Clean Data  
Merge DFs  
Add Calc Columns  
Create DB connection  
Create Postgres tables  
Populate Tables



Create Database  
Create Tables  
Populate Tables  
Define Primary Keys



Connect to Database  
Mirror Tables  
Run Flask Server  
App Routes to Pages  
App Routes to Data  
Jsonify Data



Call Data Routes  
Store Data in Var  
Plot  
Populate HTML pages

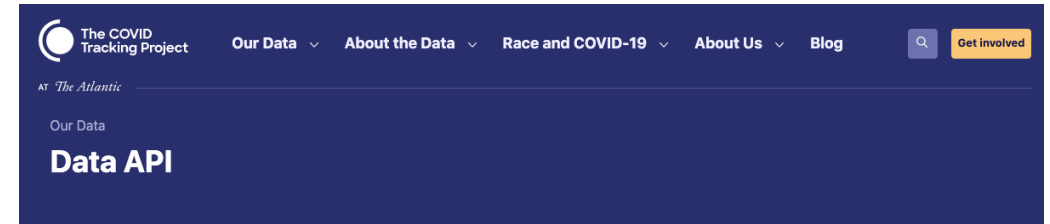


Set Page Layout  
Import JS Files  
Import Libraries  
Import API Key  
Style

# Datasets APIs

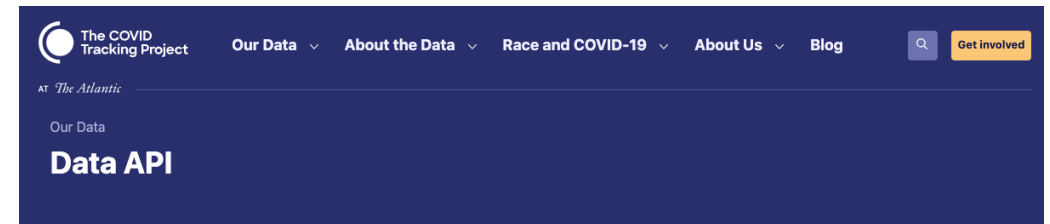
COVID information  
historical by State

<https://covidtracking.com/data/api>



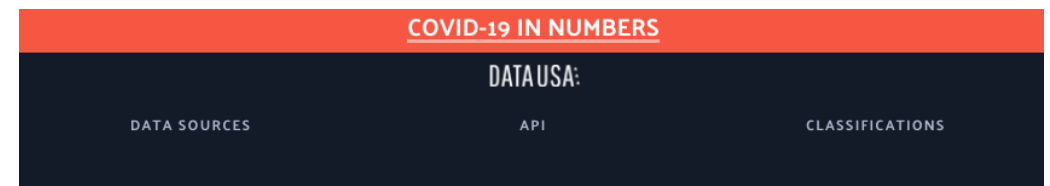
COVID information  
historical US Totals

<https://covidtracking.com/data/api>



USA Population  
by State

<https://datausa.io/about/api/>





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## Importing and Inspecting the Data

```
In [1]: # import dependencies
import requests as req
import pandas as pd
import datetime as dt
import matplotlib.pyplot as plt
import json
from config import password
from sqlalchemy import create_engine
```

```
In [2]: # getting the APIs
url_covid = 'https://api.covidtracking.com/v1/states/daily.json'
url_state_population = 'https://datausa.io/api/data?drilldowns=State&measures=Population&year=latest'
```

```
In [3]: # retrieving API and storing data in variables
covid_js = req.get(url_covid).json()
# usa_pop_js = req.get(url_usa_population).json()
state_pop_js = req.get(url_state_population).json()
print(json.dumps(state_pop_js['data'], indent=4, sort_keys=True))
```

```
In [4]: # converting the data to a dataframe for data manipulation and cleaning
covid_all = pd.DataFrame(covid_js)
state_pop_df = pd.DataFrame(state_pop_js['data'])
display(covid_all.head(), state_pop_df.head())
```

	date	state	positive	probableCases	negative	pending	totalTestResultsSource	totalTestResults	hospitalizedCurrently	hospitalizedCumulative	...	po
0	20201022	AK	12877.0	NaN	535832.0	NaN	totalTestsViral	548709.0	41.0	NaN	...	5
1	20201022	AL	177064.0	22122.0	1125753.0	NaN	totalTestsViral	1280695.0	864.0	19448.0	...	13
2	20201022	AR	102798.0	6506.0	1159242.0	NaN	totalTestsViral	1255534.0	603.0	6526.0	...	12
3	20201022	AS	0.0	NaN	1616.0	NaN	totalTestsViral	1616.0	NaN	NaN	...	
4	20201022	AZ	234906.0	5341.0	1438997.0	NaN	totalTestsPeopleViral	1668562.0	848.0	20938.0	...	16

5 rows x 55 columns

	ID State	State	ID Year	Year	Population	Slug State
0	04000US30	Montana	2018	2018	1062305	montana
1	04000US01	Alabama	2018	2018	4887871	alabama
2	04000US04	Arizona	2018	2018	7171646	arizona
3	04000US05	Arkansas	2018	2018	3013825	arkansas
4	04000US06	California	2018	2018	39557045	california



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```
In [6]: state_pop_df['State'].unique()
Out[6]: array(['Montana', 'Alabama', 'Arizona', 'Arkansas', 'California',
               'Colorado', 'Connecticut', 'Delaware', 'District of Columbia',
               'Florida', 'Georgia', 'Hawaii', 'Idaho', 'Illinois', 'Indiana',
               'Iowa', 'Kansas', 'Kentucky', 'Louisiana', 'Maine', 'Maryland',
               'Massachusetts', 'Michigan', 'Minnesota', 'Mississippi',
               'Missouri', 'Alaska', 'Nebraska', 'Nevada', 'New Hampshire',
               'New Jersey', 'New Mexico', 'New York', 'North Carolina',
               'North Dakota', 'Ohio', 'Oklahoma', 'Oregon', 'Pennsylvania',
               'Rhode Island', 'South Carolina', 'South Dakota', 'Tennessee',
               'Texas', 'Utah', 'Vermont', 'Virginia', 'Washington',
               'West Virginia', 'Wisconsin', 'Wyoming', 'Puerto Rico'],
              dtype=object)
```

df.head()  
df.shape  
df.describe()  
df.columns  
df.info()

```
deprecated_fields = ['checkTimeEt', 'commercialScore', 'dateChecked', 'dateModified',
                    'grade', 'hash', 'hospitalized', 'negativeIncrease',
                    'negativeRegularScore', 'negativeScore', 'posNeg', 'positiveScore',
                    'score', 'total', 'totalTestResultsSource']
non_required_fields = ['deathConfirmed', 'deathProbable', 'lastUpdateEt',
                      'totalTestsViral', 'positiveTestsViral', 'negativeTestsViral',
                      'positiveCasesViral', 'probableCases', 'negative', 'recovered',
                      'pending', 'totalTestEncountersViral', 'totalTestsPeopleViral',
                      'totalTestsAntibody', 'positiveTestsAntibody', 'negativeTestsAntibody',
                      'totalTestsPeopleAntibody', 'positiveTestsPeopleAntibody',
                      'negativeTestsPeopleAntibody', 'totalTestsPeopleAntigen',
                      'positiveTestsPeopleAntigen', 'totalTestsAntigen', 'positiveTestsAntigen',
                      'totalTestResultsIncrease', 'totalTestResults']
```

```
In [12]: # removing deprecated and non-required fields to obtain the filtered list
filtered_fields = []
for i in all_fields:
    if i not in deprecated_fields and i not in non_required_fields:
        filtered_fields.append(i)
filtered_fields
```

```
In [23]: # merging the covid_df with state_df
covid_wpop = covid_df.merge(state_df, how='inner', on='fips')
covid_wpop.head()
```



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#### Seven-day rolling average of new cases/deaths, by number of days since X daily cases/deaths first recorded

```
In [29]: # indexing by state and sorting by state and date
covid_indexed = covid_wpop.set_index(['state']).sort_index().sort_values(['state', 'date'])

In [30]: # keeping fields to be used
covid_rollavg = covid_indexed[['date', 'positive', 'positiveIncrease', 'death', 'deathIncrease']]

In [31]: # inserting calculated column: 7 days rolling average of cases
covid_rollavg['positiveRollingAvg'] = covid_rollavg.groupby(level=0)['positiveIncrease'].rolling(window=7).mean().value
covid_rollavg
```

```
In [33]: # new cases: looping to get the date at which the daily reported cases >= threshold for each state.
state_list = covid_rollavg.index.get_level_values('state').unique()
new_threshold = 10
dates_new = []
for i in state_list:
    new_df = covid_rollavg.loc[i]
    new_df = new_df.loc[new_df['positiveIncrease'] >= new_threshold]
    date = new_df.iloc[0].date
    dates_new.append(date)
dates_new
Timestamp('2020-03-13 00:00:00'),
Timestamp('2020-03-13 00:00:00'),
Timestamp('2020-03-20 00:00:00'),
Timestamp('2020-03-21 00:00:00'),
Timestamp('2020-03-20 00:00:00'),
Timestamp('2020-03-10 00:00:00'),
```

```
In [34]: # zipping the states with the respective date
new_dict = dict(zip(state_list, dates_new))
new_dict
{'NV': Timestamp('2020-03-13 00:00:00'),
 'NY': Timestamp('2020-03-05 00:00:00'),
 'OH': Timestamp('2020-03-15 00:00:00'),
 'OK': Timestamp('2020-03-18 00:00:00')}
```

```
In [42]: # populating new_datelapse with the date subtraction for number of days since reaching the threshold
for x in covid_rollavg.index:
    covid_rollavg.iloc[x, 8] = (covid_rollavg.iloc[x, 1] - new_dict[covid_rollavg.iloc[x, 0]]).days
```



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```
In [61]: # create the connection string
rds_connection_string = "postgres:" + password + "@localhost:5432/covid19_db"
```

```
In [62]: # createing the engine connection with Postgres
engine = create_engine(f'postgresql://{rds_connection_string}')
```

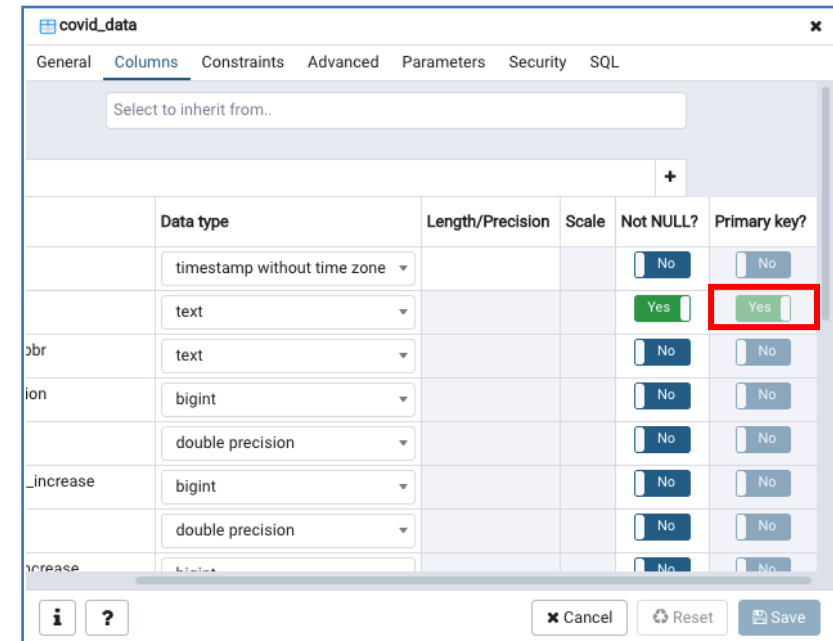
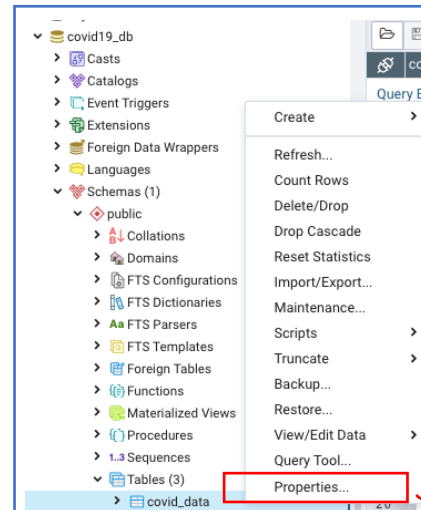
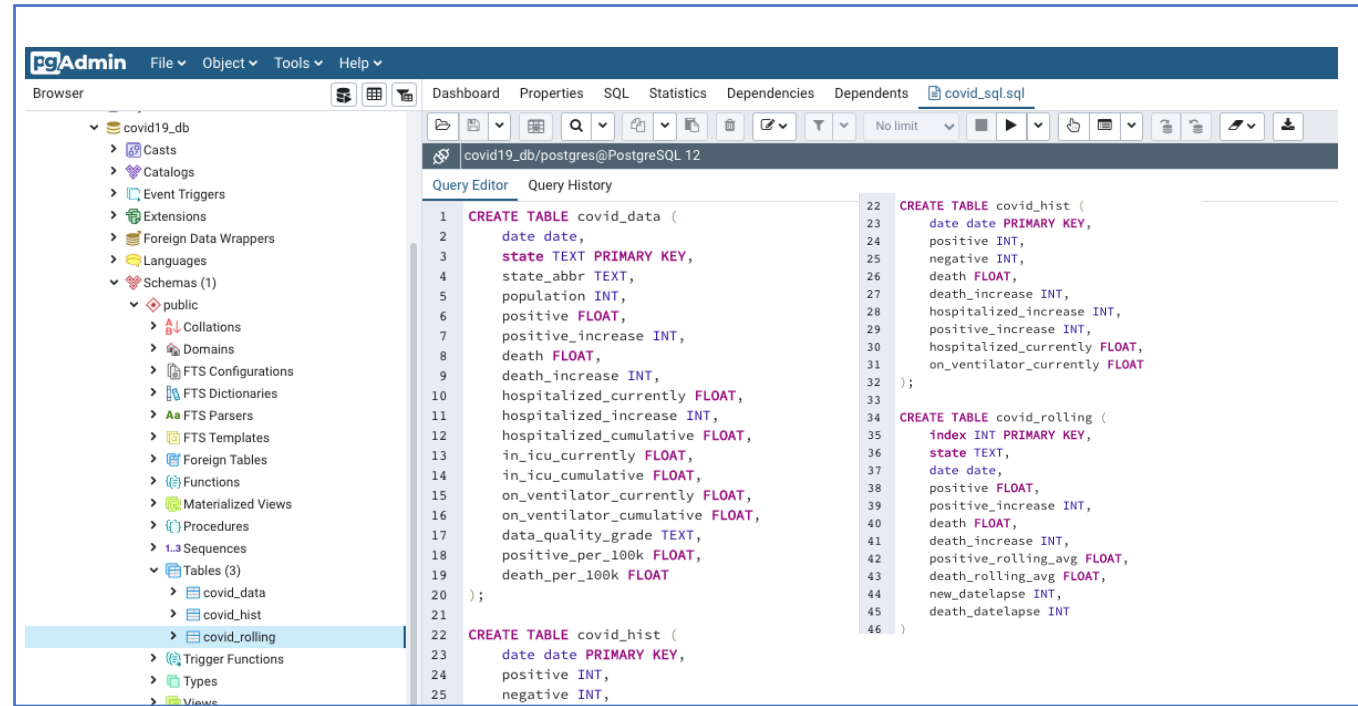


```
In [63]: # loading covid_rollingavg to SQL
covid_rollingavg.to_sql(name='covid_rolling', con=engine, if_exists='replace', index=True)
```

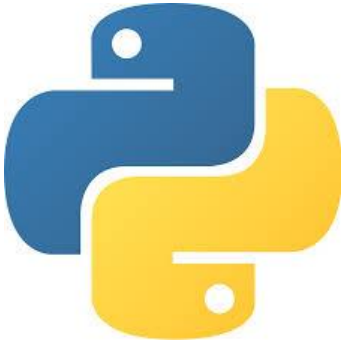
```
In [64]: # reading from SQL for validation
covid_rolling = pd.read_sql_query('select * from covid_rolling', con=engine).head(15)
covid_rolling
```



Create Database  
Create Tables  
Populate Tables  
Define Primary  
Keys





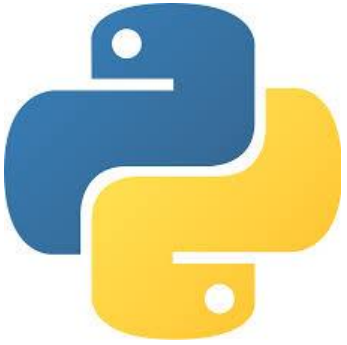


Connect to Database  
Mirror Tables  
Run Flask Server  
App Routes to Pages  
App Routes to Data  
Jsonify Data



```
COVID-19-Tracker — python · python app.py — 80x24
(NewPythonData) Emilios-MBP:COVID-19-Tracker emiliobello$ python app.py
* Serving Flask app "app" (lazy loading)
* Environment: production
  WARNING: This is a development server. Do not use it in a production deployment.
  Use a production WSGI server instead.
* Debug mode: on
* Running on http://127.0.0.1:5000/ (Press CTRL+C to quit)
* Restarting with fsevents reloader
* Debugger is active!
* Debugger PIN: 262-941-842
127.0.0.1 - - [23/Oct/2020 11:01:44] "GET / HTTP/1.1" 404 -
127.0.0.1 - - [23/Oct/2020 11:01:44] "GET /favicon.ico HTTP/1.1" 404 -
127.0.0.1 - - [23/Oct/2020 11:01:49] "GET /index.html HTTP/1.1" 200 -
127.0.0.1 - - [23/Oct/2020 11:01:49] "GET /static/css/style.css HTTP/1.1" 304 -
127.0.0.1 - - [23/Oct/2020 11:01:49] "GET /static/images/covid19.gif HTTP/1.1" 304 -
127.0.0.1 - - [23/Oct/2020 11:01:49] "GET /static/js/config.js HTTP/1.1" 304 -
127.0.0.1 - - [23/Oct/2020 11:01:49] "GET /static/js/app-numbers.js HTTP/1.1" 200 -
127.0.0.1 - - [23/Oct/2020 11:01:49] "GET /static/js/app.js HTTP/1.1" 304 -
127.0.0.1 - - [23/Oct/2020 11:01:49] "GET /static/js/app-cal.js HTTP/1.1" 304 -
127.0.0.1 - - [23/Oct/2020 11:01:49] "GET /static/js/app-cal-positive.js HTTP/1.1" 304 -
```

```
app.py ×
app.py > ...
1  # Import the functions we need from flask
2  from flask import Flask
3  from flask import render_template
4  from flask import jsonify
5
6  # Import the functions we need from SQL Alchemy
7  import sqlalchemy
8  from sqlalchemy.ext.automap import automap_base
9  from sqlalchemy.orm import Session
10 from sqlalchemy import create_engine
11
12 # Import username and password
13 from config import password
14
15 # Define the database connection parameters
16 username = 'postgres' # Ideally this would come from config.py (or similar)
17 password = password # Ideally this would come from config.py (or similar)
18 database_name = 'covid19_db' # Created in Week 9, Night 1, Exercise 08-Stu_CRUD
19 connection_string = f'postgresql://{username}:{password}@localhost:5432/{database_name}'
20
21 # Connect to the database
22 engine = create_engine(connection_string)
23 base = automap_base()
24 base.prepare(engine, reflect=True)
25
26 # Choose the table we wish to use
27 table_bystate = base.classes.covid_data
28 table_hist = base.classes.covid_hist
29 table = base.classes.covid_rolling
30
31 # Instantiate the Flask application. (Chocolate cake recipe.)
32 # This statement is required for Flask to do its job.
33 app = Flask(__name__)
34 app.config['SEND_FILE_MAX_AGE_DEFAULT'] = 0 # Effectively disables page caching
35
```



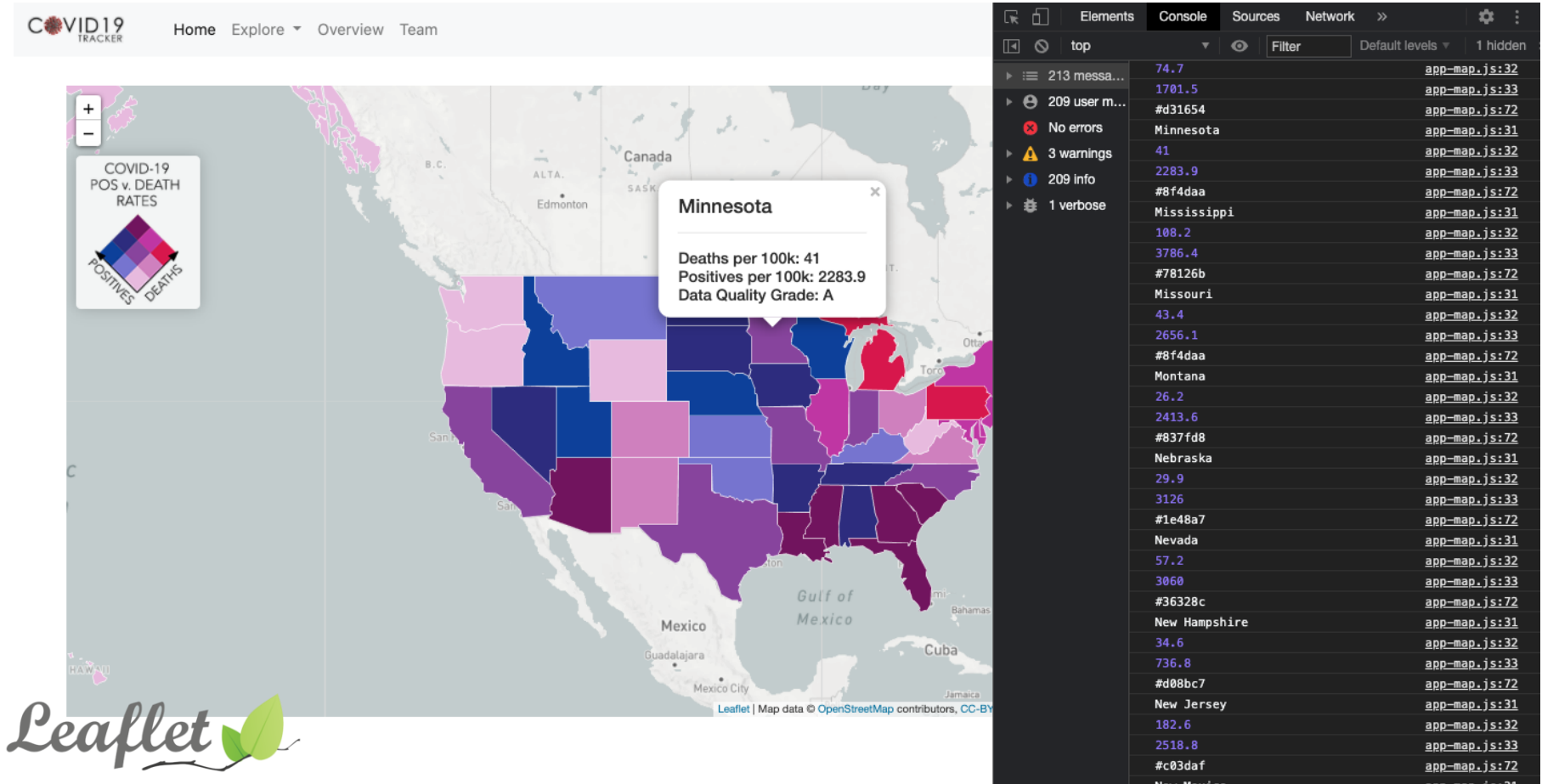
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```
app.py  X
app.py > ...
89
90 # DEFINE APP ROUTES TO QUERY SPECIFIC DATA
91
92 @app.route("/covidhistory")
93 def QueryCovidHist():
94     ''' Query the database for Covid History of US and return the results as JSON '''
95
96     session = Session(engine)
97     results = session.query(table_hist.date, table_hist.death_increase, table_hist.death, table_hist.
98     session.close()
99
100     hist = []
101     for date, death_increase, death, positive, negative, hospitalized_currently, on_ventilator_curre
102         dict = {}
103         dict["date"] = date
104         dict["death_incr"] = death_increase
105         dict["all_death"] = death
106         dict["total_pos"] = positive
107         dict["total_neg"] = negative
108         dict["hospitalized_current"] = hospitalized_currently
109         dict["on_ventilator_currently"] = on_ventilator_currently
110         dict["hospitalized_increase"] = hospitalized_increase
111         dict["positive_increase"] = positive_increase
112         hist.append(dict)
113
114     return jsonify(hist)
115
```

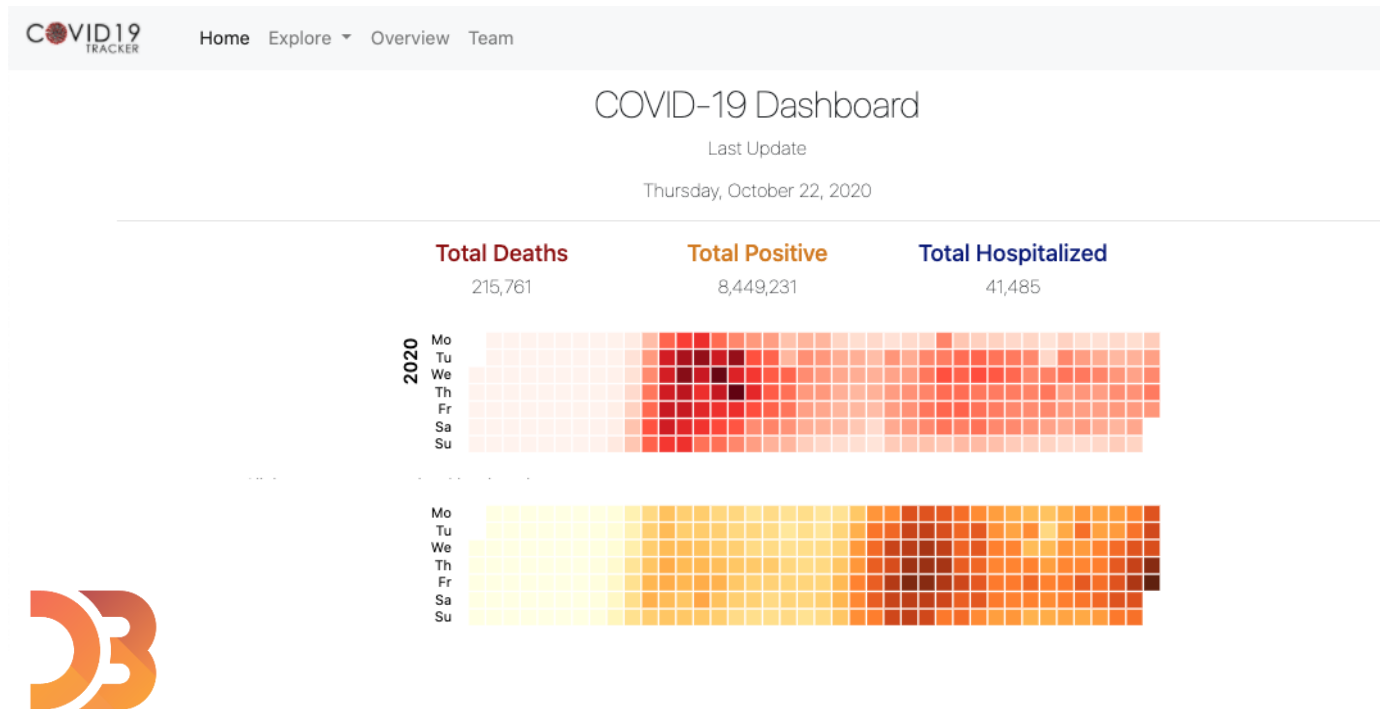


Call Data Routes  
Store Data in Var  
Plot  
Populate HTML pages





Set Page Layout  
Import JS Files  
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Import API Key  
Style



```
# style.css x
static > css > # style.css > .body
1  /* ----- INDEX ----- */
2
3  /* Classes */
4
5  .header-row {
6    padding-top: 10px;
7    text-align: center;
8  }
9
10 /* ----- OVERVIEW ----- */
11
12 /* Classes */
13 .list-header {
14   text-align: center;
15   color: #333333;
16   font-weight: lighter;
17 }
18
19 #title-resource {
20   text-align: center;
21   padding: 10px;
22   font-weight: lighter;
23 }
24
25 /* ----- TEAM TAGS ----- */
26
27 /* Classes */
28 .rounded-circle {
29   width: 200px;
30   height: 200px;
31 }
32
33 /* IDs */
34 #bio {
35   text-align: center;
36   padding: 20px;
37 }
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