In [1]:
```
# import necesssary lib

import math
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import re
from datetime import datetime

import urllib
from urllib.request import Request
import json
```

In [2]:
```
# Get the list of countries
req = Request("https://api.covid19api.com/countries", headers={'User-Agent': 'Google'})

with urllib.request.urlopen(req) as url:
    # read string as json
    data = json.loads(url.read().decode())
```

Based on the API call above, we can see that the Slug for Singapore is 'singapore'

In [3]:
```
# Get the number of confirmed, deaths and recovered cases in Singapore since 23 Jan 2020
req = Request("https://api.covid19api.com/total/dayone/country/singapore", headers={'User-

with urllib.request.urlopen(req) as url:
    # read string as json
    data = json.loads(url.read().decode())
```

In [4]:
```
# See the number of days
print(len(data))
```

```
719
```

There are 718 days worth of data for Singapore

In [5]:
```
# Convert the list of JSON objects into dataframe
df = pd.json_normalize(data)
```

In [6]:
```
# take a quick look at the dataframe
df.head()
```

Out[6]:

	Country	CountryCode	Province	City	CityCode	Lat	Lon	Confirmed	Deaths	Recovered	Active	Date
0	Singapore					0	0	1	0	0	1	2020-01-23T00:00:00Z
1	Singapore					0	0	3	0	0	3	2020-01-24T00:00:00Z
2	Singapore					0	0	3	0	0	3	2020-01-25T00:00:00Z
3	Singapore					0	0	4	0	0	4	2020-01-26T00:00:00Z
4	Singapore					0	0	5	0	0	5	2020-01-27T00:00:00Z

In [7]:
```
# check the data types for each columns
df.dtypes
```

Out[7]:
```
Country         object
CountryCode     object
Province        object
City            object
CityCode        object
Lat             object
Lon             object
Confirmed        int64
Deaths           int64
Recovered        int64
Active           int64
Date            object
dtype: object
```

The datatype for Date is wrong. It should be converted to Date data type instead of remaining as string

In [8]:
```
# convert the date column in string to date object
df['Date'] = df['Date'].apply(lambda x: datetime.fromisoformat(x[:-1]))
```

In [9]:
```
# drop unnecessary columns such as CountryCode, Province, City, CityCode, Lat, Lon
df.drop(columns=['CountryCode','Province','City','CityCode','Lat','Lon'], inplace=True)
```

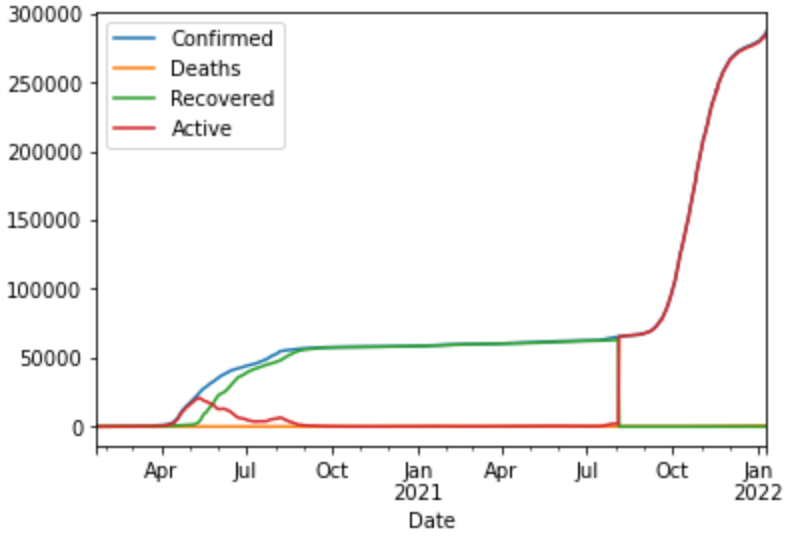
In [10]:
```
# take a quick look at the dataframe
df.head()
```

Out[10]:

	Country	Confirmed	Deaths	Recovered	Active	Date
0	Singapore	1	0	0	1	2020-01-23
1	Singapore	3	0	0	3	2020-01-24
2	Singapore	3	0	0	3	2020-01-25
3	Singapore	4	0	0	4	2020-01-26
4	Singapore	5	0	0	5	2020-01-27

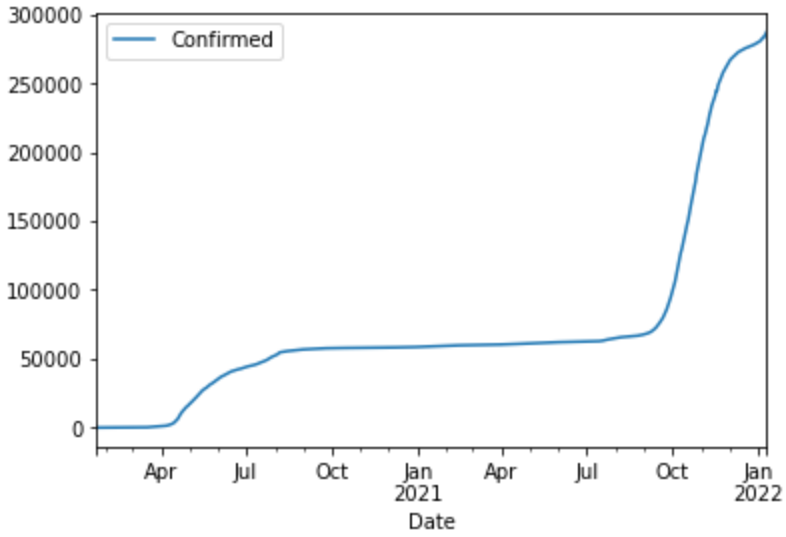
In [11]:
```
# plot a graph to show the number of cases of each status in Singapore over time
df.plot(x='Date',y=['Confirmed','Deaths','Recovered','Active'])
```

Out[11]:
```
<AxesSubplot:xlabel='Date'>
```



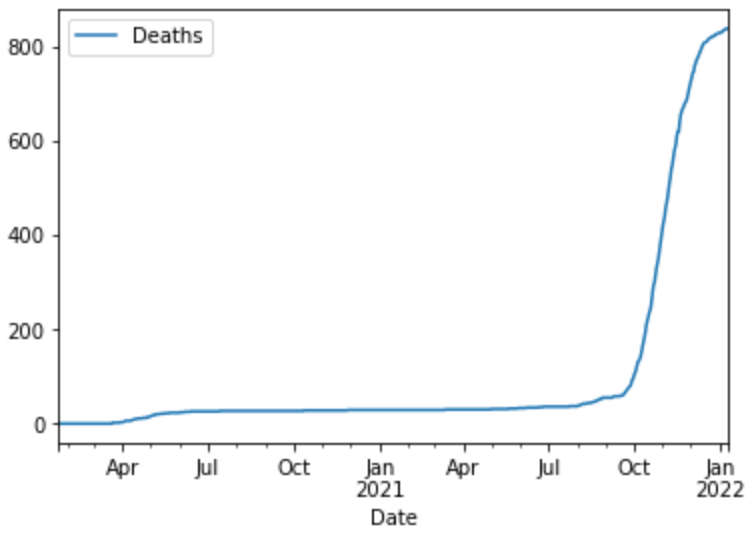
In [12]:
```
# plot a graph to show the number of confirmed cases in Singapore over time
df.plot(x='Date',y=['Confirmed'])
```

Out[12]:
```
<AxesSubplot:xlabel='Date'>
```



In [13]:
```
# plot a graph to show the number of confirmed cases in Singapore over time
df.plot(x='Date',y=['Deaths'])
```

Out[13]:
```
<AxesSubplot:xlabel='Date'>
```



Based on these charts, we can see a sudden drop in Recovered number while the Active number spiked up tremendously. This happens around August 2021. Let's take a look at the data

In [14]:
```
df[(df['Date'].dt.year == 2021) & (df['Date'].dt.month == 8)]
```

Out[14]:

	Country	Confirmed	Deaths	Recovered	Active	Date
556	Singapore	65102	37	62957	2108	2021-08-01
557	Singapore	65213	38	63033	2142	2021-08-02
558	Singapore	65315	38	63252	2025	2021-08-03
559	Singapore	65410	39	63357	2014	2021-08-04
560	Singapore	65508	40	0	65468	2021-08-05
561	Singapore	65605	41	0	65564	2021-08-06
562	Singapore	65686	42	0	65644	2021-08-07
563	Singapore	65764	42	0	65722	2021-08-08
564	Singapore	65836	42	0	65614	2021-08-09
565	Singapore	65836	42	0	65794	2021-08-10
566	Singapore	65953	43	0	65910	2021-08-11
567	Singapore	66012	43	0	65969	2021-08-12
568	Singapore	66061	44	0	66017	2021-08-13
569	Singapore	66119	44	0	66075	2021-08-14
570	Singapore	66172	44	0	66128	2021-08-15
571	Singapore	66225	44	0	66181	2021-08-16
572	Singapore	66281	45	0	66236	2021-08-17
573	Singapore	66334	46	0	66288	2021-08-18
574	Singapore	66366	46	0	66320	2021-08-19
575	Singapore	66406	47	0	66359	2021-08-20
576	Singapore	66443	47	0	66396	2021-08-21
577	Singapore	66478	49	0	66429	2021-08-22
578	Singapore	66576	50	0	66526	2021-08-23
579	Singapore	66692	50	0	66642	2021-08-24
580	Singapore	66812	52	0	66760	2021-08-25
581	Singapore	66928	52	0	66876	2021-08-26
582	Singapore	66928	52	0	66876	2021-08-27
583	Singapore	67171	55	0	67116	2021-08-28
584	Singapore	67171	55	0	67116	2021-08-29
585	Singapore	67459	55	0	67404	2021-08-30
586	Singapore	67620	55	0	67565	2021-08-31

We can see that the Recovered Number drops to zero from 5 August 2021 onwards and the number seems to

add to the Active number. It seems that from 5 August 2021, all recovered Covid19 patients are treated as Active