File: 2.3_Medeiros_Dashboard.ipynb
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Date: 1/10/21
Course: DSC 640 Data Presentation and Visualization
Desc: Assignment 2.3 Dashboard
Usage: Program imports, cleans, and organizes data, then generates exploratory charts.

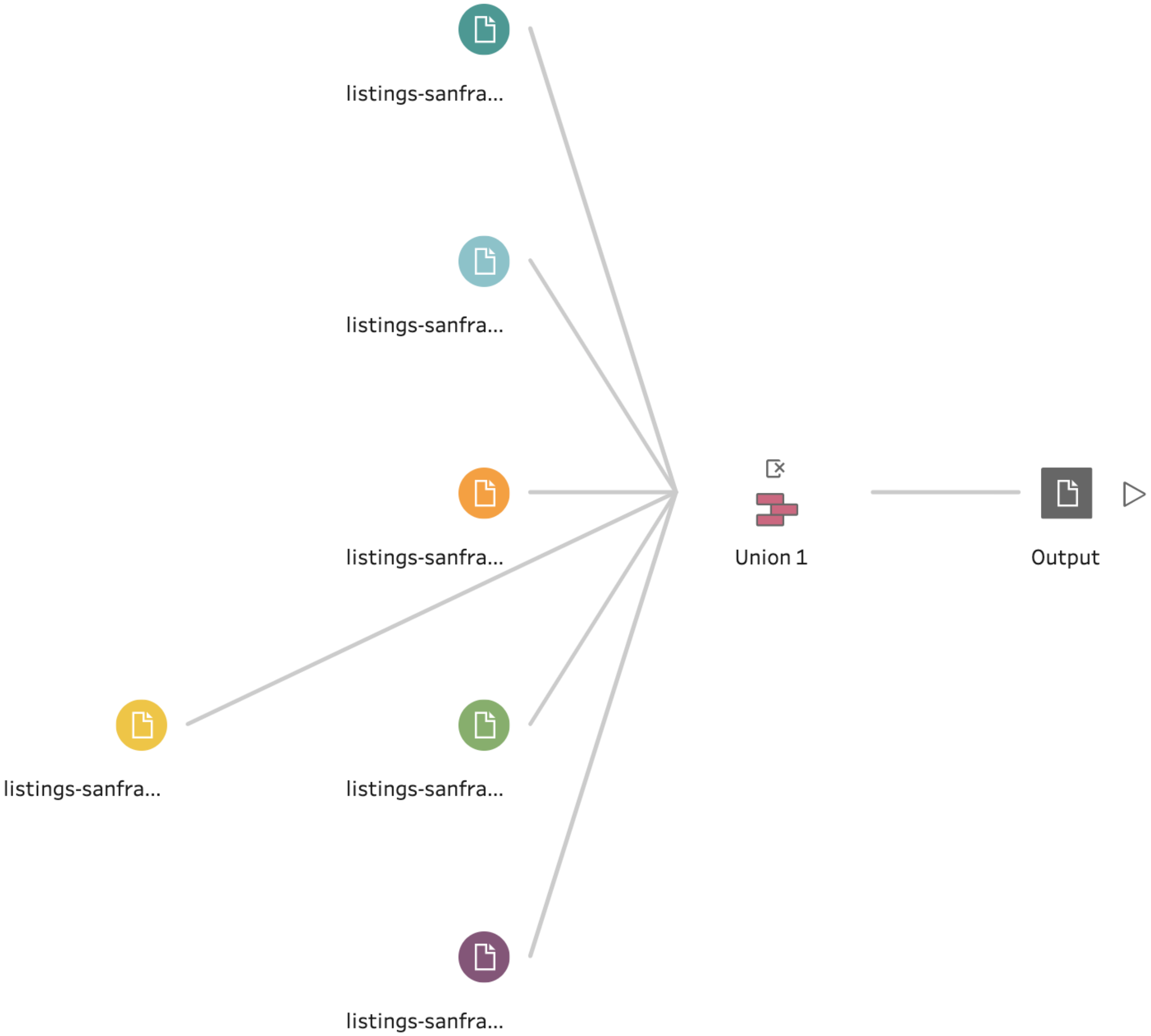
In [1]:
```
import pandas as pd
import numpy as np

import matplotlib as mpl
import matplotlib.pyplot as plt
```

San Francisco Airbnb and Housing Market Trends

Loading Airbnb Listings Data

These data come from http://insideairbnb.com/get-the-data.html (http://insideairbnb.com/get-the-data.html). To look at listings over time, I downloaded their archival data from each December. In total, I have 6 years of listings data from 2015 to 2020. Before loading it into this project, I merged these 6 separate datasets using Tableau Prep Builder into a combined csv file.

Tableau Prep Builder Flow:


listings-sanfra...
listings-sanfra...
listings-sanfra...
Union 1
Output
listings-sanfra...
listings-sanfra...
listings-sanfra...

In [2]:

```
# Loading merged Airbnb listings data
sf_airbnb_df = pd.read_csv('listings-sf_2015-2020.csv', encoding = "ISO-8859
-1", engine='python')

# Previewing data
sf_airbnb_df.head()
```

Out[2]:

	Table Names	id	name	host_id	host_name	neighbourhood	room_type	price	number_c
0	listings-sanfrancisco-2015.csv	4720512	Private Room in Guest House #105	202591	Jeffrey	Western Addition	Private room	80	
1	listings-sanfrancisco-2015.csv	1214348	Hayes Valley Gem - Center of SF!	6608684	Dan	Western Addition	Entire home/apt	950	
2	listings-sanfrancisco-2015.csv	8193992	Lower Pacific Heights Gem	7745422	NaN	Western Addition	Private room	350	
3	listings-sanfrancisco-2015.csv	9668595	Simple Studio in the Center of SF	49963870	Elvi	Western Addition	Entire home/apt	99	
4	listings-sanfrancisco-2015.csv	8521718	Amazing Attic Room in NOPA Duplex	30081902	Ben	Western Addition	Private room	175	

In [3]:
```python
# Changing 'Table Names' column name
sf_airbnb_df.rename(columns={"Table Names": "Original File"}, inplace=True)

# Previewing data
sf_airbnb_df.head()
```

Out[3]:

	Original File	id	name	host_id	host_name	neighbourhood	room_type	price	number_c
0	listings-sanfrancisco-2015.csv	4720512	Private Room in Guest House #105	202591	Jeffrey	Western Addition	Private room	80	
1	listings-sanfrancisco-2015.csv	1214348	Hayes Valley Gem - Center of SF!	6608684	Dan	Western Addition	Entire home/apt	950	
2	listings-sanfrancisco-2015.csv	8193992	Lower Pacific Heights Gem	7745422	NaN	Western Addition	Private room	350	
3	listings-sanfrancisco-2015.csv	9668595	Simple Studio in the Center of SF	49963870	Elvi	Western Addition	Entire home/apt	99	
4	listings-sanfrancisco-2015.csv	8521718	Amazing Attic Room in NOPA Duplex	30081902	Ben	Western Addition	Private room	175	

In order to find the number of listings per year, I'm going to group by the original file names and calculate the unique values within the 'id' column.

In [4]:
```python
# Finding number of unique listings per year
num_listings_per_yr = sf_airbnb_df.groupby('Original File')['id'].nunique()
```

In [5]:
```python
print(num_listings_per_yr)
```

```
Original File
listings-sanfrancisco-2015.csv    7165
listings-sanfrancisco-2016.csv    9066
listings-sanfrancisco-2017.csv    6650
listings-sanfrancisco-2018.csv    7072
listings-sanfrancisco-2019.csv    8533
listings-sanfrancisco-2020.csv    7087
Name: id, dtype: int64
```

In [6]:
```python
type(num_listings_per_yr)
```

Out[6]:
```
pandas.core.series.Series
```

In [7]:
```
num_listings_per_yr_df = pd.DataFrame(data=num_listings_per_yr)

num_listings_per_yr_df
```

Out[7]:

	id
Original File	
listings-sanfrancisco-2015.csv	7165
listings-sanfrancisco-2016.csv	9066
listings-sanfrancisco-2017.csv	6650
listings-sanfrancisco-2018.csv	7072
listings-sanfrancisco-2019.csv	8533
listings-sanfrancisco-2020.csv	7087

In [8]:
```
# Saving listings as list
listings_list = (num_listings_per_yr_df.iloc[:, 0]).tolist()

# Restructuring data into new dataframe
d = {'Year': [2015, 2016, 2017, 2018, 2019, 2020], 'Total Listings': listing
s_list}
total_listings_df = pd.DataFrame(data=d)

total_listings_df
```

Out[8]:

	Year	Total Listings
0	2015	7165
1	2016	9066
2	2017	6650
3	2018	7072
4	2019	8533
5	2020	7087

Loading Housing Data

Home Values

The original source of these data is https://www.zillow.com/research/data/ (https://www.zillow.com/research/data/). Since I'm only focusing on the city of San Francisco, I removed the rest of the rows in Excel and added a header column up front before loading it into this project.

In [9]:

```
# Loading modified housing data
sf_housing_df = pd.read_csv('zillow-sf.csv', header=None, index_col=0)

# Previewing data
sf_housing_df.head()
```

Out[9]:

	1	2	3	4	5	6	7	8	9	10	...	
0												
Date	1/31/96	2/29/96	3/31/96	4/30/96	5/31/96	6/30/96	7/31/96	8/31/96	9/30/96	10/31/96	...	2/
Home Value	293098	292149	291505	290377	289565	289195	288911	289376	290090	291385	...	14

2 rows × 299 columns

In [10]:

```
# Transposing dataframe to switch rows to columns
sf_housing_df_t = sf_housing_df.T

# Previewing data
sf_housing_df_t.head()
```

Out[10]:

	Date	Home Value
1	1/31/96	293098
2	2/29/96	292149
3	3/31/96	291505
4	4/30/96	290377
5	5/31/96	289565

In [11]:

```
# Checking dataframe summary
sf_housing_df_t.info()
```

```
<class 'pandas.core.frame.DataFrame'>
Int64Index: 299 entries, 1 to 299
Data columns (total 2 columns):
Date          299 non-null object
Home Value    299 non-null object
dtypes: object(2)
memory usage: 17.0+ KB
```

In [12]:

```
# Changing dates to datetime format
sf_housing_df_t['Date'] = pd.to_datetime(sf_housing_df_t['Date'])

# Previewing data
sf_housing_df_t.head()
```

Out[12]:

	Date	Home Value
1	1996-01-31	293098
2	1996-02-29	292149
3	1996-03-31	291505
4	1996-04-30	290377
5	1996-05-31	289565

In [13]:

```
# Changing Home Value to numeric format
sf_housing_df_t['Home Value'] = pd.to_numeric(sf_housing_df_t['Home Value'])

# Previewing data
sf_housing_df_t.head()
```

Out[13]:

	Date	Home Value
1	1996-01-31	293098
2	1996-02-29	292149
3	1996-03-31	291505
4	1996-04-30	290377
5	1996-05-31	289565

In [14]:

```
# Checking dataframe summary
sf_housing_df_t.info()
```

```
<class 'pandas.core.frame.DataFrame'>
Int64Index: 299 entries, 1 to 299
Data columns (total 2 columns):
Date          299 non-null datetime64[ns]
Home Value    299 non-null int64
dtypes: datetime64[ns](1), int64(1)
memory usage: 17.0 KB
```

In [15]:

```
# Setting Date as index
sf_housing_df_t = sf_housing_df_t.set_index('Date')

# Previewing data
sf_housing_df_t.head()
```

Out[15]:

	Home Value
Date	
1996-01-31	293098
1996-02-29	292149
1996-03-31	291505
1996-04-30	290377
1996-05-31	289565

Loading Housing Data

Rental Prices

The original source of these data is https://www.zillow.com/research/data/ (https://www.zillow.com/research/data/). Since I'm only focusing on the city of San Francisco, I removed the rest of the rows in Excel and added a header column up front before loading it into this project.

In [16]:

```
# Loading modified housing data
sf_rentals_df = pd.read_csv('zillow-sf-rent.csv', header=None, index_col=0)

# Previewing data
sf_rentals_df.head()
```

Out[16]:

	1	2	3	4	5	6	7	8	9	10	...	62	63	64
0														
Date	2015-01	2015-02	2015-03	2015-04	2015-05	2015-06	2015-07	2015-08	2015-09	2015-10	...	2020-02	2020-03	2020-04
Rent Price	2636	2664	2692	2720	2744	2768	2791	2812	2832	2852	...	3220	3203	3187

2 rows × 71 columns

In [17]:

```
# Transposing dataframe to switch rows to columns
sf_rentals_df_t = sf_rentals_df.T

# Previewing data
sf_rentals_df_t.head()
```

Out[17]:

	Date	Rent Price
1	2015-01	2636
2	2015-02	2664
3	2015-03	2692
4	2015-04	2720
5	2015-05	2744

In [18]:

```
# Changing dates to datetime format
sf_rentals_df_t['Date'] = pd.to_datetime(sf_rentals_df_t['Date'])

# Previewing data
sf_rentals_df_t.head()
```

Out[18]:

	Date	Rent Price
1	2015-01-01	2636
2	2015-02-01	2664
3	2015-03-01	2692
4	2015-04-01	2720
5	2015-05-01	2744

In [19]:

```
# Changing Rent Price to numeric format
sf_rentals_df_t['Rent Price'] = pd.to_numeric(sf_rentals_df_t['Rent Price'])

# Previewing data
sf_rentals_df_t.head()
```

Out[19]:

	Date	Rent Price
1	2015-01-01	2636
2	2015-02-01	2664
3	2015-03-01	2692
4	2015-04-01	2720
5	2015-05-01	2744

In [20]:

```
# Checking dataframe summary
sf_rentals_df_t.info()
```

```
<class 'pandas.core.frame.DataFrame'>
Int64Index: 71 entries, 1 to 71
Data columns (total 2 columns):
Date          71 non-null datetime64[ns]
Rent Price    71 non-null int64
dtypes: datetime64[ns](1), int64(1)
memory usage: 4.2 KB
```

In [21]:

```
# Setting Date as index
sf_rentals_df_t = sf_rentals_df_t.set_index('Date')

# Previewing data
sf_rentals_df_t.head()
```

Out[21]:

	Rent Price
Date	
2015-01-01	2636
2015-02-01	2664
2015-03-01	2692
2015-04-01	2720
2015-05-01	2744

Data Visualization

After loading and cleaning, I have 4 dataframes to work with for visualizations:

sf_airbnb_df
total_listings_df
sf_housing_df_t
sf_rentals_df_t

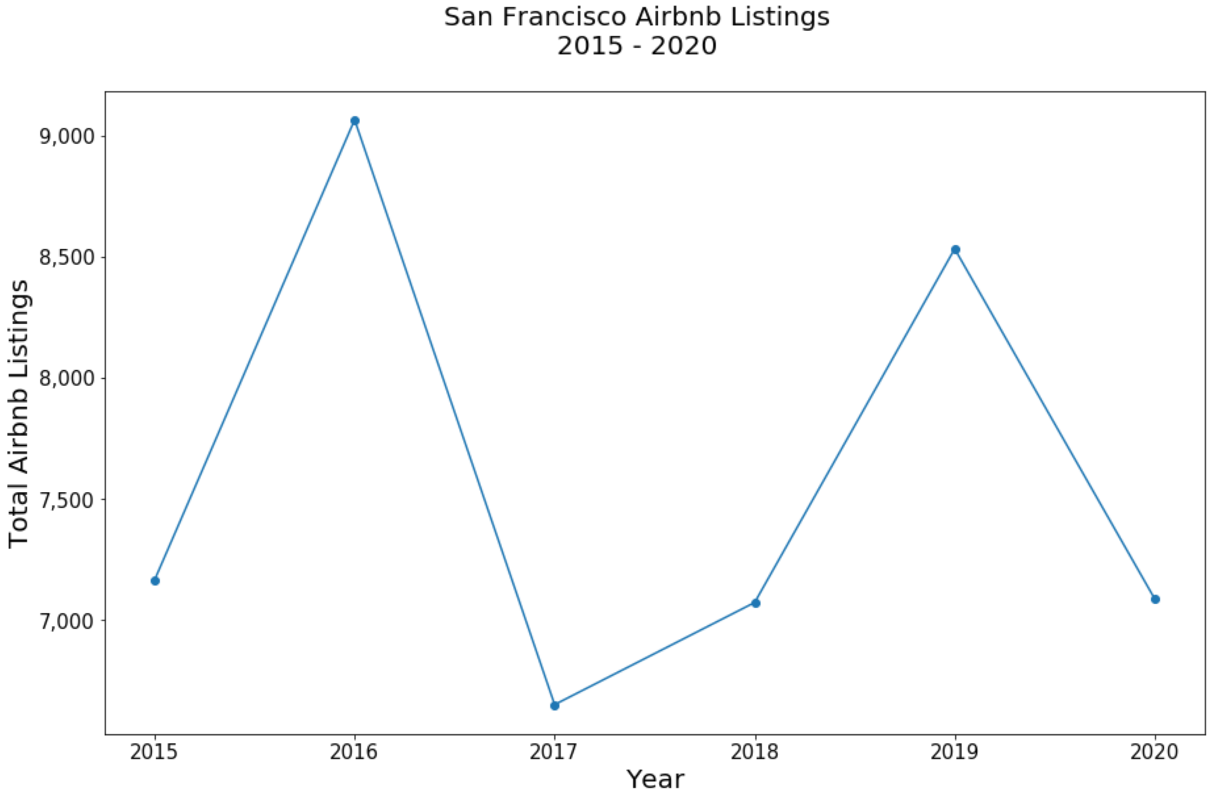
In [22]:

```
# Writing cleaned data to csv files
sf_airbnb_df.to_csv('sf_airbnb_df.csv')
total_listings_df.to_csv('total_listings_df.csv')
sf_housing_df_t.to_csv('sf_housing_df_t.csv')
sf_rentals_df_t.to_csv('sf_rentals_df_t.csv')
```

Line Chart - Airbnb listings

In [23]:

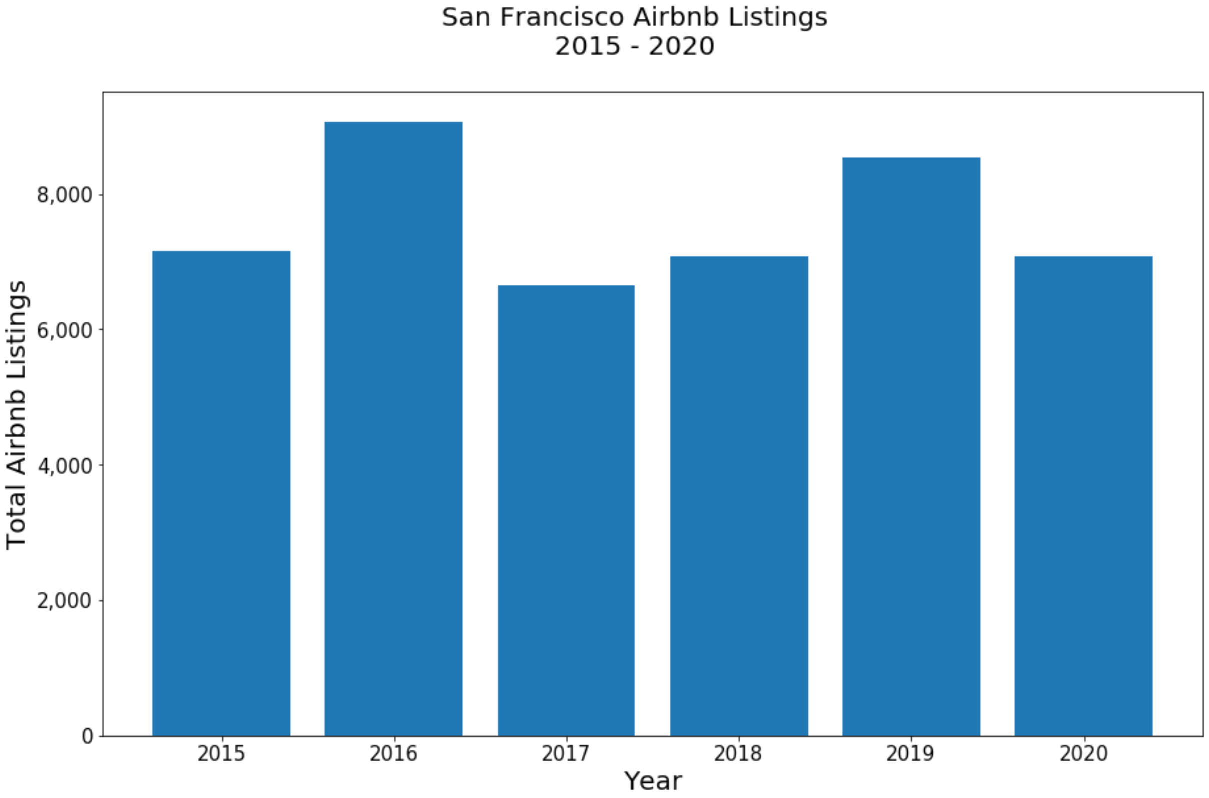
```
# Creating figure and plot space
fig, ax = plt.subplots(figsize=(15, 9))

ax.get_yaxis().set_major_formatter(
    mpl.ticker.FuncFormatter(lambda y, p: format(int(y), ',')))

plt.plot(total_listings_df['Year'], total_listings_df['Total Listings'], marker='o',)
plt.xlabel('Year', fontsize=20)
plt.xticks(fontsize=15)
plt.ylabel('Total Airbnb Listings', fontsize=20)
plt.yticks(fontsize=15)
plt.suptitle('San Francisco Airbnb Listings\n2015 - 2020', fontsize=20)

plt.savefig('airbnb-linechart.png')

plt.show()
```



Bar Chart - Airbnb listings

In [24]:

```
# Creating figure and plot space
fig, ax = plt.subplots(figsize=(15, 9))

ax.get_yaxis().set_major_formatter(
    mpl.ticker.FuncFormatter(lambda y, p: format(int(y), ',')))

ax.bar(total_listings_df['Year'], total_listings_df['Total Listings'])
plt.xlabel('Year', fontsize=20)
plt.xticks(fontsize=15)
plt.ylabel('Total Airbnb Listings', fontsize=20)
plt.yticks(fontsize=15)
plt.suptitle('San Francisco Airbnb Listings\n2015 - 2020', fontsize=20)

plt.savefig('airbnb-barchart.png')

plt.show()
```



Line Chart - Home Values

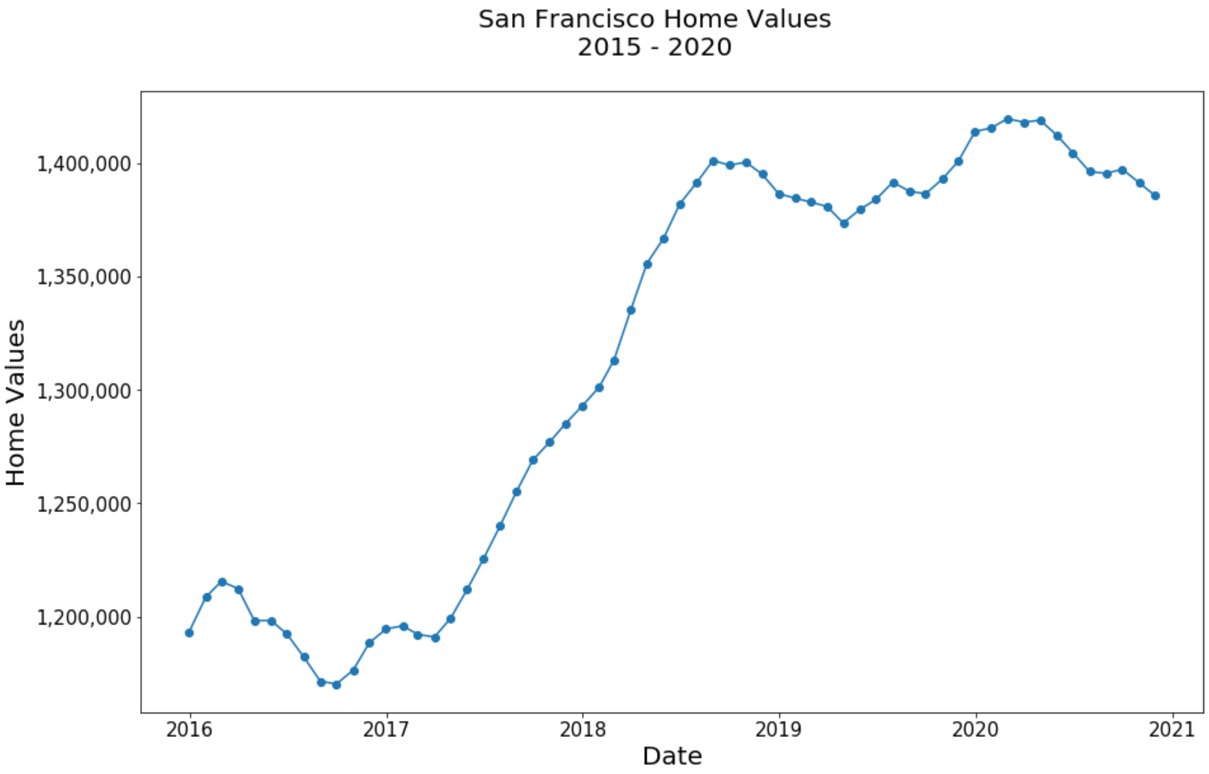
In [25]:

```
# Filtering housing data to 2015 - 2020

housing_df_subset = sf_housing_df_t.loc['2015-12-01':'2020-12-31']

housing_df_subset.head()
```

Out[25]:

	Home Value
Date	
2015-12-31	1193367
2016-01-31	1208674
2016-02-29	1215580
2016-03-31	1212365
2016-04-30	1198282

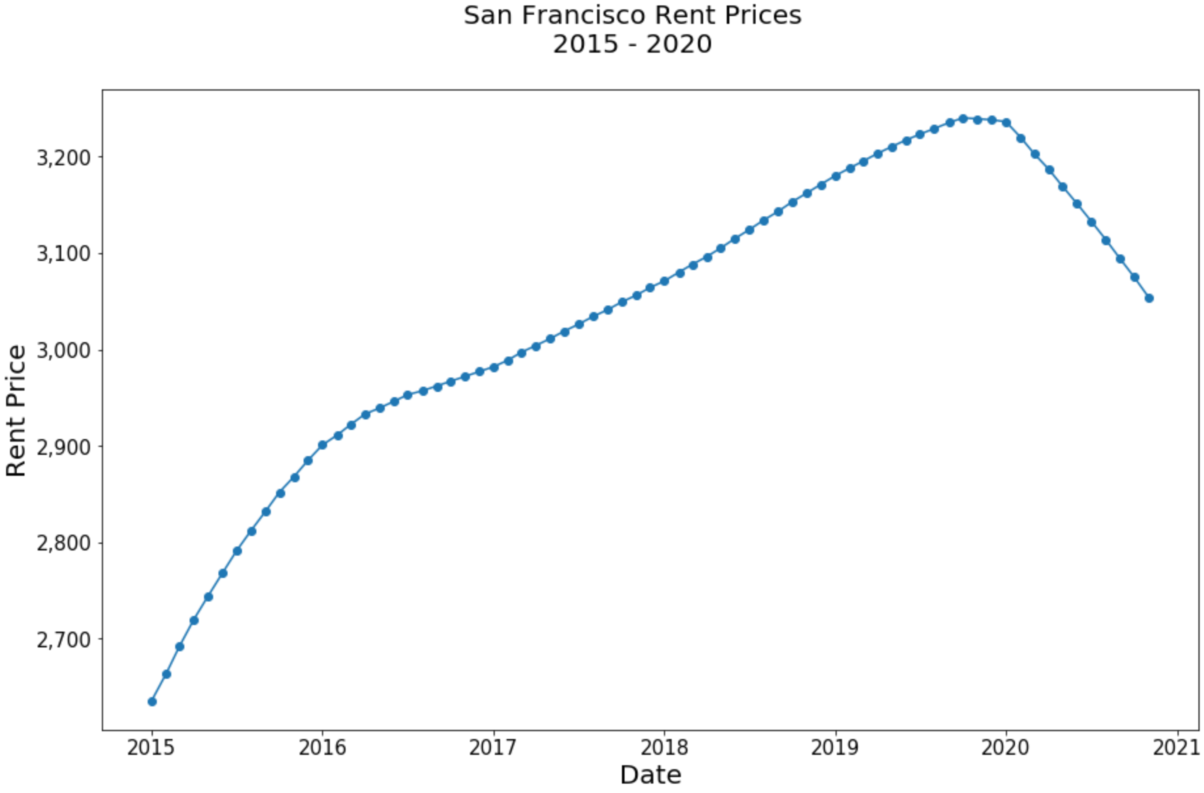
```
In [31]: from pandas.plotting import register_matplotlib_converters
         register_matplotlib_converters()

         # Creating figure and plot space
         fig, ax = plt.subplots(figsize=(15, 9))

         plt.plot(housing_df_subset.index, housing_df_subset['Home Value'], marker=
         'o',)

         # Adding commas to y-axis
         ax.get_yaxis().set_major_formatter(
             mpl.ticker.FuncFormatter(lambda y, p: format(int(y), ',')))

         plt.xlabel('Date', fontsize=20)
         plt.xticks(fontsize=15)
         plt.ylabel('Home Values', fontsize=20)
         plt.yticks(fontsize=15)
         plt.suptitle('San Francisco Home Values\n2015 - 2020', fontsize=20)

         plt.savefig('homes-linechart.png')

         plt.show()
```



Line Chart - Rental Prices

In [33]:

```python
# Creating figure and plot space
fig, ax = plt.subplots(figsize=(15, 9))

plt.plot(sf_rentals_df_t.index, sf_rentals_df_t['Rent Price'], marker='o',)

# Adding commas to y-axis
ax.get_yaxis().set_major_formatter(
    mpl.ticker.FuncFormatter(lambda y, p: format(int(y), ',')))

plt.xlabel('Date', fontsize=20)
plt.xticks(fontsize=15)
plt.ylabel('Rent Price', fontsize=20)
plt.yticks(fontsize=15)
plt.suptitle('San Francisco Rent Prices\n2015 - 2020', fontsize=20)

plt.savefig('rentals-linechart.png')

plt.show()
```



Now that I've explored and organized my data, I'll use Tableau to generate some nicer looking graphs.