```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import datetime as dt
from datetime import datetime
from pandas import Series
```

```
from google.colab import drive
drive.mount('/content/drive')
```

```
Mounted at /content/drive
```

```
data = pd.read_csv('/content/drive/MyDrive/MARUTI.csv')
```

```
data = data[['Date','Open','High','Low','Close','Volume','VWAP']]
```

```
data.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 4098 entries, 0 to 4097
Data columns (total 7 columns):
 #   Column  Non-Null Count  Dtype  
---  ------  --------------  -----  
 0   Date    4098 non-null   object 
 1   Open    4098 non-null   float64
 2   High    4098 non-null   float64
 3   Low     4098 non-null   float64
 4   Close   4098 non-null   float64
 5   Volume  4098 non-null   int64  
 6   VWAP    4098 non-null   float64
dtypes: float64(5), int64(1), object(1)
memory usage: 224.2+ KB
```

```
data['Date'] = data['Date'].apply(pd.to_datetime)
data.head()
```

	Date	Open	High	Low	Close	Volume	VWAP
0	2003-07-09	164.90	170.40	155.00	164.30	35164283	165.95
1	2003-07-10	167.00	168.70	164.50	167.00	10464179	166.74
2	2003-07-11	167.75	174.85	166.25	173.35	11740117	172.45
3	2003-07-14	174.25	179.25	174.25	177.95	5982324	177.91
4	2003-07-15	200.00	200.00	173.00	176.20	6173689	176.88

```
from datetime import datetime
my_year = 2019
my_month = 4
my_day = 21
my_hour = 10
my_minute = 5
my_second = 30
```

```
test_date = datetime(my_year, my_month, my_day)
test_date
```

```
datetime.datetime(2019, 4, 21, 0, 0)
```

```
test_date = datetime(my_year, my_month, my_day, my_hour, my_minute, my_second)
print('The day is : ', test_date.day)
print('The hour is : ', test_date.hour)
print('The month is : ', test_date.month)
```

```
The day is :  21
The hour is :  10
The month is :  4
```

```
data_vwap = data[['Date','VWAP']]
data_vwap['Date'] = data_vwap['Date'].apply(pd.to_datetime)
```

```
data_vwap.head()
```

```
<ipython-input-10-6fe4201d5c98>:2: SettingWithCopyWarning:
A value is trying to be set on a copy of a slice from a DataFrame.
Try using .loc[row_indexer,col_indexer] = value instead

See the caveats in the documentation: https://pandas.pydata.org/pandas-docs/stable/user_guide/indexing.html#returning-a-view-versus-a-co
  data_vwap['Date'] = data_vwap['Date'].apply(pd.to_datetime)
```

	Date	VWAP
0	2003-07-09	165.95
1	2003-07-10	166.74
2	2003-07-11	172.45
3	2003-07-14	177.91
4	2003-07-15	176.88

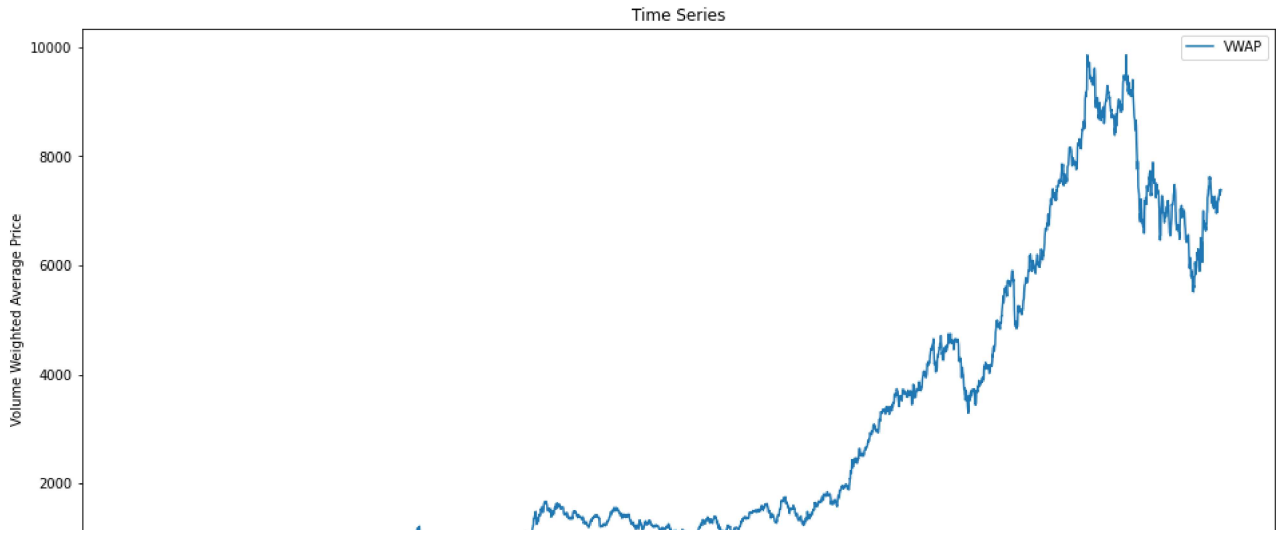
```
data_vwap['year'] = data_vwap.Date.dt.year
data_vwap['month'] = data_vwap.Date.dt.month
data_vwap['day'] = data_vwap.Date.dt.day
data_vwap['day of week'] = data_vwap.Date.dt.dayofweek

#Set Date column as the index column.
data_vwap.set_index('Date', inplace=True)
data_vwap.head()
```

```
<ipython-input-11-27ac835208d6>:1: SettingWithCopyWarning:
A value is trying to be set on a copy of a slice from a DataFrame.
Try using .loc[row_indexer,col_indexer] = value instead

See the caveats in the documentation: https://pandas.pydata.org/pandas-docs/stable/user_guide/indexing.html#returning-a-view-versus-a-co
  data_vwap['year'] = data_vwap.Date.dt.year
<ipython-input-11-27ac835208d6>:2: SettingWithCopyWarning:
A value is trying to be set on a copy of a slice from a DataFrame.
Try using .loc[row_indexer,col_indexer] = value instead

See the caveats in the documentation: https://pandas.pydata.org/pandas-docs/stable/user_guide/indexing.html#returning-a-view-versus-a-co
  data_vwap['month'] = data_vwap.Date.dt.month
<ipython-input-11-27ac835208d6>:3: SettingWithCopyWarning:
A value is trying to be set on a copy of a slice from a DataFrame.
Try using .loc[row_indexer,col_indexer] = value instead

See the caveats in the documentation: https://pandas.pydata.org/pandas-docs/stable/user_guide/indexing.html#returning-a-view-versus-a-co
  data_vwap['day'] = data_vwap.Date.dt.day
<ipython-input-11-27ac835208d6>:4: SettingWithCopyWarning:
A value is trying to be set on a copy of a slice from a DataFrame.
Try using .loc[row_indexer,col_indexer] = value instead

See the caveats in the documentation: https://pandas.pydata.org/pandas-docs/stable/user_guide/indexing.html#returning-a-view-versus-a-co
  data_vwap['day of week'] = data_vwap.Date.dt.dayofweek
```

Date	VWAP	year	month	day	day of week
2003-07-09	165.95	2003	7	9	2
2003-07-10	166.74	2003	7	10	3
2003-07-11	172.45	2003	7	11	4
2003-07-14	177.91	2003	7	14	0
2003-07-15	176.88	2003	7	15	1

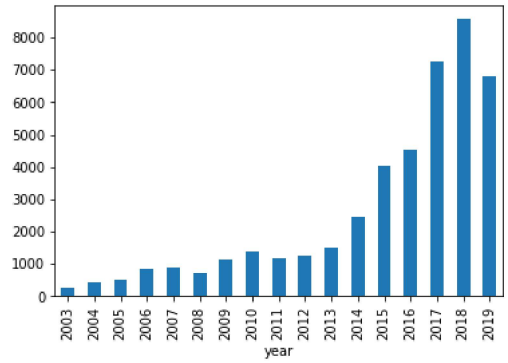
```
# Visualising the VWAP

plt.figure(figsize=(16,8))
plt.plot(data_vwap['VWAP'], label='VWAP')
plt.title('Time Series')
plt.xlabel("Time(year)")
plt.ylabel("Volume Weighted Average Price")
plt.legend(loc='best')
```

```
<matplotlib.legend.Legend at 0x7f56b5eddb80>
```



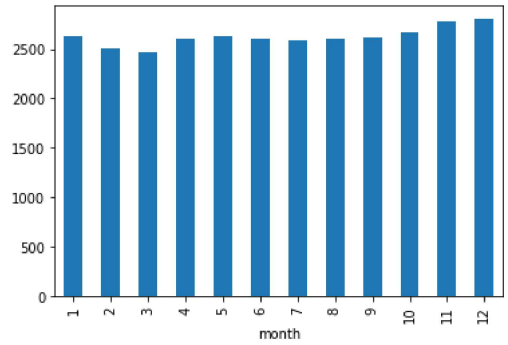

```
data_vwap.groupby('year')['VWAP'].mean().plot.bar()
```

```
<AxesSubplot:xlabel='year'>
```




```
data_vwap.groupby('month')['VWAP'].mean().plot.bar()
```

```
<AxesSubplot:xlabel='month'>
```

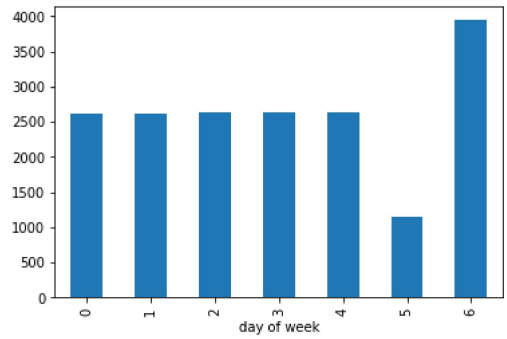



```
# Daily VWAP of Maruti Stocks

data_vwap.groupby('day')['VWAP'].mean().plot.bar()
```

```
<AxesSubplot:xlabel='day'>
```

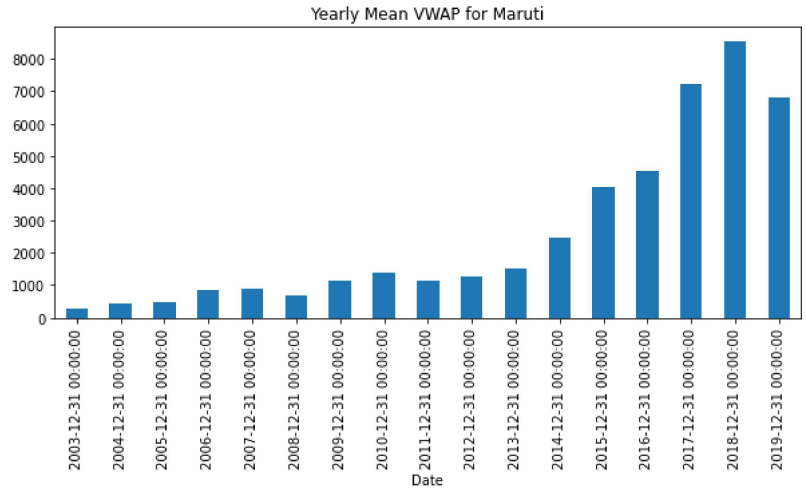
```
data_vwap.groupby('day of week')['VWAP'].mean().plot.bar()
```

```
<AxesSubplot:xlabel='day of week'>
```



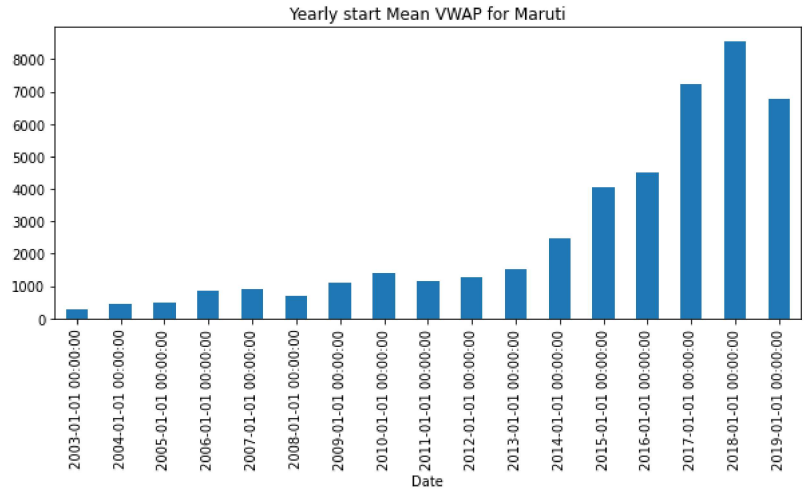

```
data_vwap['VWAP'].resample('A').mean().plot(kind='bar',figsize = (10,4))
plt.title('Yearly Mean VWAP for Maruti')
```

```
Text(0.5, 1.0, 'Yearly Mean VWAP for Maruti')
```



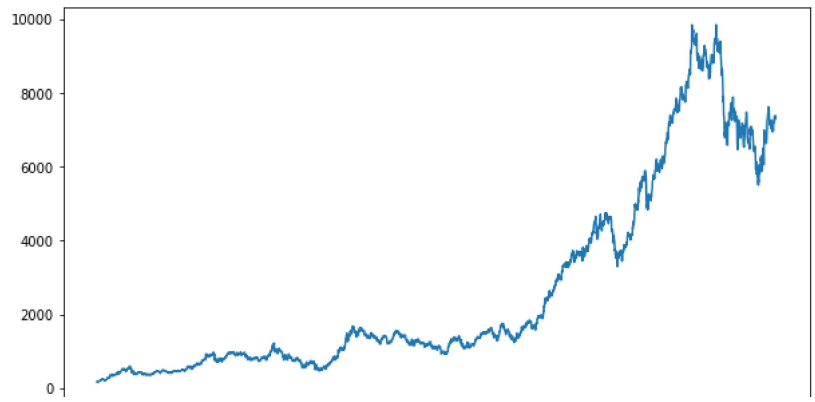

```
data_vwap['VWAP'].resample('AS').mean().plot(kind='bar',figsize = (10,4))
plt.title('Yearly start Mean VWAP for Maruti')
```

```
Text(0.5, 1.0, 'Yearly start Mean VWAP for Maruti')
```



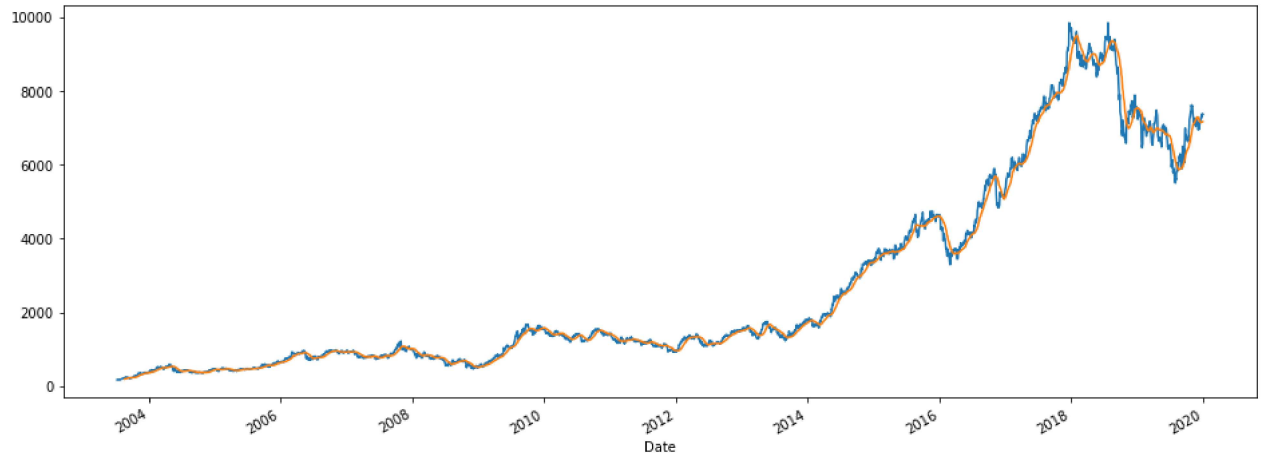

```
data_vwap['VWAP'].plot(figsize = (10,6))
```

```
<AxesSubplot:xlabel='Date'>
```




```
data_vwap['VWAP'].plot()
data_vwap.rolling(window=30).mean()['VWAP'].plot(figsize=(16, 6))
```

```
<AxesSubplot:xlabel='Date'>
```




```
!pip install pmdarima
```

```
Looking in indexes: https://pypi.org/simple, https://us-python.pkg.dev/colab-wheels/public/simple/
Collecting pmdarima
  Downloading pmdarima-2.0.2-cp38-cp38-manylinux_2_17_x86_64.manylinux2014_x86_64.manylinux_2_28_x86_64.whl (1.9 MB)
     ━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━ 1.9/1.9 MB 24.8 MB/s eta 0:00:00
Requirement already satisfied: numpy>=1.21.2 in /usr/local/lib/python3.8/dist-packages (from pmdarima) (1.22.4)
Requirement already satisfied: scikit-learn>=0.22 in /usr/local/lib/python3.8/dist-packages (from pmdarima) (1.0.2)
Requirement already satisfied: pandas>=0.19 in /usr/local/lib/python3.8/dist-packages (from pmdarima) (1.3.5)
Collecting statsmodels>=0.13.2
  Downloading statsmodels-0.13.5-cp38-cp38-manylinux_2_17_x86_64.manylinux2014_x86_64.whl (9.9 MB)
     ━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━ 9.9/9.9 MB 78.7 MB/s eta 0:00:00
Requirement already satisfied: urllib3 in /usr/local/lib/python3.8/dist-packages (from pmdarima) (1.24.3)
Requirement already satisfied: scipy>=1.3.2 in /usr/local/lib/python3.8/dist-packages (from pmdarima) (1.7.3)
Requirement already satisfied: joblib>=0.11 in /usr/local/lib/python3.8/dist-packages (from pmdarima) (1.2.0)
Requirement already satisfied: setuptools!=50.0.0,>=38.6.0 in /usr/local/lib/python3.8/dist-packages (from pmdarima) (57.4.0)
Requirement already satisfied: Cython!=0.29.18,!=0.29.31,>=0.29 in /usr/local/lib/python3.8/dist-packages (from pmdarima) (0.29.33)
Requirement already satisfied: pytz>=2017.3 in /usr/local/lib/python3.8/dist-packages (from pandas>=0.19->pmdarima) (2022.7.1)
Requirement already satisfied: python-dateutil>=2.7.3 in /usr/local/lib/python3.8/dist-packages (from pandas>=0.19->pmdarima) (2.8.2)
Requirement already satisfied: threadpoolctl>=2.0.0 in /usr/local/lib/python3.8/dist-packages (from scikit-learn>=0.22->pmdarima) (3.1.0
Requirement already satisfied: patsy>=0.5.2 in /usr/local/lib/python3.8/dist-packages (from statsmodels>=0.13.2->pmdarima) (0.5.3)
Requirement already satisfied: packaging>=21.3 in /usr/local/lib/python3.8/dist-packages (from statsmodels>=0.13.2->pmdarima) (23.0)
Requirement already satisfied: six in /usr/local/lib/python3.8/dist-packages (from patsy>=0.5.2->statsmodels>=0.13.2->pmdarima) (1.15.0)
Installing collected packages: statsmodels, pmdarima
  Attempting uninstall: statsmodels
    Found existing installation: statsmodels 0.12.2
    Uninstalling statsmodels-0.12.2:
      Successfully uninstalled statsmodels-0.12.2
Successfully installed pmdarima-2.0.2 statsmodels-0.13.5
```

```
import pmdarima as pm
```

```
from sklearn.metrics import mean_absolute_percentage_error
```

```
train = pd.read_csv('/content/drive/MyDrive/MARUTI.csv')


train = train[:-100]
test = train[-100:]


plt.figure(figsize = (35,10))
plt.grid()
plt.plot(train['Close'], marker='v', label='Train')
plt.plot(test['Close'], marker = 'o', label = 'Test')
plt.xticks(rotation=90)
plt.legend()
plt.show
```

```
<function matplotlib.pyplot.show(close=None, block=None)>
```