In [4]:
```
pip install chart_studio
```

```
Requirement already satisfied: chart_studio in c:\users\sjha7\anaconda3\lib\site-pack
ages (1.1.0)
Requirement already satisfied: plotly in c:\users\sjha7\anaconda3\lib\site-packages
(from chart_studio) (5.9.0)
Requirement already satisfied: requests in c:\users\sjha7\anaconda3\lib\site-packages
(from chart_studio) (2.31.0)
Requirement already satisfied: retrying>=1.3.3 in c:\users\sjha7\anaconda3\lib\site-p
ackages (from chart_studio) (1.3.4)
Requirement already satisfied: six in c:\users\sjha7\anaconda3\lib\site-packages (fro
m chart_studio) (1.16.0)
Requirement already satisfied: tenacity>=6.2.0 in c:\users\sjha7\anaconda3\lib\site-p
ackages (from plotly->chart_studio) (8.2.2)
Requirement already satisfied: charset-normalizer<4,>=2 in c:\users\sjha7\anaconda3\l
ib\site-packages (from requests->chart_studio) (2.0.4)
Requirement already satisfied: idna<4,>=2.5 in c:\users\sjha7\anaconda3\lib\site-pack
ages (from requests->chart_studio) (3.4)
Requirement already satisfied: urllib3<3,>=1.21.1 in c:\users\sjha7\anaconda3\lib\sit
e-packages (from requests->chart_studio) (1.26.16)
Requirement already satisfied: certifi>=2017.4.17 in c:\users\sjha7\anaconda3\lib\sit
e-packages (from requests->chart_studio) (2023.7.22)
Note: you may need to restart the kernel to use updated packages.
```

In [5]:
```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt

import chart_studio.plotly as py
import plotly.graph_objs as go
import plotly.express as px

from plotly.offline import download_plotlyjs, init_notebook_mode, plot, iplot
init_notebook_mode(connected=True)
```

In [6]:
```
df = pd.read_csv('EWMAX.csv')
```

In [7]:
```
df.head()
```

Out[7]:

	Date	Open	High	Low	Close	Adj_Close	Volume
0	2000/3/27	3.812500	4.156250	3.812500	4.125000	4.125000	3675600
1	2000/3/28	4.125000	4.125000	4.000000	4.015625	4.015625	1077600
2	2000/3/29	4.000000	4.031250	3.953125	4.000000	4.000000	437200
3	2000/3/30	4.000000	4.000000	3.843750	3.843750	3.843750	1883600
4	2000/3/31	3.734375	3.734375	3.390625	3.390625	3.390625	7931600

In [8]:
```
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 4392 entries, 0 to 4391
Data columns (total 7 columns):
 #   Column     Non-Null Count  Dtype  
---  ------     --------------  -----  
 0   Date       4392 non-null   object 
 1   Open       4392 non-null   float64
 2   High       4392 non-null   float64
 3   Low        4392 non-null   float64
 4   Close      4392 non-null   float64
 5   Adj_Close  4392 non-null   float64
 6   Volume     4392 non-null   int64  
dtypes: float64(5), int64(1), object(1)
memory usage: 240.3+ KB
```

In [9]:
```
df['Date'] = pd.to_datetime(df['Date'])
```

In [10]:
```
print(f'Dataframe contains stock prices between {df.Date.min()} {df.Date.max()}')
print(f'Total days = {(df.Date.max()-df.Date.min()).days} days')
```

```
Dataframe contains stock prices between 2000-03-27 00:00:00 2017-09-08 00:00:00
Total days = 6374 days
```

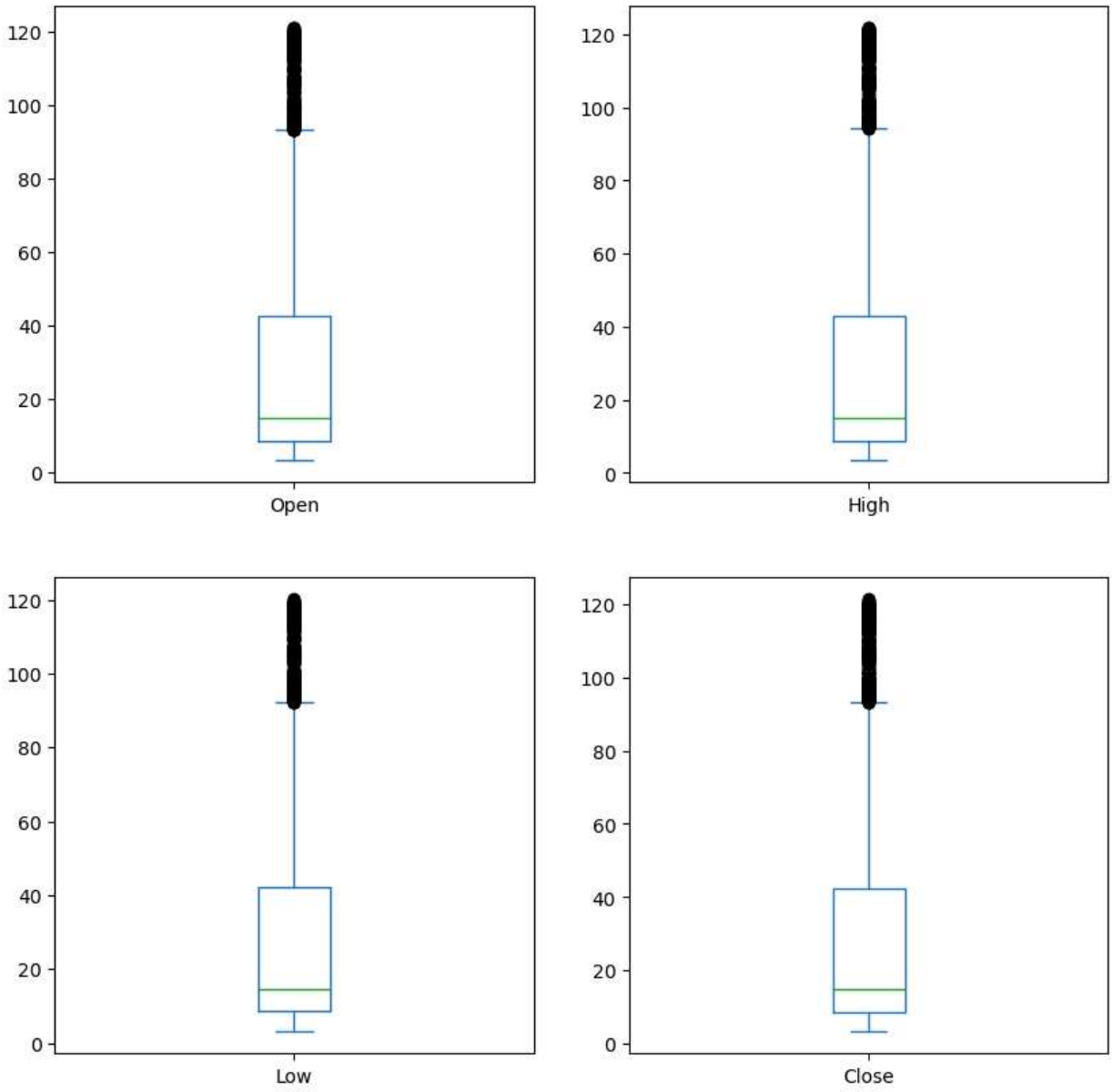
In [11]:
```
df.describe()
```

Out[11]:

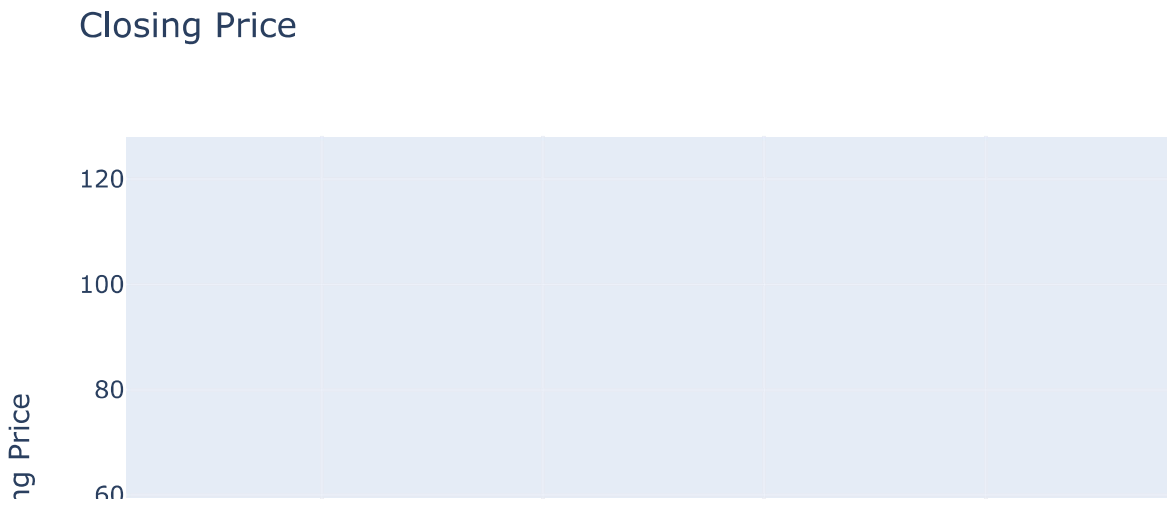
	Date	Open	High	Low	Close	Adj_Close	Volu
count	4392	4392.000000	4392.000000	4392.000000	4392.000000	4392.000000	4.392000e
mean	2008-12-18 18:38:21.639344128	30.562539	30.893618	30.238833	30.572580	30.572580	1.884027e
min	2000-03-27 00:00:00	3.296875	3.390625	3.000000	3.250000	3.250000	1.904000e
25%	2004-08-10 18:00:00	8.718125	8.803125	8.625000	8.712500	8.712500	1.088800e
50%	2008-12-17 12:00:00	14.766250	14.981250	14.662500	14.767500	14.767500	1.539300e
75%	2013-05-01 06:00:00	42.546248	43.051249	42.086249	42.539999	42.539999	2.188900e
max	2017-09-08 00:00:00	121.080002	121.750000	120.169998	121.360001	121.360001	4.641260e
std	NaN	29.914758	30.210974	29.615761	29.905778	29.905778	1.621609e

In [12]:
```
df[['Open', 'High', 'Low', 'Close']].plot(kind='box', subplots=True, figsize=(10,10),
```

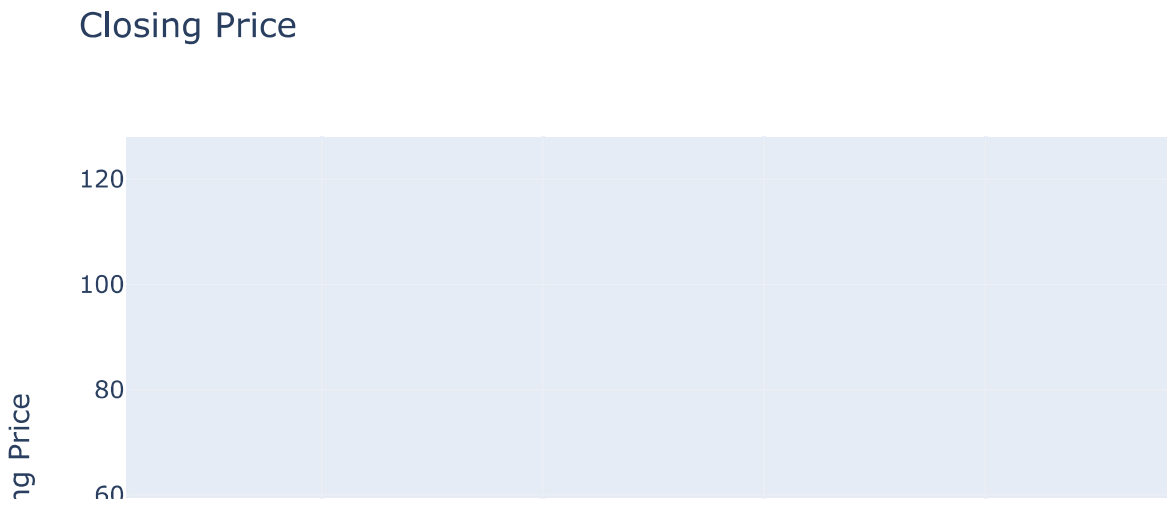
Out[12]:
```
Open        Axes(0.125,0.53;0.352273x0.35)
High     Axes(0.547727,0.53;0.352273x0.35)
Low         Axes(0.125,0.11;0.352273x0.35)
Close    Axes(0.547727,0.11;0.352273x0.35)
dtype: object
```



In [13]:
```
df_data = [{'x':df['Date'], 'y': df['Close']}]
plot = go.Figure(data=df_data)
plot.update_layout(title='Closing Price', xaxis_title='Date', yaxis_title='Closing Pri
plot.show()
```



In [14]:
```
iplot(plot)
```



In [15]:
```
pip install keras
```

```
Requirement already satisfied: keras in c:\users\sjha7\anaconda3\lib\site-packages
(3.9.2)Note: you may need to restart the kernel to use updated packages.

Requirement already satisfied: absl-py in c:\users\sjha7\anaconda3\lib\site-packages
(from keras) (2.2.2)
Requirement already satisfied: numpy in c:\users\sjha7\anaconda3\lib\site-packages (f
rom keras) (1.26.4)
Requirement already satisfied: rich in c:\users\sjha7\anaconda3\lib\site-packages (fr
om keras) (14.0.0)
Requirement already satisfied: namex in c:\users\sjha7\anaconda3\lib\site-packages (f
rom keras) (0.0.9)
Requirement already satisfied: h5py in c:\users\sjha7\anaconda3\lib\site-packages (fr
om keras) (3.13.0)
Requirement already satisfied: optree in c:\users\sjha7\anaconda3\lib\site-packages
(from keras) (0.15.0)
Requirement already satisfied: ml-dtypes in c:\users\sjha7\anaconda3\lib\site-package
s (from keras) (0.5.1)
Requirement already satisfied: packaging in c:\users\sjha7\anaconda3\lib\site-package
s (from keras) (23.1)
Requirement already satisfied: typing-extensions>=4.5.0 in c:\users\sjha7\anaconda3\l
ib\site-packages (from optree->keras) (4.7.1)
Requirement already satisfied: markdown-it-py>=2.2.0 in c:\users\sjha7\anaconda3\lib
\site-packages (from rich->keras) (2.2.0)
Requirement already satisfied: pygments<3.0.0,>=2.13.0 in c:\users\sjha7\anaconda3\li
b\site-packages (from rich->keras) (2.15.1)
Requirement already satisfied: mdurl~=0.1 in c:\users\sjha7\anaconda3\lib\site-packag
es (from markdown-it-py>=2.2.0->rich->keras) (0.1.0)
```

In [16]:
```
pip install scikit-learn
```

```
Requirement already satisfied: scikit-learn in c:\users\sjha7\anaconda3\lib\site-pack
ages (1.3.0)
Requirement already satisfied: numpy>=1.17.3 in c:\users\sjha7\anaconda3\lib\site-pac
kages (from scikit-learn) (1.26.4)
Requirement already satisfied: scipy>=1.5.0 in c:\users\sjha7\anaconda3\lib\site-pack
ages (from scikit-learn) (1.11.1)
Requirement already satisfied: joblib>=1.1.1 in c:\users\sjha7\anaconda3\lib\site-pac
kages (from scikit-learn) (1.2.0)
Requirement already satisfied: threadpoolctl>=2.0.0 in c:\users\sjha7\anaconda3\lib\s
ite-packages (from scikit-learn) (2.2.0)
Note: you may need to restart the kernel to use updated packages.
```

In [17]:
```
!pip install tensorflow
```

```
Requirement already satisfied: tensorflow in c:\users\sjha7\anaconda3\lib\site-packag
es (2.19.0)
Requirement already satisfied: absl-py>=1.0.0 in c:\users\sjha7\anaconda3\lib\site-pa
ckages (from tensorflow) (2.2.2)
Requirement already satisfied: astunparse>=1.6.0 in c:\users\sjha7\anaconda3\lib\site
-packages (from tensorflow) (1.6.3)
Requirement already satisfied: flatbuffers>=24.3.25 in c:\users\sjha7\anaconda3\lib\s
ite-packages (from tensorflow) (25.2.10)
Requirement already satisfied: gast!=0.5.0,!=0.5.1,!=0.5.2,>=0.2.1 in c:\users\sjha7
\anaconda3\lib\site-packages (from tensorflow) (0.6.0)
Requirement already satisfied: google-pasta>=0.1.1 in c:\users\sjha7\anaconda3\lib\si
te-packages (from tensorflow) (0.2.0)
Requirement already satisfied: libclang>=13.0.0 in c:\users\sjha7\anaconda3\lib\site-
packages (from tensorflow) (18.1.1)
Requirement already satisfied: opt-einsum>=2.3.2 in c:\users\sjha7\anaconda3\lib\site
-packages (from tensorflow) (3.4.0)
Requirement already satisfied: packaging in c:\users\sjha7\anaconda3\lib\site-package
s (from tensorflow) (23.1)
Requirement already satisfied: protobuf!=4.21.0,!=4.21.1,!=4.21.2,!=4.21.3,!=4.21.4,!
=4.21.5,<6.0.0dev,>=3.20.3 in c:\users\sjha7\anaconda3\lib\site-packages (from tensor
flow) (5.29.4)
Requirement already satisfied: requests<3,>=2.21.0 in c:\users\sjha7\anaconda3\lib\si
te-packages (from tensorflow) (2.31.0)
Requirement already satisfied: setuptools in c:\users\sjha7\anaconda3\lib\site-packag
es (from tensorflow) (68.0.0)
Requirement already satisfied: six>=1.12.0 in c:\users\sjha7\anaconda3\lib\site-packa
ges (from tensorflow) (1.16.0)
Requirement already satisfied: termcolor>=1.1.0 in c:\users\sjha7\anaconda3\lib\site-
packages (from tensorflow) (3.1.0)
Requirement already satisfied: typing-extensions>=3.6.6 in c:\users\sjha7\anaconda3\l
ib\site-packages (from tensorflow) (4.7.1)
Requirement already satisfied: wrapt>=1.11.0 in c:\users\sjha7\anaconda3\lib\site-pac
kages (from tensorflow) (1.14.1)
Requirement already satisfied: grpcio<2.0,>=1.24.3 in c:\users\sjha7\anaconda3\lib\si
te-packages (from tensorflow) (1.71.0)
Requirement already satisfied: tensorboard~=2.19.0 in c:\users\sjha7\anaconda3\lib\si
te-packages (from tensorflow) (2.19.0)
Requirement already satisfied: keras>=3.5.0 in c:\users\sjha7\anaconda3\lib\site-pack
ages (from tensorflow) (3.9.2)
Requirement already satisfied: numpy<2.2.0,>=1.26.0 in c:\users\sjha7\anaconda3\lib\s
ite-packages (from tensorflow) (1.26.4)
Requirement already satisfied: h5py>=3.11.0 in c:\users\sjha7\anaconda3\lib\site-pack
ages (from tensorflow) (3.13.0)
Requirement already satisfied: ml-dtypes<1.0.0,>=0.5.1 in c:\users\sjha7\anaconda3\li
b\site-packages (from tensorflow) (0.5.1)
Requirement already satisfied: tensorflow-io-gcs-filesystem>=0.23.1 in c:\users\sjha7
\anaconda3\lib\site-packages (from tensorflow) (0.31.0)
Requirement already satisfied: wheel<1.0,>=0.23.0 in c:\users\sjha7\anaconda3\lib\sit
e-packages (from astunparse>=1.6.0->tensorflow) (0.38.4)
Requirement already satisfied: rich in c:\users\sjha7\anaconda3\lib\site-packages (fr
om keras>=3.5.0->tensorflow) (14.0.0)
Requirement already satisfied: namex in c:\users\sjha7\anaconda3\lib\site-packages (f
rom keras>=3.5.0->tensorflow) (0.0.9)
Requirement already satisfied: optree in c:\users\sjha7\anaconda3\lib\site-packages
(from keras>=3.5.0->tensorflow) (0.15.0)
Requirement already satisfied: charset-normalizer<4,>=2 in c:\users\sjha7\anaconda3\l
ib\site-packages (from requests<3,>=2.21.0->tensorflow) (2.0.4)
Requirement already satisfied: idna<4,>=2.5 in c:\users\sjha7\anaconda3\lib\site-pack
ages (from requests<3,>=2.21.0->tensorflow) (3.4)
Requirement already satisfied: urllib3<3,>=1.21.1 in c:\users\sjha7\anaconda3\lib\sit
```

```
e-packages (from requests<3,>=2.21.0->tensorflow) (1.26.16)
Requirement already satisfied: certifi>=2017.4.17 in c:\users\sjha7\anaconda3\lib\sit
e-packages (from requests<3,>=2.21.0->tensorflow) (2023.7.22)
Requirement already satisfied: markdown>=2.6.8 in c:\users\sjha7\anaconda3\lib\site-p
ackages (from tensorboard~=2.19.0->tensorflow) (3.4.1)
Requirement already satisfied: tensorboard-data-server<0.8.0,>=0.7.0 in c:\users\sjha
7\anaconda3\lib\site-packages (from tensorboard~=2.19.0->tensorflow) (0.7.2)
Requirement already satisfied: werkzeug>=1.0.1 in c:\users\sjha7\anaconda3\lib\site-p
ackages (from tensorboard~=2.19.0->tensorflow) (2.2.3)
Requirement already satisfied: MarkupSafe>=2.1.1 in c:\users\sjha7\anaconda3\lib\site
-packages (from werkzeug>=1.0.1->tensorboard~=2.19.0->tensorflow) (2.1.1)
Requirement already satisfied: markdown-it-py>=2.2.0 in c:\users\sjha7\anaconda3\lib
\site-packages (from rich->keras>=3.5.0->tensorflow) (2.2.0)
Requirement already satisfied: pygments<3.0.0,>=2.13.0 in c:\users\sjha7\anaconda3\li
b\site-packages (from rich->keras>=3.5.0->tensorflow) (2.15.1)
Requirement already satisfied: mdurl~=0.1 in c:\users\sjha7\anaconda3\lib\site-packag
es (from markdown-it-py>=2.2.0->rich->keras>=3.5.0->tensorflow) (0.1.0)
```

In [18]:
```
from sklearn.model_selection import train_test_split
from sklearn.preprocessing import MinMaxScaler

from sklearn.preprocessing import StandardScaler

from sklearn.metrics import mean_squared_error as mse
from sklearn.metrics import r2_score
```

In [19]:
```
X = np.array(df.index).reshape(-1,1)
Y = df['Close']
X_train, X_test, Y_train, Y_test = train_test_split(X, Y, test_size=0.3, random_state=
```

In [20]:
```
scaler = StandardScaler().fit(X_train)
```

In [21]:
```
from sklearn.linear_model import LinearRegression
```

In [22]:
```
lm= LinearRegression()
lm.fit(X_train, Y_train)
```

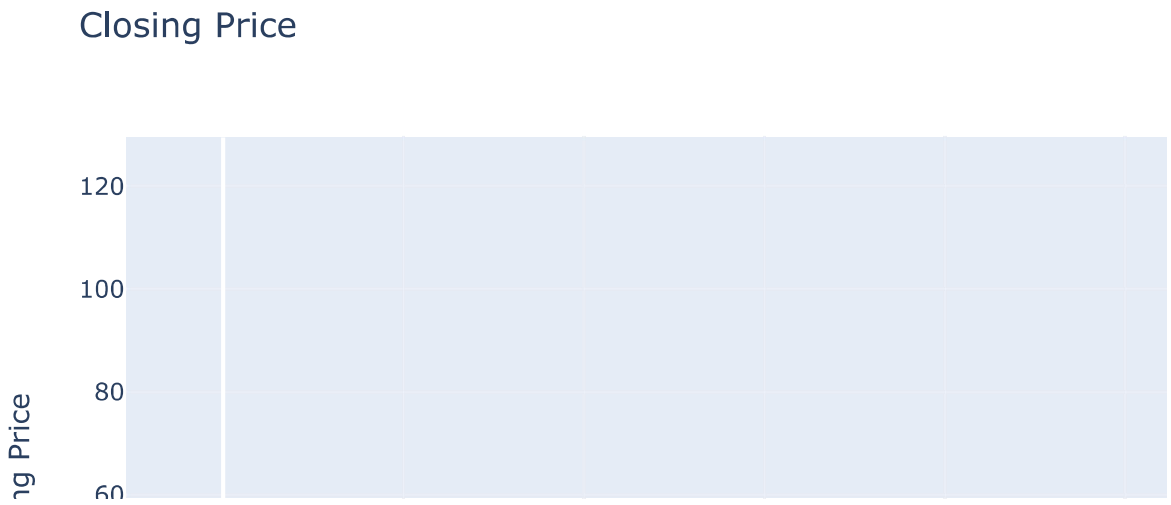
Out[22]:
```
▾ LinearRegression

LinearRegression()
```

In [23]:
```
trace0 = go.Scatter(x=X_train.T[0], y=Y_train, mode='markers', name='Training Data')
trace1 = go.Scatter(x=X_test.T[0], y=Y_test, mode='markers', name='Testing Data')


df_data = [trace0, trace1]
plot = go.Figure(data=df_data)
plot.update_layout(title='Closing Price', xaxis_title='Date', yaxis_title='Closing Pri
plot.show()
```

In [24]:
```
iplot(plot)
```



In [25]:
```
scores=f'''
{'Metric'.ljust(10)}{'Train'.center(20)}{'Test'.center(20)}
{'r2_score'.ljust(10)}{r2_score(Y_train, lm.predict(X_train))}\t{r2_score(Y_test,lm.pr
{'MSE'.ljust(10)}{mse(Y_train, lm.predict(X_train))}\t{mse(Y_test,lm.predict(X_test))}
'''
print(scores)
```

```
Metric           Train                Test
r2_score  0.7528861534401794    0.7529906267435282
MSE       222.19721680971537    217.821767849839
```

In [ ]: