In [3]:

```
import math
import yfinance as yf
import numpy as np
import pandas as pd
from sklearn.preprocessing import MinMaxScaler
import matplotlib.pyplot as plt


import tensorflow as tf
from tensorflow import keras
from tensorflow.keras import layers

stock_data = yf.download('AAPL', start='2016-01-01', end='2021-10-01')
stock_data.head()
```

```
[*********************100%%**********************]  1 of 1 completed
```

Out[3]:

	Open	High	Low	Close	Adj Close	Volume
Date						
2016-01-04	25.652500	26.342501	25.500000	26.337500	24.009062	270597600
2016-01-05	26.437500	26.462500	25.602501	25.677500	23.407410	223164000
2016-01-06	25.139999	25.592501	24.967501	25.174999	22.949339	273829600
2016-01-07	24.670000	25.032499	24.107500	24.112499	21.980770	324377600
2016-01-08	24.637501	24.777500	24.190001	24.240000	22.096998	283192000

In [2]:

```
pip install yfinance
```

```
Collecting yfinance
  Obtaining dependency information for yfinance from https://files.pythonhost
ed.org/packages/e9/43/93ea65227c938a0a4a8925d7f054b050ea743044b887170da9eca21
0635a/yfinance-0.2.28-py2.py3-none-any.whl.metadata (https://files.pythonhost
ed.org/packages/e9/43/93ea65227c938a0a4a8925d7f054b050ea743044b887170da9eca21
0635a/yfinance-0.2.28-py2.py3-none-any.whl.metadata)
  Downloading yfinance-0.2.28-py2.py3-none-any.whl.metadata (11 kB)
Requirement already satisfied: pandas>=1.3.0 in c:\users\saipr\anaconda3\lib
\site-packages (from yfinance) (1.5.3)
Requirement already satisfied: numpy>=1.16.5 in c:\users\saipr\anaconda3\lib
\site-packages (from yfinance) (1.24.3)
Requirement already satisfied: requests>=2.31 in c:\users\saipr\anaconda3\lib
\site-packages (from yfinance) (2.31.0)
Collecting multitasking>=0.0.7 (from yfinance)
  Downloading multitasking-0.0.11-py3-none-any.whl (8.5 kB)
Requirement already satisfied: lxml>=4.9.1 in c:\users\saipr\anaconda3\lib\si
te-packages (from yfinance) (4.9.2)
Requirement already satisfied: appdirs>=1.4.4 in c:\users\saipr\anaconda3\lib
\site-packages (from yfinance) (1.4.4)
Requirement already satisfied: pytz>=2022.5 in c:\users\saipr\anaconda3\lib\s
ite-packages (from yfinance) (2022.7)
Collecting frozendict>=2.3.4 (from yfinance)
  Downloading frozendict-2.3.8-py311-none-any.whl (14 kB)
Requirement already satisfied: beautifulsoup4>=4.11.1 in c:\users\saipr\anaco
nda3\lib\site-packages (from yfinance) (4.12.2)
Collecting html5lib>=1.1 (from yfinance)
  Downloading html5lib-1.1-py2.py3-none-any.whl (112 kB)
     ---------------------------------------- 0.0/112.2 kB ? eta -:--:--
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Requirement already satisfied: soupsieve>1.2 in c:\users\saipr\anaconda3\lib
\site-packages (from beautifulsoup4>=4.11.1->yfinance) (2.4)
Requirement already satisfied: six>=1.9 in c:\users\saipr\anaconda3\lib\site-
packages (from html5lib>=1.1->yfinance) (1.16.0)
Requirement already satisfied: webencodings in c:\users\saipr\anaconda3\lib\s
ite-packages (from html5lib>=1.1->yfinance) (0.5.1)
Requirement already satisfied: python-dateutil>=2.8.1 in c:\users\saipr\anaco
nda3\lib\site-packages (from pandas>=1.3.0->yfinance) (2.8.2)
Requirement already satisfied: charset-normalizer<4,>=2 in c:\users\saipr\ana
conda3\lib\site-packages (from requests>=2.31->yfinance) (2.0.4)
Requirement already satisfied: idna<4,>=2.5 in c:\users\saipr\anaconda3\lib\s
ite-packages (from requests>=2.31->yfinance) (3.4)
Requirement already satisfied: urllib3<3,>=1.21.1 in c:\users\saipr\anaconda3
\lib\site-packages (from requests>=2.31->yfinance) (1.26.16)
Requirement already satisfied: certifi>=2017.4.17 in c:\users\saipr\anaconda3
\lib\site-packages (from requests>=2.31->yfinance) (2023.7.22)
Downloading yfinance-0.2.28-py2.py3-none-any.whl (65 kB)
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   ------------------------- --------------- 41.0/65.3 kB 122.9 kB/s eta 0:00:
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   ------------------------------- --------- 51.2/65.3 kB 27.9 kB/s eta 0:00:0
1
   ----------------------------------------- 65.3/65.3 kB 37.1 kB/s eta 0:00:0
0
Installing collected packages: multitasking, html5lib, frozendict, yfinance
Successfully installed frozendict-2.3.8 html5lib-1.1 multitasking-0.0.11 yfin
ance-0.2.28
Note: you may need to restart the kernel to use updated packages.
```
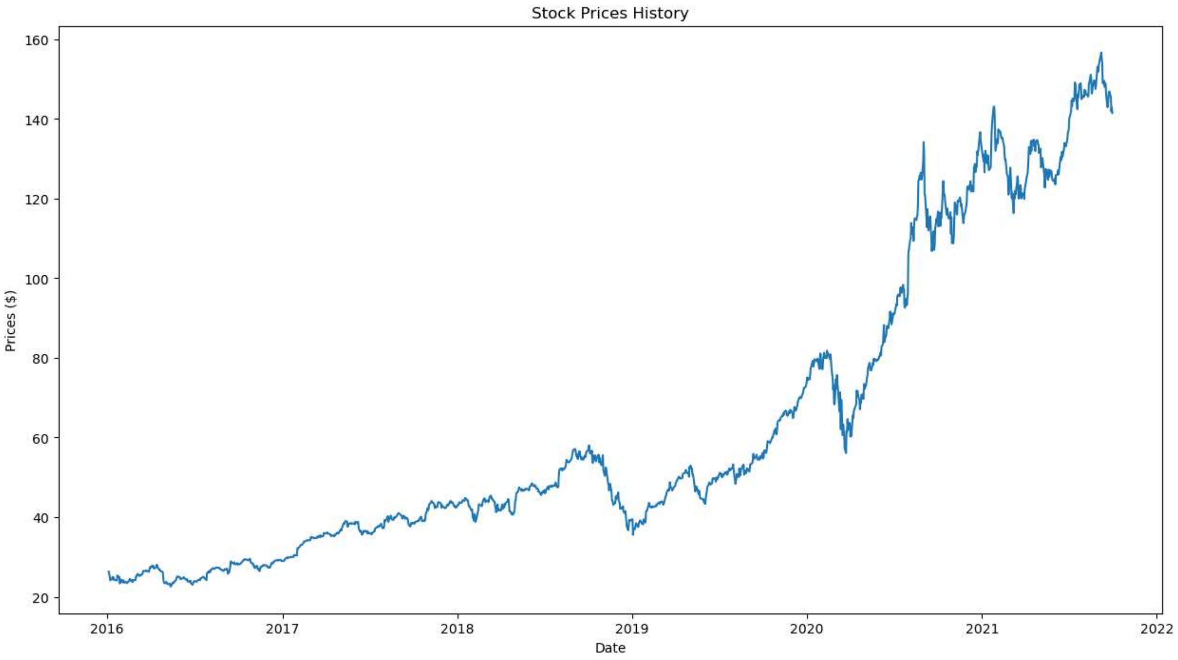

In [4]:

```
plt.figure(figsize=(15, 8))
plt.title('Stock Prices History')
plt.plot(stock_data['Close'])
plt.xlabel('Date')
plt.ylabel('Prices ($)')
```

Out[4]:

```
Text(0, 0.5, 'Prices ($)')
```



In [5]:

```
close_prices = stock_data['Close']
values = close_prices.values
training_data_len = math.ceil(len(values)* 0.8)

scaler = MinMaxScaler(feature_range=(0,1))
scaled_data = scaler.fit_transform(values.reshape(-1,1))
train_data = scaled_data[0: training_data_len, :]

x_train = []
y_train = []

for i in range(60, len(train_data)):
    x_train.append(train_data[i-60:i, 0])
    y_train.append(train_data[i, 0])

x_train, y_train = np.array(x_train), np.array(y_train)
x_train = np.reshape(x_train, (x_train.shape[0], x_train.shape[1], 1))
```

In [6]:

```
test_data = scaled_data[training_data_len-60: , : ]
x_test = []
y_test = values[training_data_len:]

for i in range(60, len(test_data)):
  x_test.append(test_data[i-60:i, 0])

x_test = np.array(x_test)
x_test = np.reshape(x_test, (x_test.shape[0], x_test.shape[1], 1))
```

In [7]:

```
model = keras.Sequential()
model.add(layers.LSTM(100, return_sequences=True, input_shape=(x_train.shape[1
model.add(layers.LSTM(100, return_sequences=False))
model.add(layers.Dense(25))
model.add(layers.Dense(1))
model.summary()
```

```
Model: "sequential"
_________________________________________________________________
 Layer (type)                Output Shape              Param #   
=================================================================
 lstm (LSTM)                 (None, 60, 100)           40800     
                                                                 
 lstm_1 (LSTM)               (None, 100)               80400     
                                                                 
 dense (Dense)               (None, 25)                2525      
                                                                 
 dense_1 (Dense)             (None, 1)                 26        
                                                                 
=================================================================
Total params: 123751 (483.40 KB)
Trainable params: 123751 (483.40 KB)
Non-trainable params: 0 (0.00 Byte)
_________________________________________________________________
```

In [8]:

```
model.compile(optimizer='adam', loss='mean_squared_error')
model.fit(x_train, y_train, batch_size= 1, epochs=3)
```

```
Epoch 1/3
1098/1098 [==============================] - 56s 44ms/step - loss: 9.2123e-04
Epoch 2/3
1098/1098 [==============================] - 49s 44ms/step - loss: 2.9142e-04
Epoch 3/3
1098/1098 [==============================] - 49s 44ms/step - loss: 3.3356e-04
```

Out[8]:

```
<keras.src.callbacks.History at 0x25e17e4fa50>
```

In [9]:

```
predictions = model.predict(x_test)
predictions = scaler.inverse_transform(predictions)
rmse = np.sqrt(np.mean(predictions - y_test)**2)
rmse
```

```
10/10 [==============================] - 3s 77ms/step
```

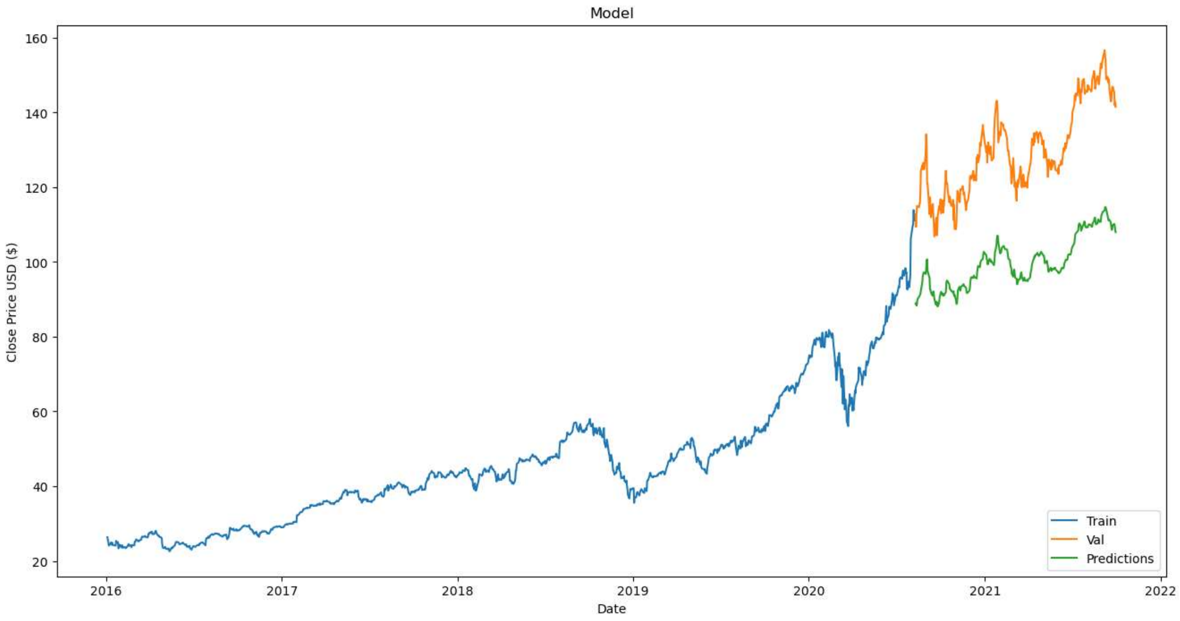
Out[9]:

```
29.729622943178594
```

In [10]:

```
data = stock_data.filter(['Close'])
train = data[:training_data_len]
validation = data[training_data_len:]
validation['Predictions'] = predictions
plt.figure(figsize=(16,8))
plt.title('Model')
plt.xlabel('Date')
plt.ylabel('Close Price USD ($)')
plt.plot(train)
plt.plot(validation[['Close', 'Predictions']])
plt.legend(['Train', 'Val', 'Predictions'], loc='lower right')
plt.show()
```

```
C:\Users\saipr\AppData\Local\Temp\ipykernel_18416\154904543.py:4: SettingWith
CopyWarning:
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/s
table/user_guide/indexing.html#returning-a-view-versus-a-copy (https://panda
s.pydata.org/pandas-docs/stable/user_guide/indexing.html#returning-a-view-ver
sus-a-copy)
  validation['Predictions'] = predictions
```



In [ ]: