EXPERIMENT - 7

AIM: To implement program for decomposing time series data into trend and seasonality.
PROCEDURE AND CODE:
Steps 1: Importing the necessary packages.

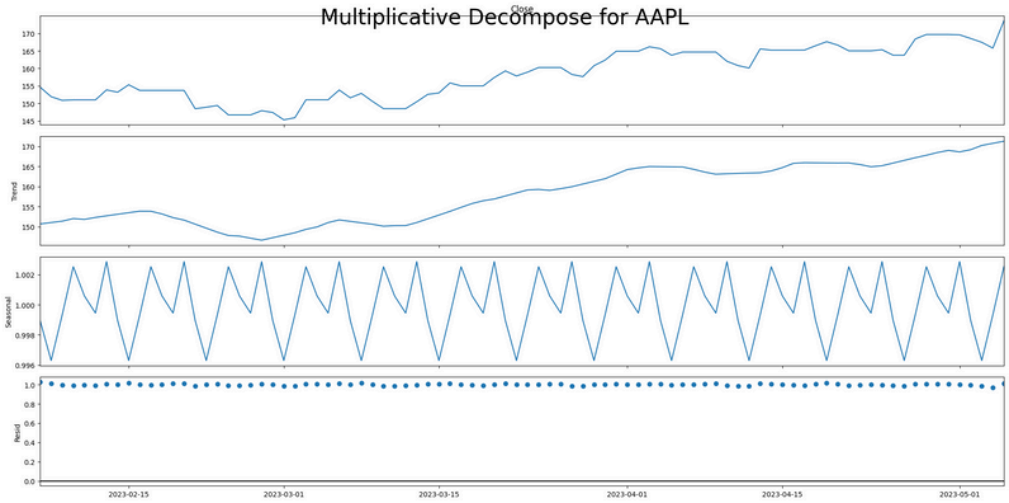
```
# Data
import json import numpy as np
import pandas as pd
from sklearn.preprocessing import LabelEncoder
from sklearn.preprocessing import StandardScaler
# Visual
import matplotlib.pyplot as plt
import seaborn as sns
from statsmodels.tsa.seasonal import seasonal_decompose
```

Step 2: Implementing the two decomposing methods to decompose time series data into trend and seasonality by creating a decompose function.

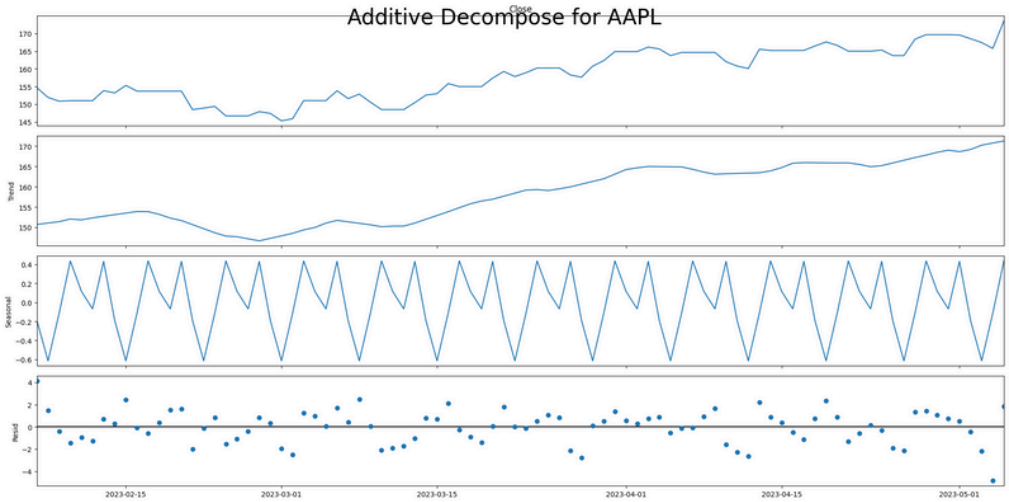
```
def decompose(df, column_name):
  """
  A function that returns the trend, seasonality and residual captured by applying both
multiplicative and
  additive model.
  df -> DataFrame
  column_name -> column_name for which trend, seasonality is to be captured
  """
  # Group the data by ticker and decompose each ticker separately.
  for ticker, data in df.groupby('Ticker'):
    data = data.set_index('Date')
    # Impute missing values using forward fill and backward fill.
    data = data.asfreq(pd.infer_freq(data.index)).fillna(method='ffill').fillna(method='bfill')

    result_mul = seasonal_decompose(
      data[column_name], model='multiplicative', extrapolate_trend='freq'
    )
    result_add = seasonal_decompose(
      data[column_name], model='additive', extrapolate_trend='freq'
    )
    plt.rcParams.update({'figure.figsize': (20, 10)})
    result_mul.plot().suptitle(
      f'Multiplicative Decompose for {ticker}', fontsize=30
    )
    result_add.plot().suptitle(
      f'Additive Decompose for {ticker}', fontsize=30
    )
    plt.show()
```

Step 3: Calling the function with suitable column values.(the prior column values trend and seaonality and residual will be displayed).

result_mul, result_add = decompose(df, 'Close')
#For AAPL Stock's Closing time series.(Multiplicative decompose)



#For AAPL Stock's Closing time series.(Additive decompose)



Result: The program for decomposing time series data into trend and seasonality is successfully done.