In [1]:

```
import pandas as pd
import matplotlib.pyplot as plt
import numpy as np
```

In [2]:

```
def prepareData(df):
    df = df.drop('Open', 1)
    df = df.drop('High', 1)
    df = df.drop('Low', 1)
    df = df.drop('Close', 1)

    df = df.astype({'Date': 'datetime64[ns]', 'Adj Close': 'float', 'Volume': 'float'}, cop

    return df
```

In [3]:

```
# The functions used to generate the price chart are adaptations of the code created by Uro
# Source: https://github.com/uros-trifunovic/Visualizing-historical-stock-prices-and-volume

# Defines the colors used in graphics
colors = {'red': '#ff207c', 'grey': '#42535b', 'blue': '#207cff', 'orange': '#ffa320', 'gre
config_ticks = {'size': 14, 'color': colors['grey'], 'labelcolor': colors['grey']}
config_title = {'size': 18, 'color': colors['grey'], 'ha': 'left', 'va': 'baseline'}

def format_borders(plot):
    plot.spines['top'].set_visible(False)
    plot.spines['left'].set_visible(False)
    plot.spines['left'].set_color(colors['grey'])
    plot.spines['bottom'].set_color(colors['grey'])

def format_legend(plot):
    plot_legend = plot.legend(loc='upper left', bbox_to_anchor=(-0.005, 0.95), fontsize=16)
    for text in plot_legend.get_texts():
        text.set_color(colors['grey'])

def get_prev_day_info(plot, date, close, vol):
    previous_close='$' + str("{:,}".format(close.iloc[-1]))
    previous_volume=str("{:,}".format(vol.iloc[-1]))
    previous_date=str(date.iloc[-1])

    plot.set_title(
        'Closing price on ' + previous_date + ': ' + previous_close +
        '\nShares traded on ' + previous_date + ': ' + previous_volume,
         fontdict=config_title, loc='left'
    )

def get_charts(symbol, date, close, vol):
    plt.rc('figure', figsize=(15, 10))

    fig, axes = plt.subplots(2, 1, gridspec_kw={'height_ratios': [3, 1]})
    fig.tight_layout(pad=3)
    fig.suptitle(symbol + ' Price and Volume', size=36, color=colors['grey'], x=0.24, y=1.1

    plot_price = axes[0]
    plot_price.plot(date, close, color=colors['blue'], linewidth=2, label='Price')
    plot_price.yaxis.tick_right()
    plot_price.tick_params(axis='both', **config_ticks)
    plot_price.set_ylabel('Price (in USD)', fontsize=14)
    plot_price.yaxis.set_label_position("right")
    plot_price.yaxis.label.set_color(colors['grey'])
    plot_price.grid(axis='y', color='gainsboro', linestyle='-', linewidth=0.5)
    plot_price.set_axisbelow(True)

    format_borders(plot_price)
    format_legend(plot_price)
    get_prev_day_info(plot_price, date, close, vol)

    plot_vol = axes[1]
    plot_vol.bar(date, vol, width=15, color='darkgrey')
    plot_vol.yaxis.tick_right()
    plot_vol.tick_params(axis='both', **config_ticks)
    plot_vol.yaxis.set_label_position("right")
    plot_vol.set_xlabel('Date', fontsize=14)
    plot_vol.set_ylabel('Volume (in millions)', fontsize=14)
    plot_vol.yaxis.label.set_color(colors['grey'])
    plot_vol.xaxis.label.set_color(colors['grey'])

    format_borders(plot_vol)
```

In [4]:

```
# Importing daily price RVN-USD
# source: https://au.finance.yahoo.com/quote/RVN-USD/history?period1=1520640000&period2=162

dfPriceRVN = pd.read_csv('Datasets/RVN-USD.csv')
dfPriceRVN
```

Out[4]:

	Date	Open	High	Low	Close	Adj Close	Volume
0	2018-03-10	0.026499	0.028772	0.026063	0.028618	0.028618	171820.0
1	2018-03-11	0.028520	0.033503	0.026241	0.031883	0.031883	279104.0
2	2018-03-12	0.031496	0.034305	0.028595	0.030258	0.030258	218114.0
3	2018-03-13	0.029902	0.030913	0.025711	0.027902	0.027902	167669.0
4	2018-03-14	0.027723	0.028685	0.023747	0.024386	0.024386	131838.0
...	...	...	...	...	...	...	...
1174	2021-05-27	0.101504	0.103803	0.091664	0.094475	0.094475	66895929.0
1175	2021-05-28	0.094473	0.096013	0.077685	0.081287	0.081287	63652398.0
1176	2021-05-29	0.081168	0.084461	0.070398	0.076148	0.076148	46482352.0
1177	2021-05-30	0.076206	0.083790	0.070914	0.078637	0.078637	38637338.0
1178	2021-05-31	0.078666	0.084311	0.074492	0.084311	0.084311	42069239.0

1179 rows × 7 columns

In [5]:

```
# Adjusting the dataset
dfPriceRVN = prepareData(dfPriceRVN)
```

In [6]:

```
dfPriceRVN
```

Out[6]:

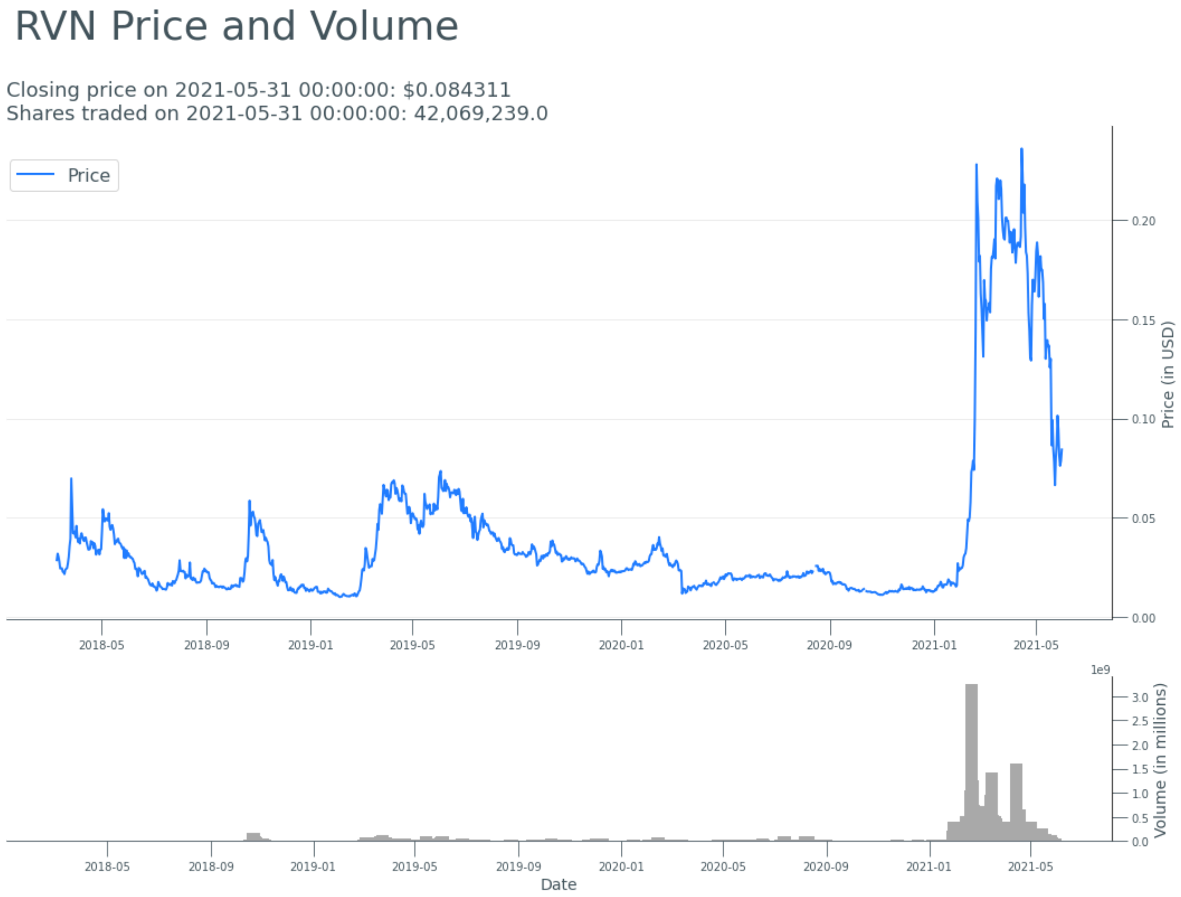
```
            Date  Adj Close      Volume
   0  2018-03-10   0.028618    171820.0
   1  2018-03-11   0.031883    279104.0
   2  2018-03-12   0.030258    218114.0
   3  2018-03-13   0.027902    167669.0
   4  2018-03-14   0.024386    131838.0
 ...         ...        ...         ...
1174  2021-05-27   0.094475  66895929.0
1175  2021-05-28   0.081287  63652398.0
1176  2021-05-29   0.076148  46482352.0
1177  2021-05-30   0.078637  38637338.0
1178  2021-05-31   0.084311  42069239.0

1179 rows × 3 columns
```

In [7]:

```
# Generate the price chart
%matplotlib inline

get_charts('RVN', dfPriceRVN['Date'], dfPriceRVN['Adj Close'], dfPriceRVN['Volume'])
```



In [8]:

```
# Importing daily price BTC-USD
# source: https://au.finance.yahoo.com/quote/RVN-USD/history?period1=1520640000&period2=162

dfPriceBTC = pd.read_csv('Datasets/BTC-USD.csv')
dfPriceBTC
```

Out[8]:

	Date	Open	High	Low	Close	Adj Close	Volur
0	2018-03-10	9350.589844	9531.320313	8828.469727	8866.000000	8866.000000	5.386320e+
1	2018-03-11	8852.780273	9711.889648	8607.120117	9578.629883	9578.629883	6.296370e+
2	2018-03-12	9602.929688	9937.500000	8956.429688	9205.120117	9205.120117	6.457400e+
3	2018-03-13	9173.040039	9470.379883	8958.190430	9194.849609	9194.849609	5.991140e+
4	2018-03-14	9214.650391	9355.849609	8068.589844	8269.809570	8269.809570	6.438230e+
...	...	...	...	...	...	...	
1174	2021-05-27	39316.890625	40379.617188	37247.902344	38436.968750	38436.968750	4.321097e+
1175	2021-05-28	38507.082031	38856.968750	34779.039063	35697.605469	35697.605469	5.520019e+
1176	2021-05-29	35684.156250	37234.500000	33693.929688	34616.066406	34616.066406	4.523101e+
1177	2021-05-30	34607.406250	36400.667969	33520.738281	35678.128906	35678.128906	3.164608e+
1178	2021-05-31	35658.593750	37468.250000	34241.945313	37332.855469	37332.855469	3.900985e+

1179 rows × 7 columns

In [9]:

```
# Adjusting the dataset
dfPriceBTC = prepareData(dfPriceBTC)
```

In [10]:

```
dfPriceBTC
```

Out[10]:

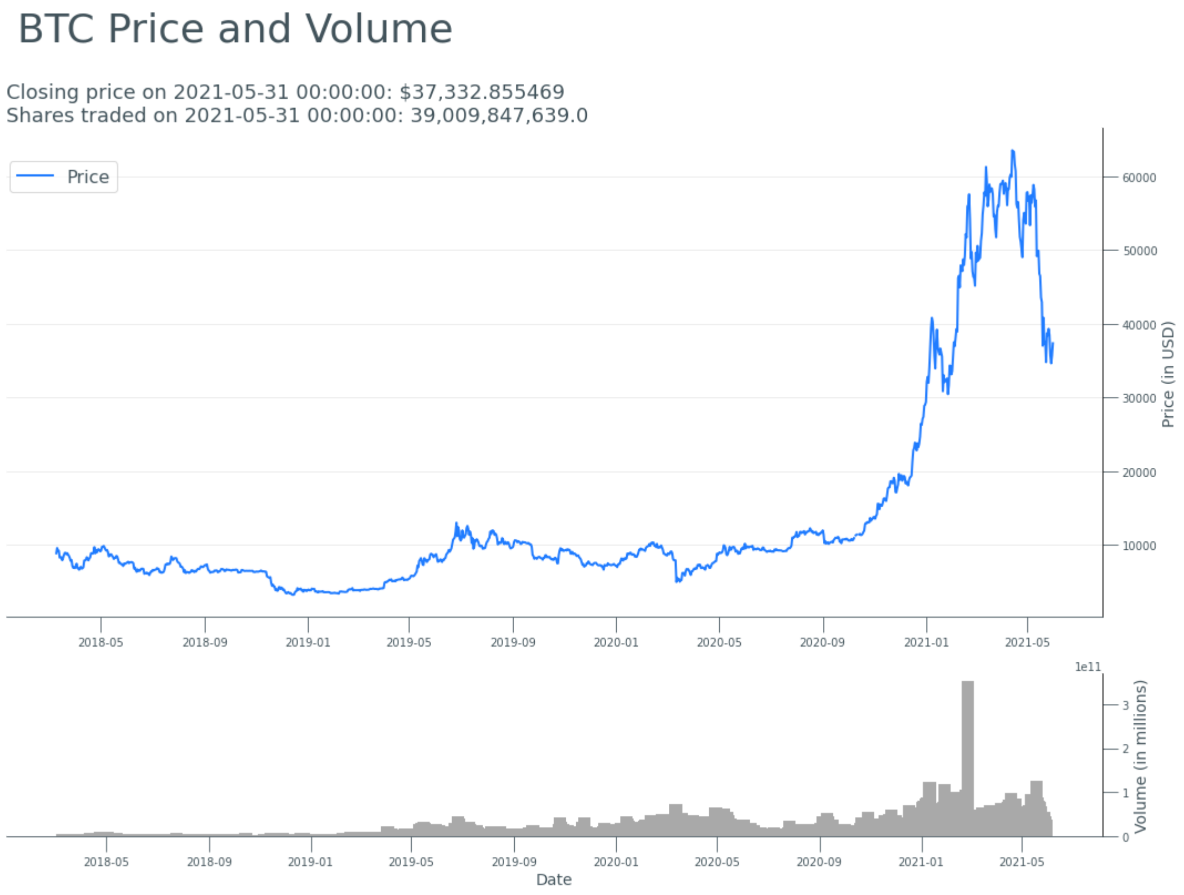
	Date	Adj Close	Volume
0	2018-03-10	8866.000000	5.386320e+09
1	2018-03-11	9578.629883	6.296370e+09
2	2018-03-12	9205.120117	6.457400e+09
3	2018-03-13	9194.849609	5.991140e+09
4	2018-03-14	8269.809570	6.438230e+09
...	...	...	...
1174	2021-05-27	38436.968750	4.321097e+10
1175	2021-05-28	35697.605469	5.520019e+10
1176	2021-05-29	34616.066406	4.523101e+10
1177	2021-05-30	35678.128906	3.164608e+10
1178	2021-05-31	37332.855469	3.900985e+10

1179 rows × 3 columns

In [11]:

```
# Generate the price chart
%matplotlib inline

get_charts('BTC', dfPriceBTC['Date'], dfPriceBTC['Adj Close'], dfPriceBTC['Volume'])
```



BTC Price and Volume

Closing price on 2021-05-31 00:00:00: $37,332.855469
Shares traded on 2021-05-31 00:00:00: 39,009,847,639.0

In [12]:

```
# Normalization/standardization of column names
def prepareDataset(df, suffix):

    df.columns = [col.lower() for col in df.columns]

    df['adj close'] = np.log(df['adj close'])
    #df['date'] =  pd.to_datetime(df['date'], format='%Y-%m-%d')

    df.columns = [col_name+'_'+suffix for col_name in df.columns]
    df.rename(columns = {'date_'+suffix:'date'}, inplace = True)

    return df
```

In [13]:

```
# Preparing dataset

prepareDataset(dfPriceRVN, 'RVN')
dfPriceRVN
```

Out[13]:

	date	adj close_RVN	volume_RVN
0	2018-03-10	-3.553719	171820.0
1	2018-03-11	-3.445682	279104.0
2	2018-03-12	-3.497995	218114.0
3	2018-03-13	-3.579057	167669.0
4	2018-03-14	-3.713746	131838.0
...	...	...	...
1174	2021-05-27	-2.359420	66895929.0
1175	2021-05-28	-2.509769	63652398.0
1176	2021-05-29	-2.575076	46482352.0
1177	2021-05-30	-2.542913	38637338.0
1178	2021-05-31	-2.473243	42069239.0

1179 rows × 3 columns

In [14]:

```
# Preparing dataset

prepareDataset(dfPriceBTC, 'BTC')
dfPriceBTC
```

Out[14]:

	date	adj close_BTC	volume_BTC
0	2018-03-10	9.089979	5.386320e+09
1	2018-03-11	9.167290	6.296370e+09
2	2018-03-12	9.127515	6.457400e+09
3	2018-03-13	9.126399	5.991140e+09
4	2018-03-14	9.020367	6.438230e+09
...	...	...	...
1174	2021-05-27	10.556775	4.321097e+10
1175	2021-05-28	10.482839	5.520019e+10
1176	2021-05-29	10.452073	4.523101e+10
1177	2021-05-30	10.482293	3.164608e+10
1178	2021-05-31	10.527629	3.900985e+10

1179 rows × 3 columns

In [15]:

```
# Merge of datasets
dfMerge = dfPriceRVN.merge(dfPriceBTC, left_on='date', right_on='date', how='left')
dfMerge
```

Out[15]:

	date	adj close_RVN	volume_RVN	adj close_BTC	volume_BTC
0	2018-03-10	-3.553719	171820.0	9.089979	5.386320e+09
1	2018-03-11	-3.445682	279104.0	9.167290	6.296370e+09
2	2018-03-12	-3.497995	218114.0	9.127515	6.457400e+09
3	2018-03-13	-3.579057	167669.0	9.126399	5.991140e+09
4	2018-03-14	-3.713746	131838.0	9.020367	6.438230e+09
...	...	...	...	...	...
1174	2021-05-27	-2.359420	66895929.0	10.556775	4.321097e+10
1175	2021-05-28	-2.509769	63652398.0	10.482839	5.520019e+10
1176	2021-05-29	-2.575076	46482352.0	10.452073	4.523101e+10
1177	2021-05-30	-2.542913	38637338.0	10.482293	3.164608e+10
1178	2021-05-31	-2.473243	42069239.0	10.527629	3.900985e+10

1179 rows × 5 columns

In [16]:

```
# Date column as index
datetime_series = pd.to_datetime(dfMerge['date'])
datetime_index = pd.DatetimeIndex(datetime_series.values)

dfMerge = dfMerge.set_index(datetime_index)

dfMerge.drop('date', axis=1, inplace=True)
dfMerge.sort_index(inplace=True)

dfMerge
```

Out[16]:

	adj close_RVN	volume_RVN	adj close_BTC	volume_BTC
2018-03-10	-3.553719	171820.0	9.089979	5.386320e+09
2018-03-11	-3.445682	279104.0	9.167290	6.296370e+09
2018-03-12	-3.497995	218114.0	9.127515	6.457400e+09
2018-03-13	-3.579057	167669.0	9.126399	5.991140e+09
2018-03-14	-3.713746	131838.0	9.020367	6.438230e+09
...	...	...	...	...
2021-05-27	-2.359420	66895929.0	10.556775	4.321097e+10
2021-05-28	-2.509769	63652398.0	10.482839	5.520019e+10
2021-05-29	-2.575076	46482352.0	10.452073	4.523101e+10
2021-05-30	-2.542913	38637338.0	10.482293	3.164608e+10
2021-05-31	-2.473243	42069239.0	10.527629	3.900985e+10

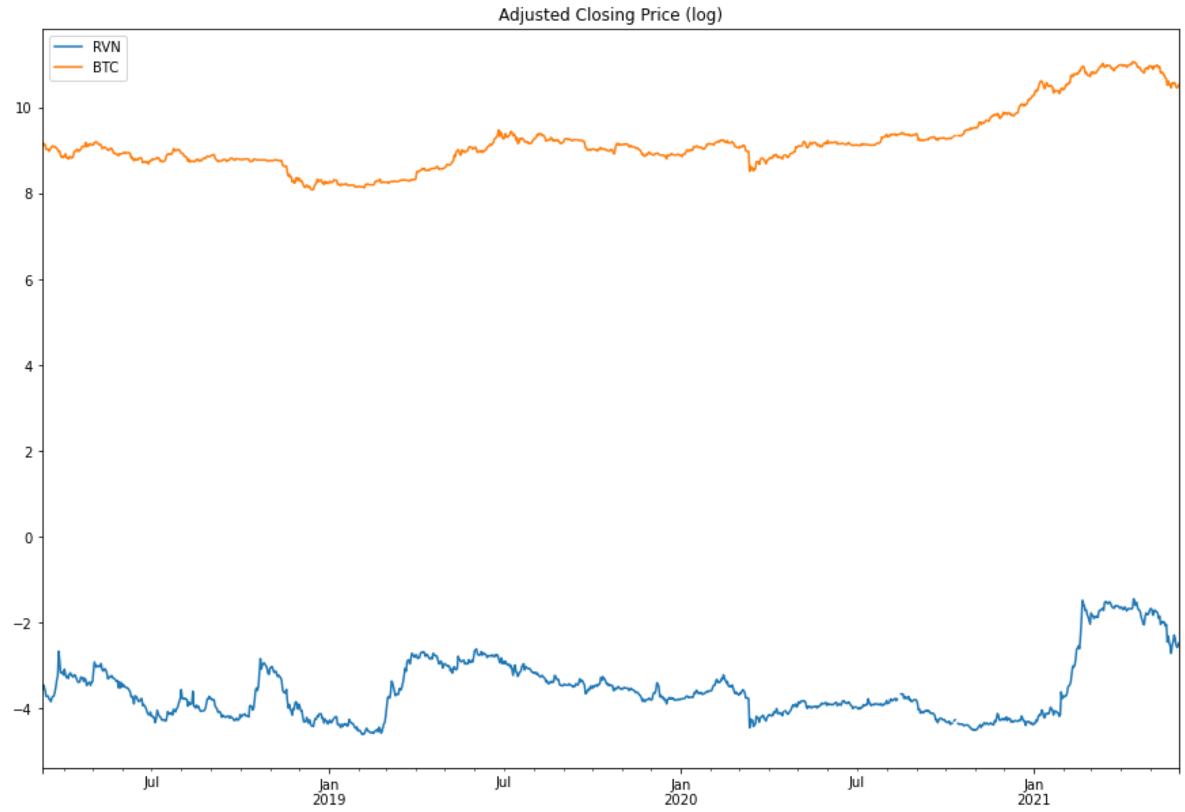
1179 rows × 4 columns

In [17]:

```
dfMerge['adj close_RVN'].plot(label='RVN', figsize=(15,10), title='Adjusted Closing Price (
dfMerge['adj close_BTC'].plot(label='BTC')
plt.legend()
```

Out[17]:

```
<matplotlib.legend.Legend at 0x17235e493d0>
```



Analyze:

In the period under analysis (10/03/2018 to 05/31/2021), the price of the BTC was in the order of thousands of dollars while the RVN was in cents.

In order to be able to present both cryptoactives in the same graph, it was necessary to apply a log to the prices.

From the graph we can see that there may be some correlation between the price of assets, we will test this hypothesis later.

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