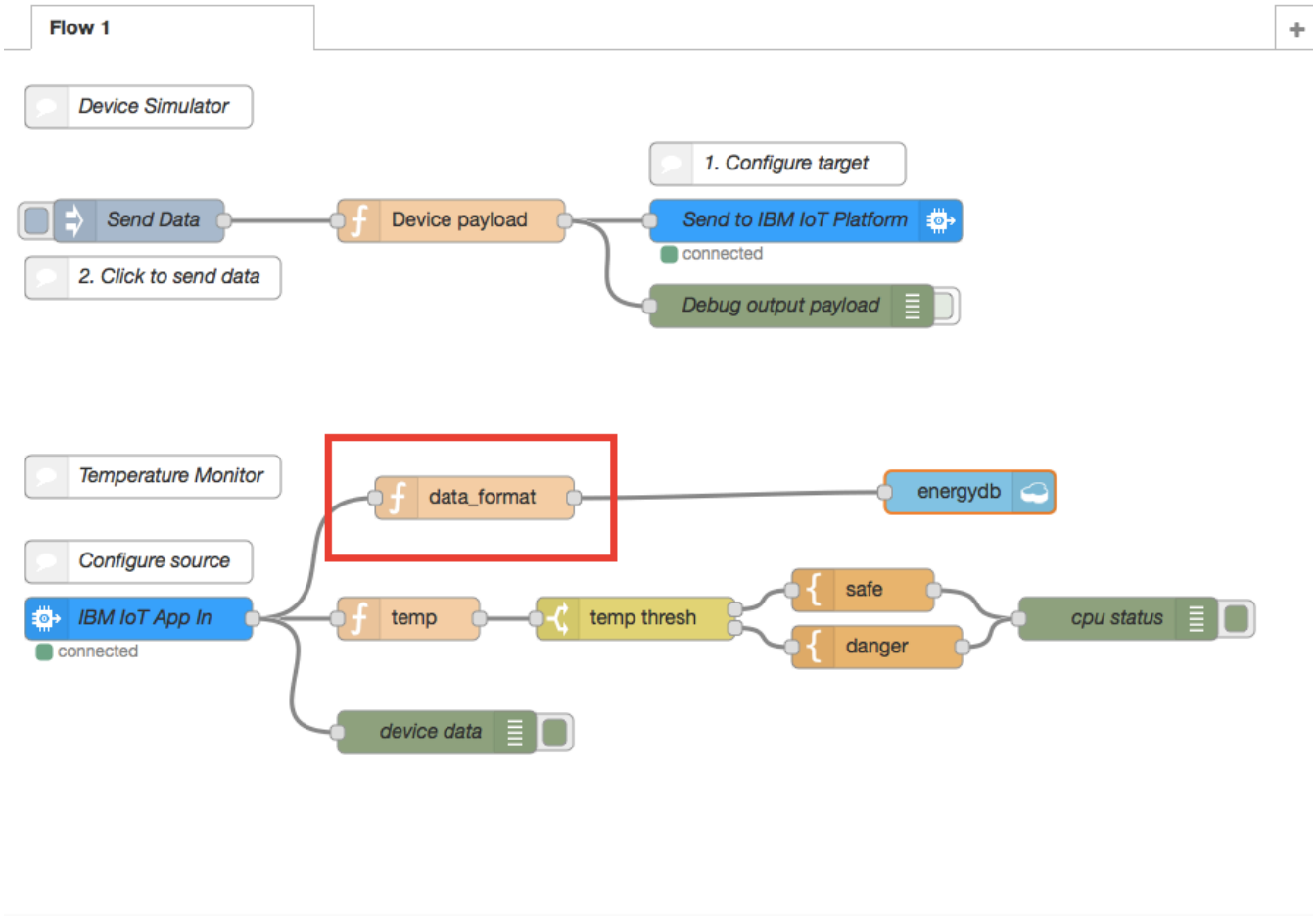
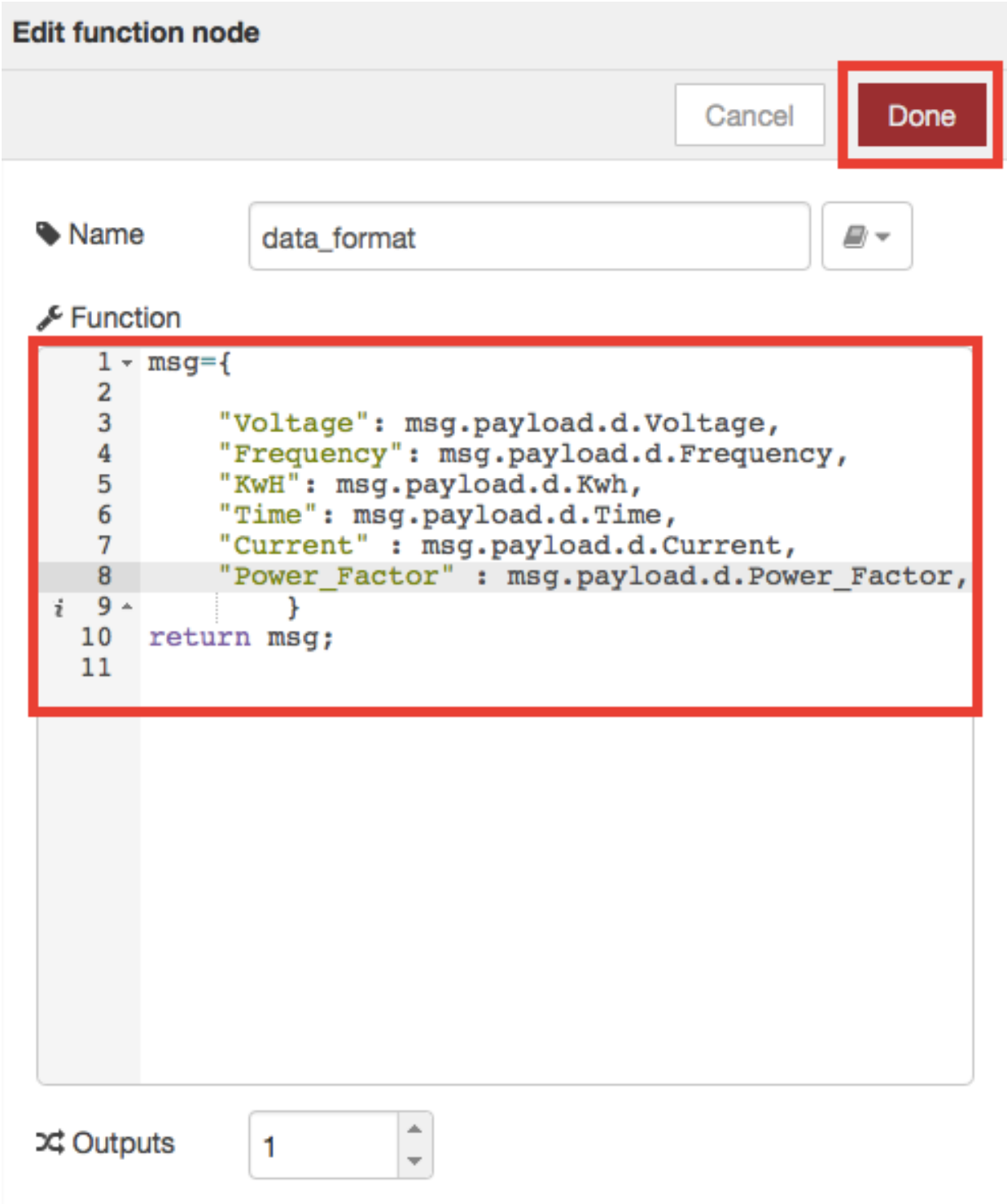
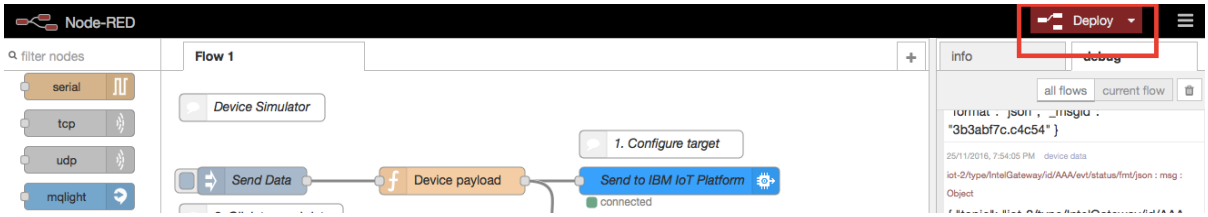
Data Visualization using Apache Spark Python Notebook



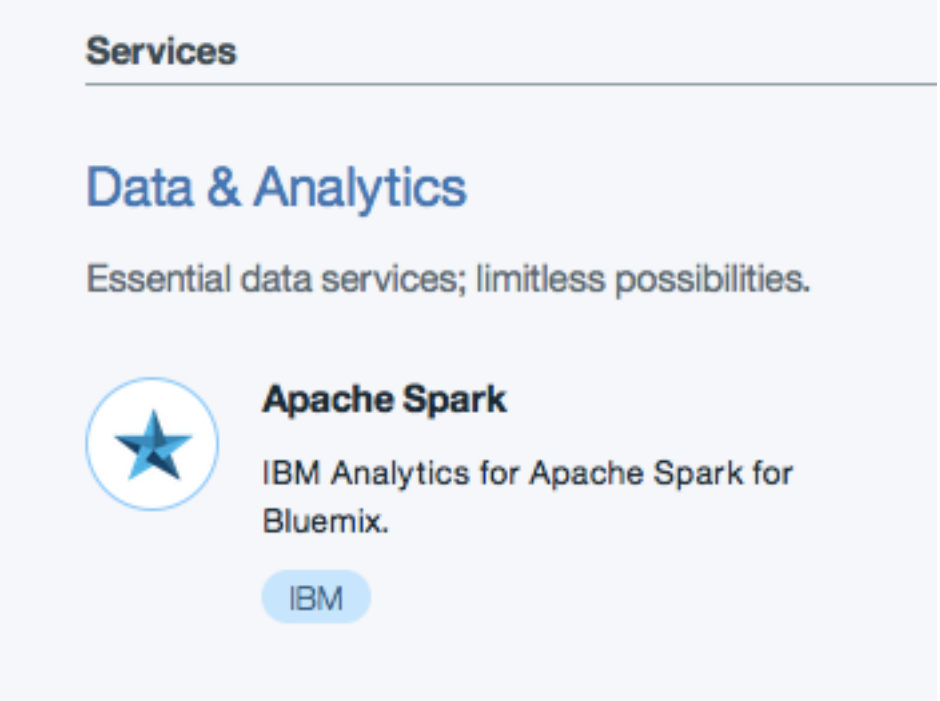
Step 1: Drag and drop function node from the left side in Node RED and wire it in between the IBM IoT Device and energydb as shown in the figure above.



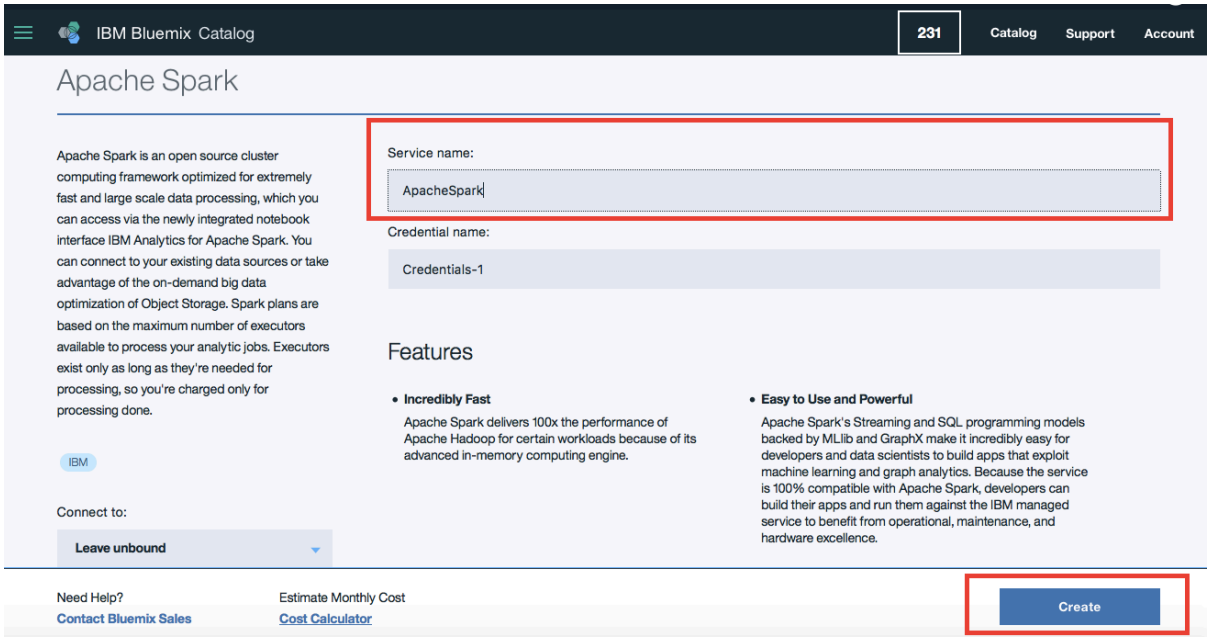
Step 2: Write the same line of code in the function node as shown in the above image and click on **DONE**



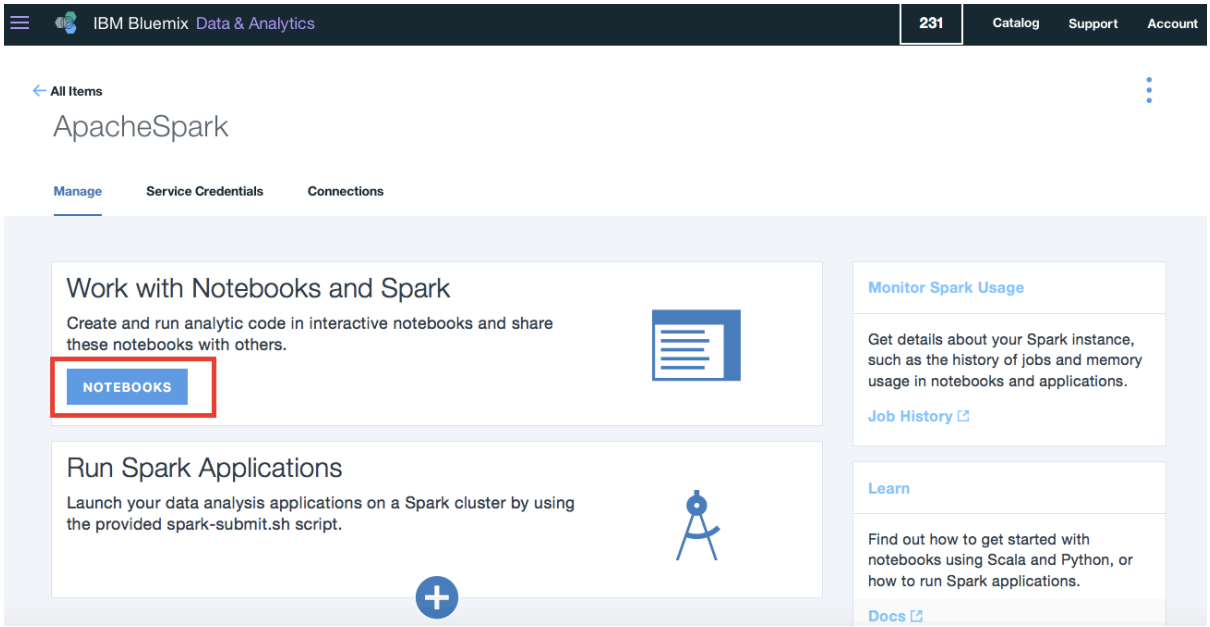
Step 3: Click on **DEPLOY** as shown in the figure above and then go to Bluemix Catalog.



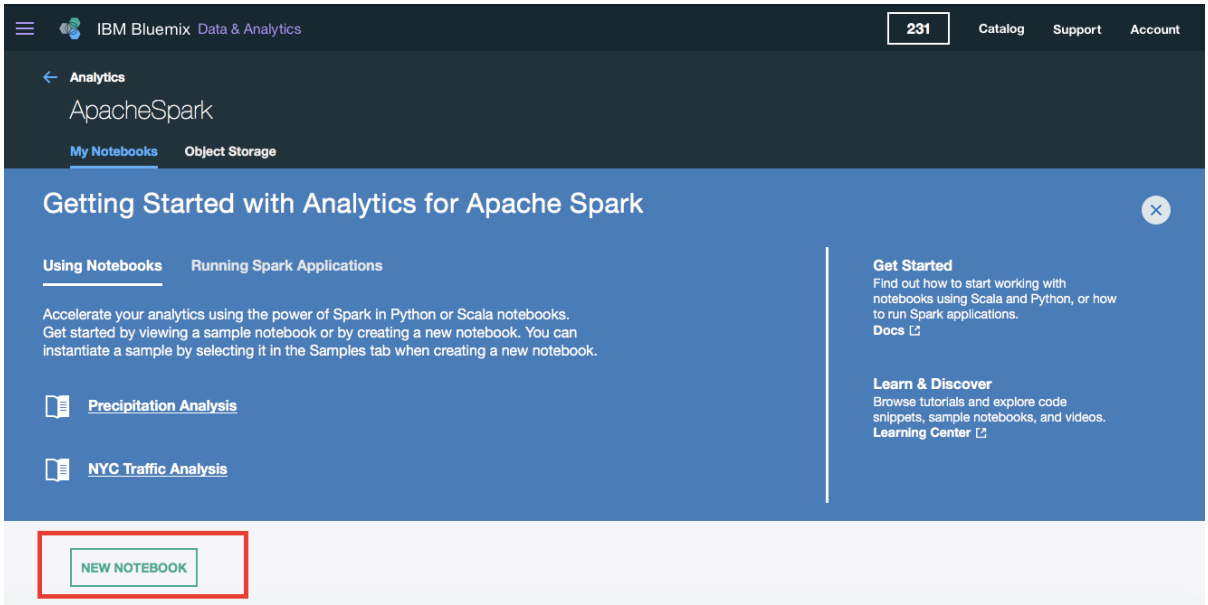
Step 4: From Catalog, in **Data & Analytics**, click on **Apache Spark**



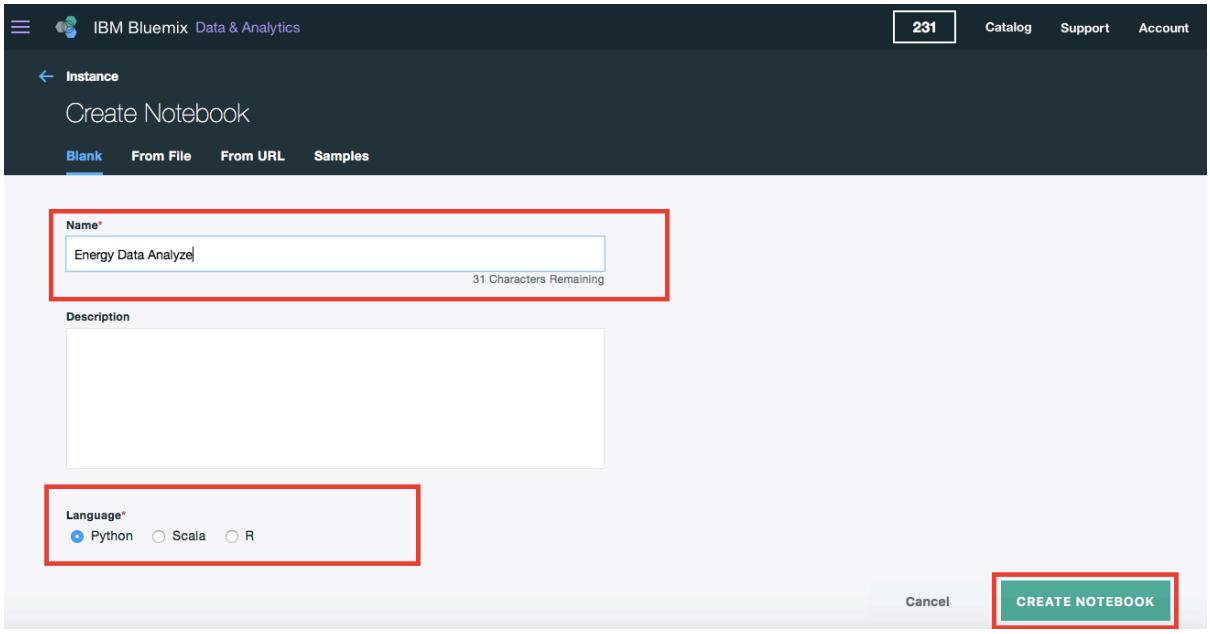
Step 5: Input the Service name and then click on **CREATE**



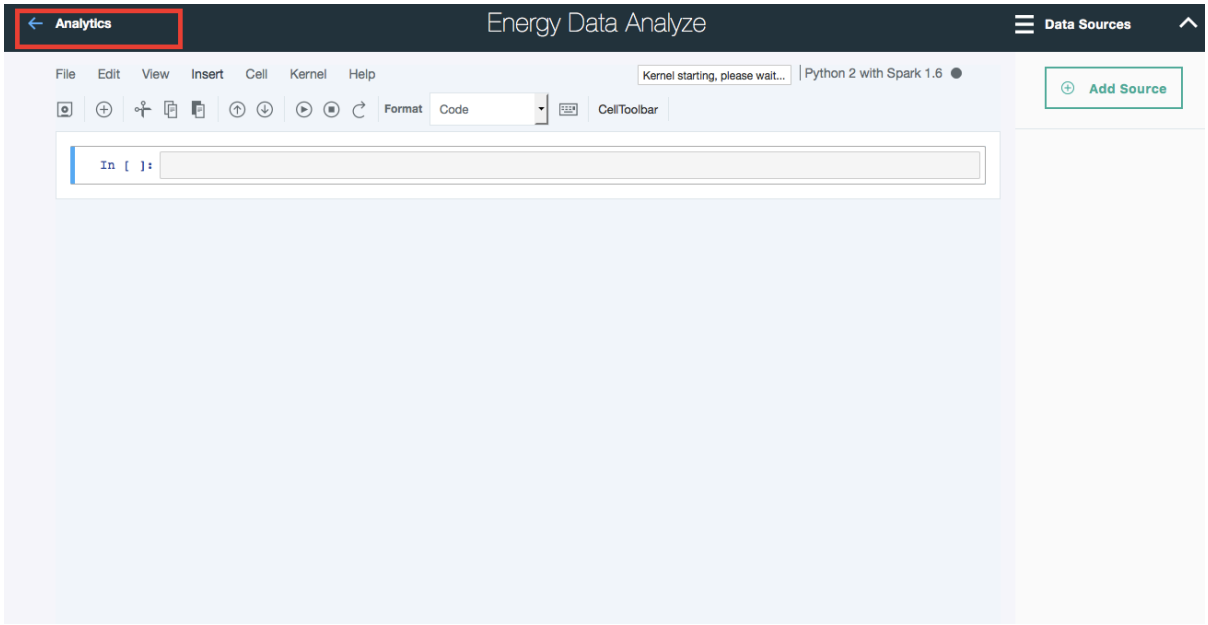
Step 6: Click on **NOTEBOOKS**



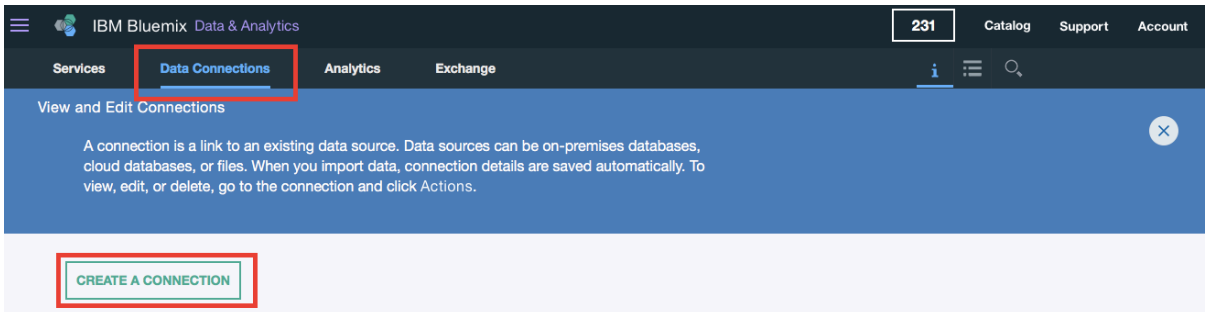
Step 7: In My Notebooks tab, Click on **NEW NOTEBOOK**



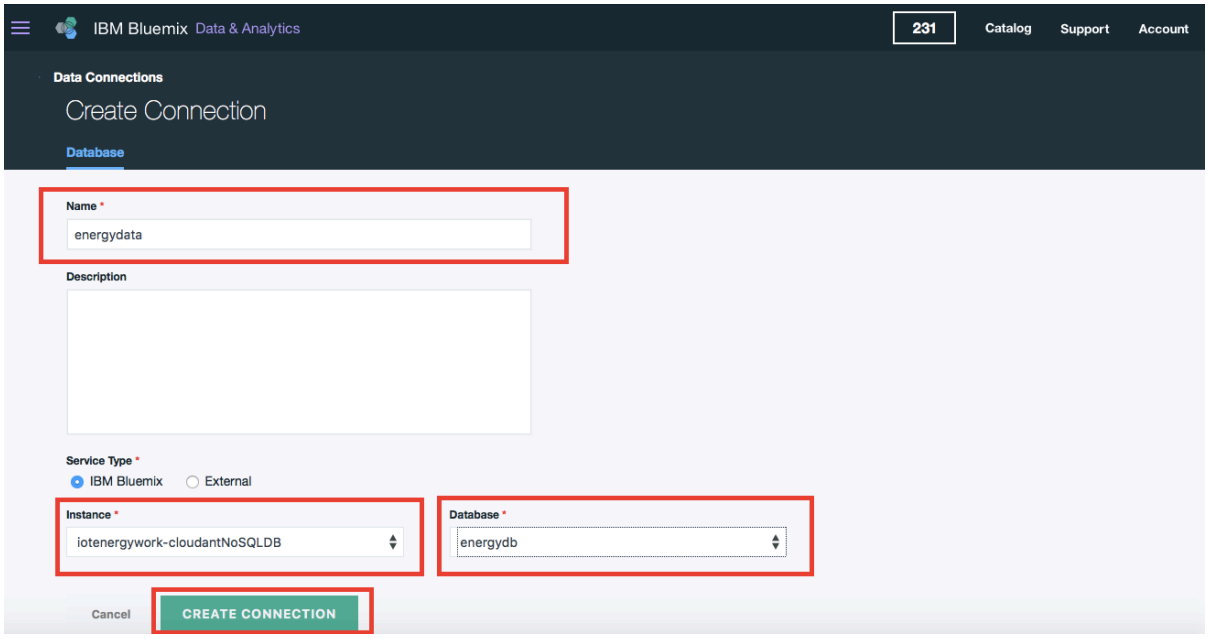
Step 8: Input the Name, Language as shown in the above image and then click on **CREATE NOTEBOOK**



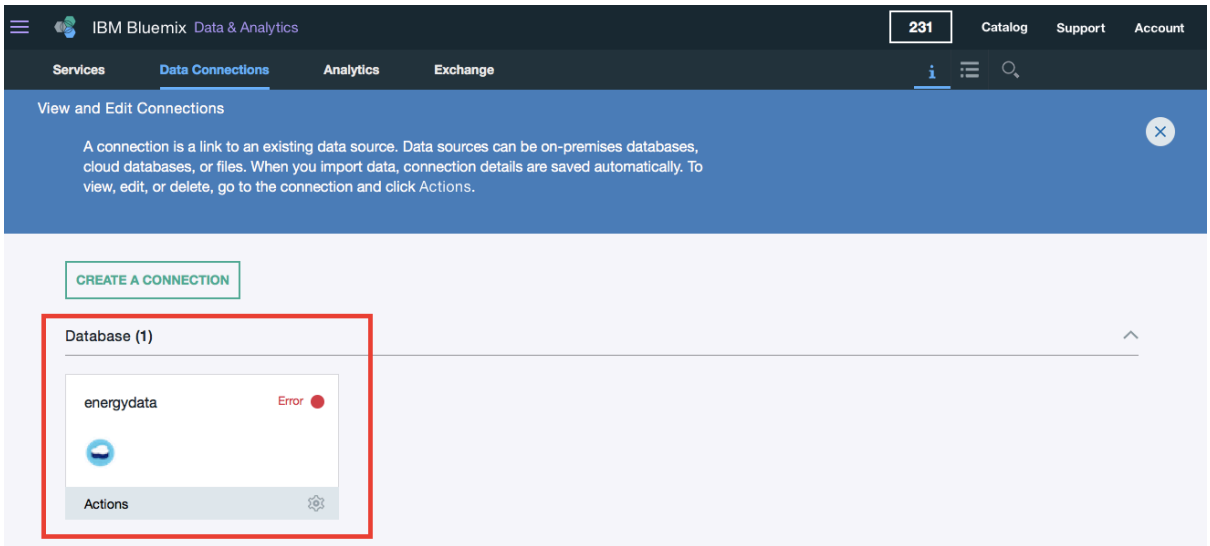
Step 9: Click on **ANALYTICS** as shown in the above image



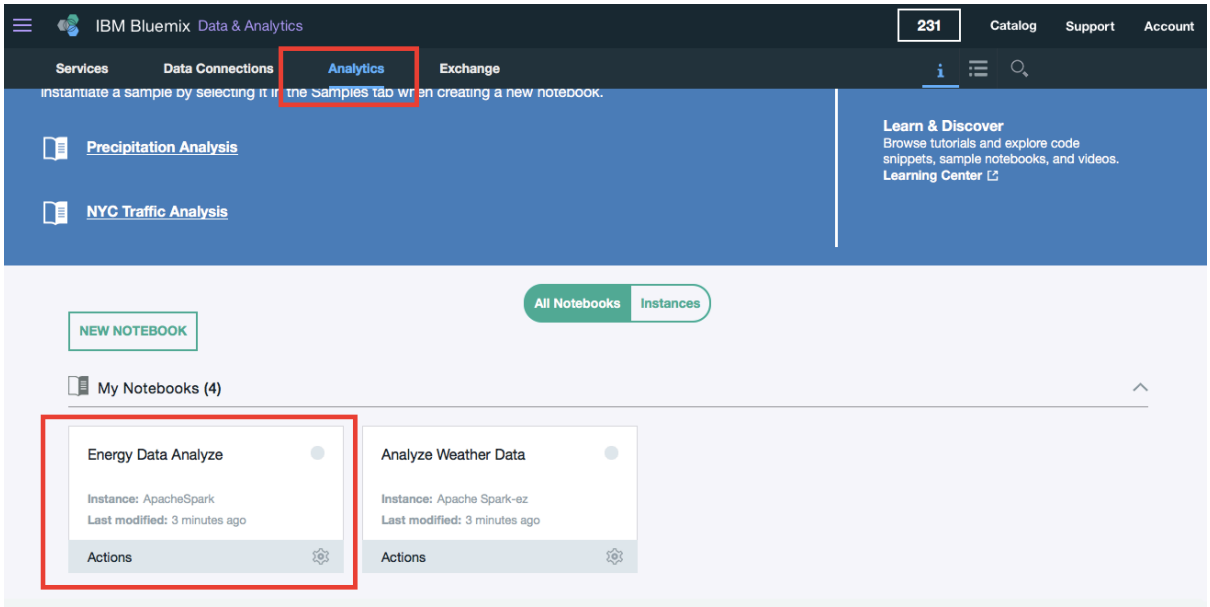
Step 10: Click on **DATA CONNECTIONS** and then click on **CREATE A CONNECTION** as shown in the above image



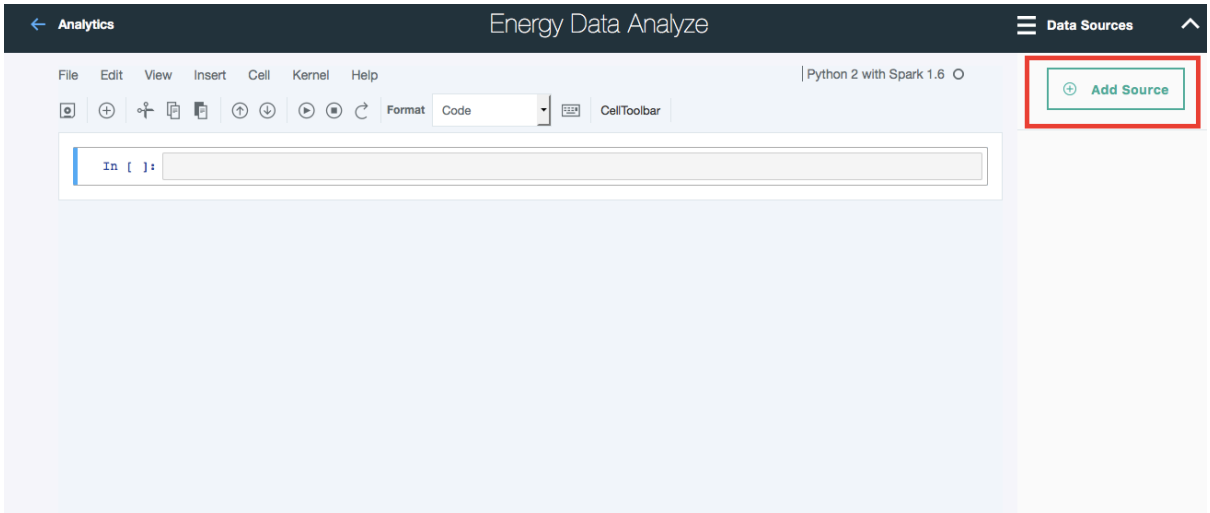
Step 11: Input Name and then Instance & Database name and Click on **CREATE CONNECTION** as shown in the image above



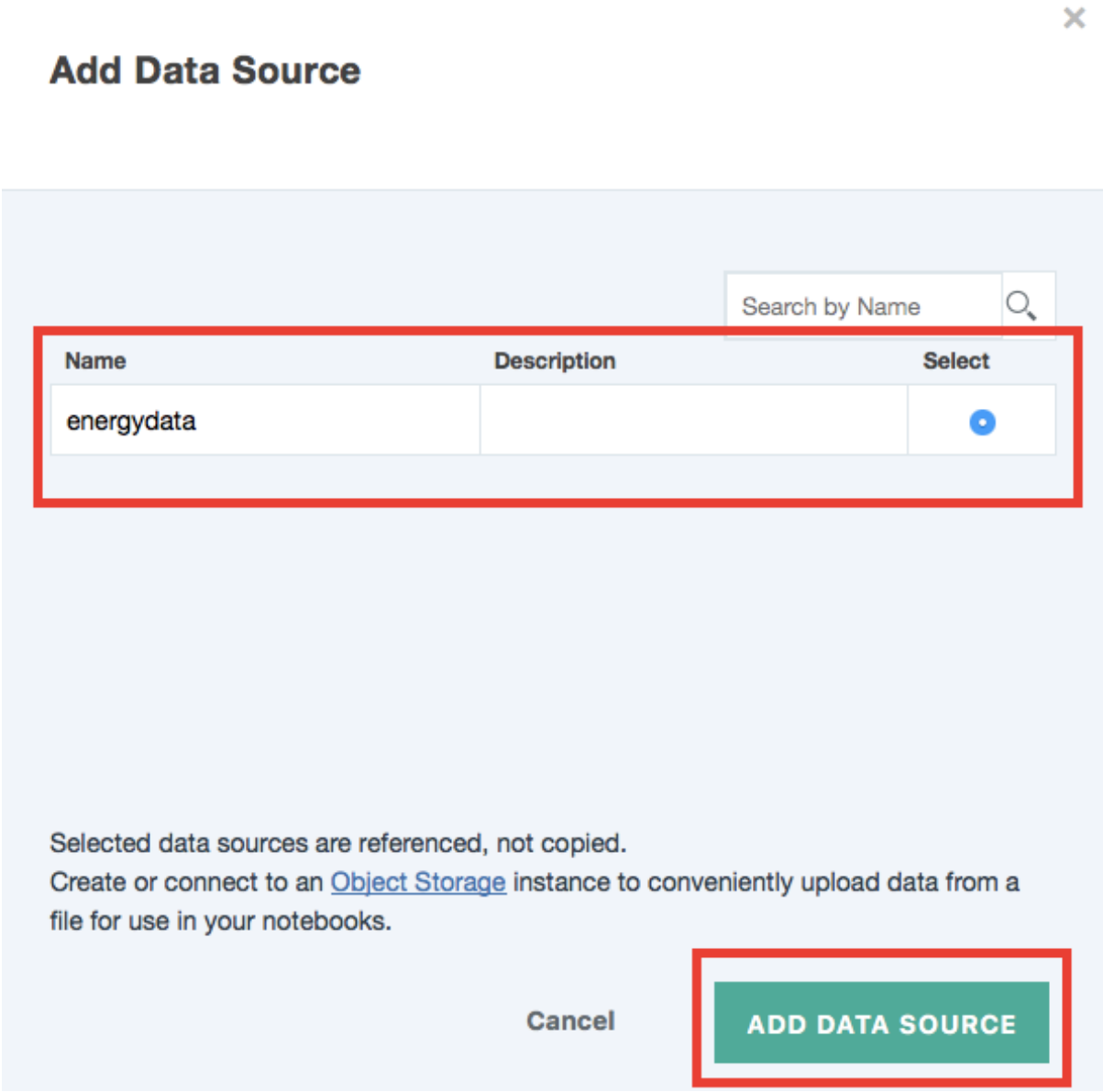
Step 12: Now you can see that your database has been added in the Data Connections Tab as shown in the image above



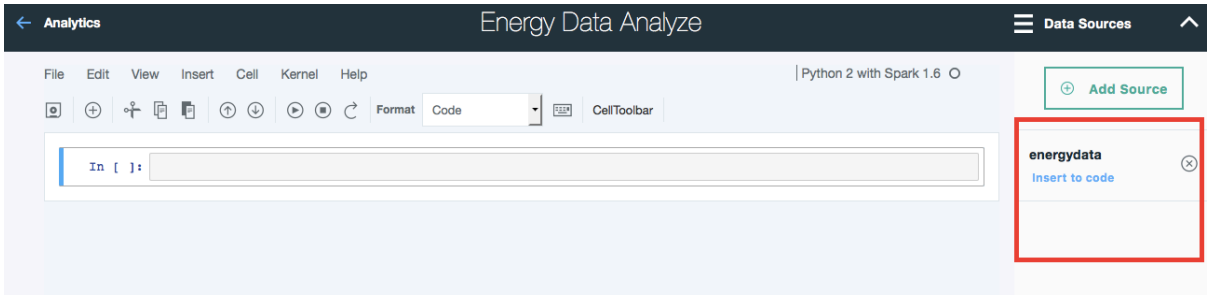
Step 13: Goto Analytics tab and click on the Energy Data Analysis as shown in the image above



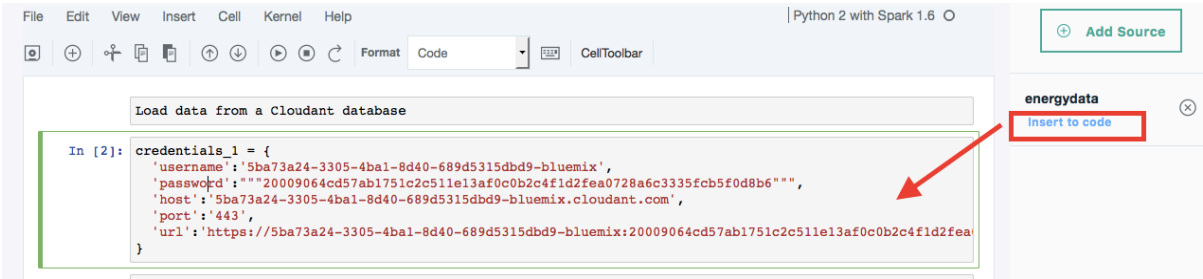
Step 14: Click on **ADD SOURCE** as shown in the image above.



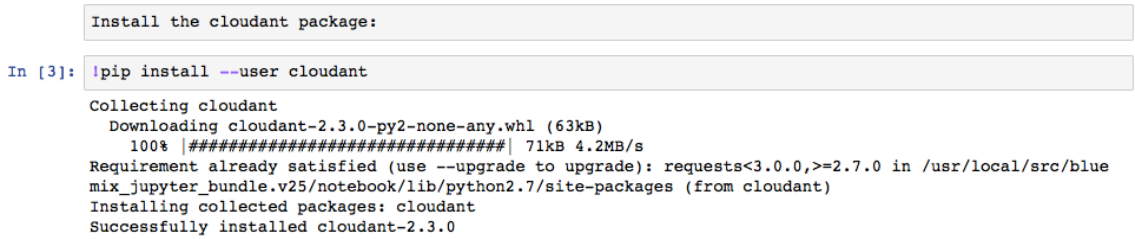
Step 15: Click on the energydata radio button and then click on ADD DATA SOURCE



Step 16: Now you will see your database on the right side as shown in the image above.



Step 17: Add a cell by clicking on the + button (from menubar) and then **Insert to code** as shown in the image above. Then click on  button.



Step 18: Add another cell by clicking on + button(from menubar) and then add **!pip install --user cloudant** Then click on  button and result should be as shown in the image above

```
Connecting to Cloudant with the credentials
```

```
In [4]: from cloudant.client import Cloudant
        from cloudant.result import Result
        import pandas as pd, json

        client = Cloudant(credentials_1['username'], credentials_1['password'], url=credentials_1['url'])
        client.connect()
```

Step 19: Add another cell by clicking on + button(from menubar) and then add **lines of code as shown in the image above and** Then click on  button.

```
List all existing databases:
```

```
In [5]: client.all_dbs()
Out[5]: [u'_replicator', u'_users', u'energydb', u'nodered']
```

Step 20: Add another cell by clicking on + button(from menubar) and then add **client.all_dbs()** Then click on  button. It will list out all the databases.

```
Listing documents in the Cloudant Database energydb
```

```
In [6]: db_name = 'energydb'
        my_database = client[db_name]
        result_collection = Result(my_database.all_docs, include_docs=True)
        data_df = pd.DataFrame([item['doc'] for item in result_collection])
        data_df.head()
```

Out[6]:

	Current	Frequency	KwH	Power_Factor	Time	Voltage	_id	_rev
0	10.003906	50	524288	0.9845	1480083098625	230.324768	063ffc18d986fb64557b64562317d1dc	1-9125fc98820
1	10.003906	50	8192	0.9845	1480083134768	231.074768	063ffc18d986fb64557b6456231fee7b	1-1c9d5581395
2	9.599854	50	128	0.9845	1480083143796	230.075012	063ffc18d986fb64557b64562321fee2	1-ef61ff62e745
3	10.003906	50	2048	0.9845	1480083167869	230.449768	063ffc18d986fb64557b64562326db35	1-ff4a87e1db72
4	10.003906	50	32768	0.9845	1480083207025	230.199768	063ffc18d986fb64557b6456232e1ddb	1-a2b227744b9

Step 21: Add another cell by clicking on + button (from menubar) and then add **lines of code as shown in the image above.** Then click on  button. You will get the output as shown in the image above.

```
Cleaning the data
```

```
In [7]: del data_df['_id']
        del data_df['_rev']
```

Step 22: Add another cell by clicking on + button (from menubar) and then add **lines of code as shown in the image above.** Then click on  button.

```
Placing Time in X axis
```

```
In [8]: data_df = data_df.set_index(data_df["Time"])
        data_df.drop(['Time'], axis=1, inplace=True)
        data_df.head()
```

Out[8]:

	Current	Frequency	KwH	Power_Factor	Voltage
Time					
1480083098625	10.003906	50	524288	0.9845	230.324768
1480083134768	10.003906	50	8192	0.9845	231.074768
1480083143796	9.599854	50	128	0.9845	230.075012
1480083167869	10.003906	50	2048	0.9845	230.449768
1480083207025	10.003906	50	32768	0.9845	230.199768

Step 23: Add another cell by clicking on + button (from menubar) and then add **lines of code as shown in the image above.** Then click on  button. You will get the output as shown in the image above

```
Including matplotlib
```

```
In [9]: %matplotlib inline
```

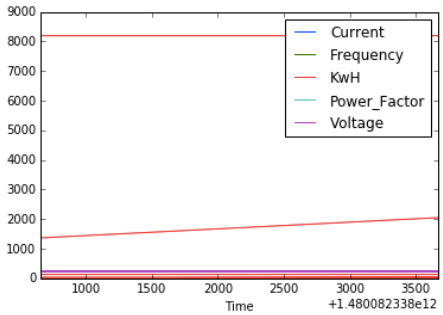
Step 24: Add another cell by clicking on + button(from menubar) and then add **lines of code as shown in the image above.** Then click on  button.

```
Converting String to Float datatype
```

```
In [10]: df=data_df.astype(float)
```

Step 25: Add another cell by clicking on + button(from menubar) and then add **lines of code as shown in the image above.** Then click on  button.

```
In [68]: df.plot()
Out[68]: <matplotlib.axes._subplots.AxesSubplot at 0x7f886534d290>
```



Step 26: Add another cell by clicking on + button(from menubar) and then add **lines of code as shown in the image above.** Then click on  button. You should see the graph plotted and data visualized.