巨量資料實戰課程(III) – 建立即時分析儀表板

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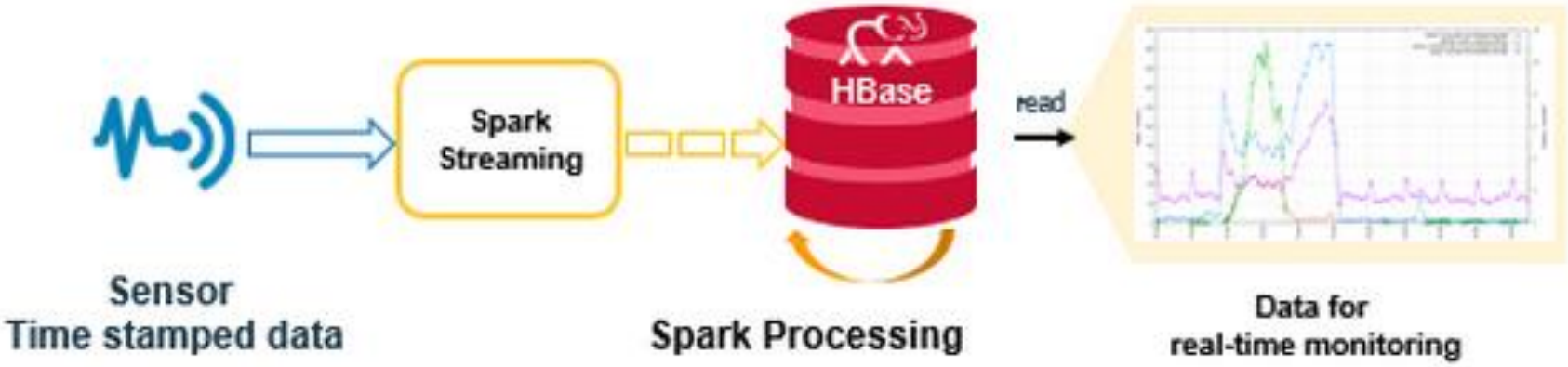
系統架構

如何建立一個即時監控儀表板



建構目標

- 啟動一個Kafka Producer 不斷遞送串流資料
- 啟用一個Spark Streaming 工作，(Consume)消化Producer 遞送過來的Streaming Log，並且將資料存進HBase
- 聚合(Aggregate) Hbase 的資料，並將結果呈現到儀表板上

建立資料API

Flask

- 什麼是Flask?

a microframework for Python based on Werkzeug, Jinja 2 and good intentions

- 安裝Flask

pip install flask

第一個Flask APP

```
from flask import Flask
app = Flask(__name__)

@app.route("/")
def hello():
    return "Hello World!"

if __name__ == "__main__":
    app.run()
```

hello.py

打入 python hello.py 執行

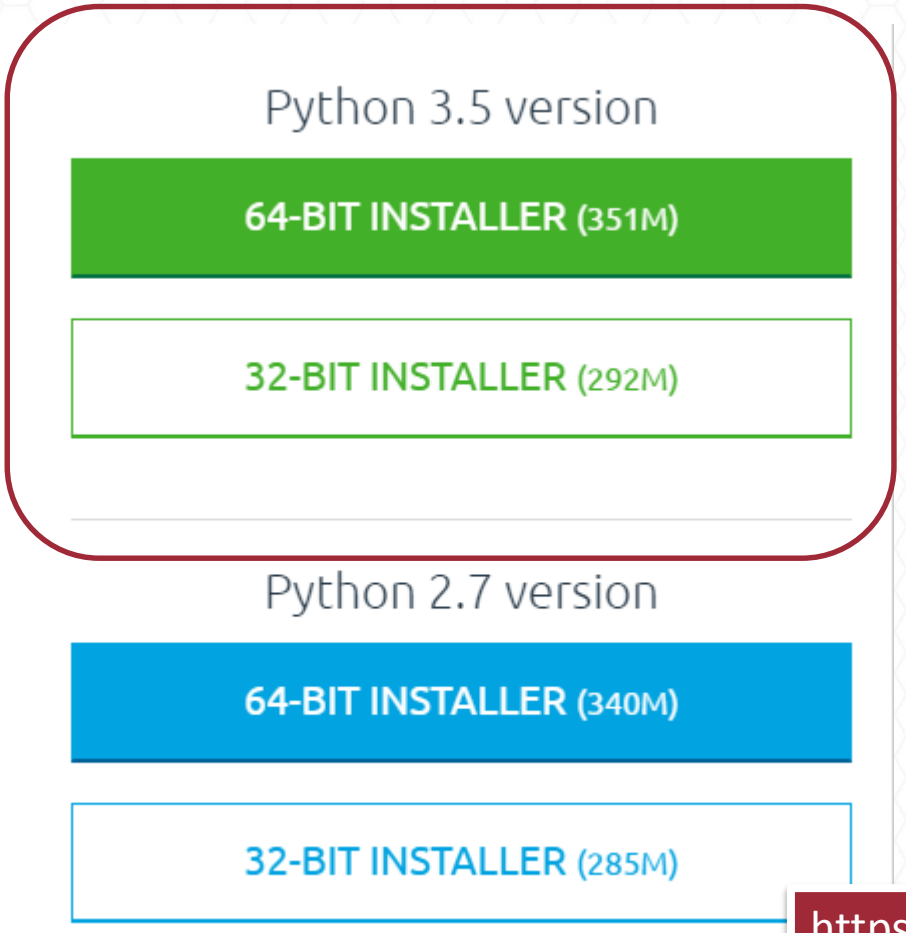
預設會在 http://127.0.0.1:5000/ 看到 Hello World

回傳JSON 資料

```
@app.route("/")
def api():
    dt = datetime.datetime.now().strftime('%Y-%m-%d %H:%M:%S.%f')
    data = random.randint(50,900)
    return jsonify({'dt':dt, 'data':data})
```

Plotly

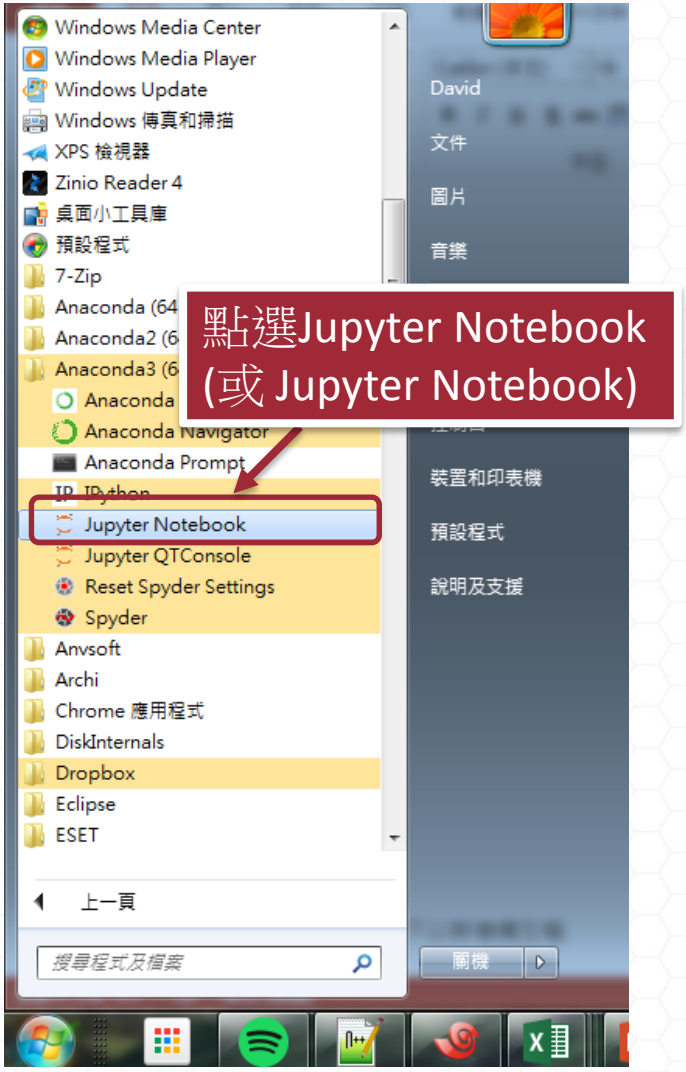
安裝Anaconda

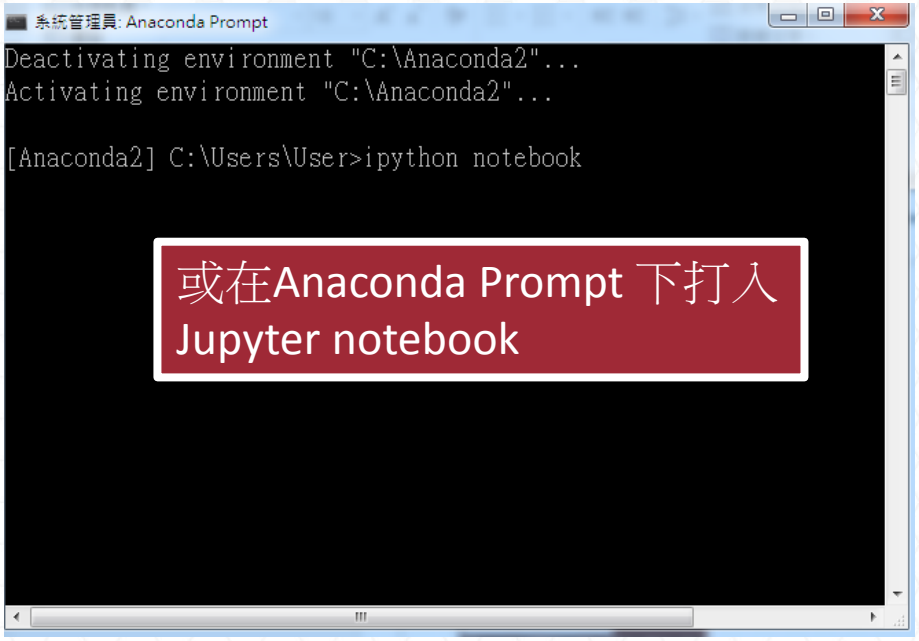


選擇Python 3.5 版

https://www.continuum.io/downloads

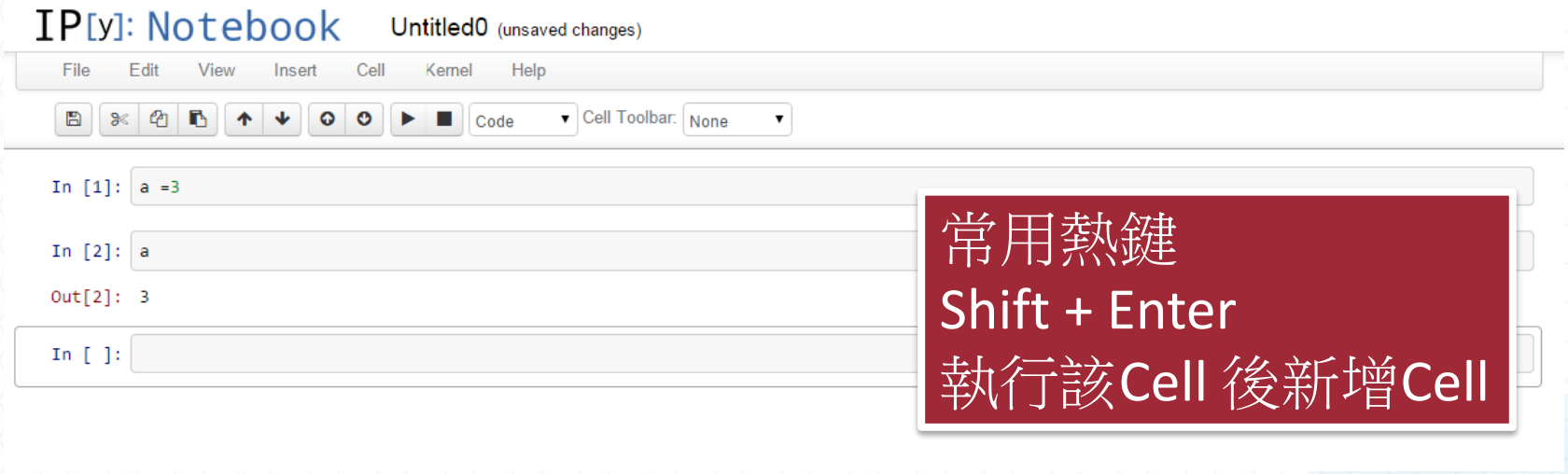
使用 Jupyter Notebook





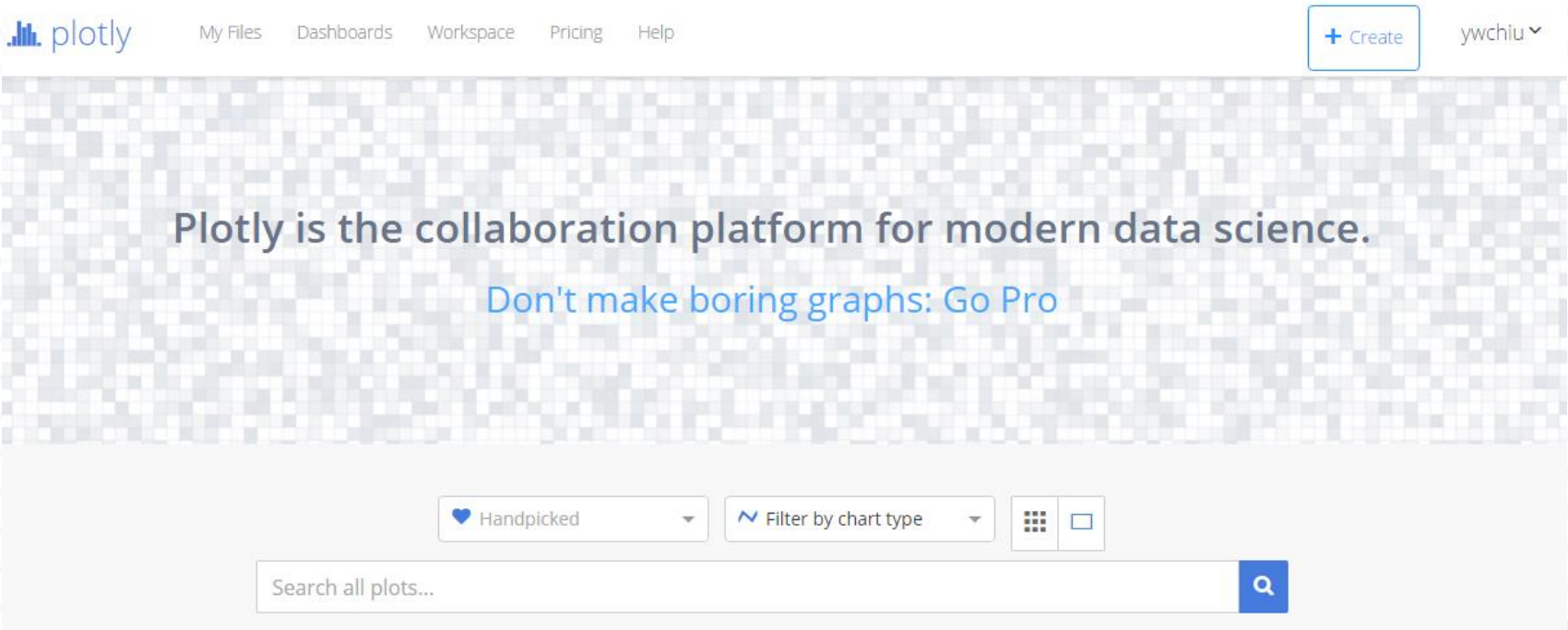
啟用 Jupyter Notebook

- 在命令列下打:
  - Jupyter notebook
  - 自動開啟瀏覽器後便可瀏覽 (預設為localhost:8888)
- 可匯出.ipynb, .py 各種不同格式檔案
- 瀏覽快捷鍵 Help -> Keyboard Shortcuts



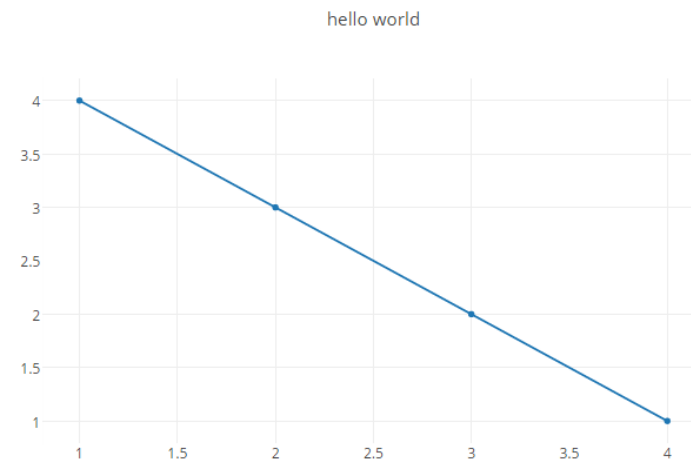
Plotly

- pip install plotly



使用Plotly 畫圖

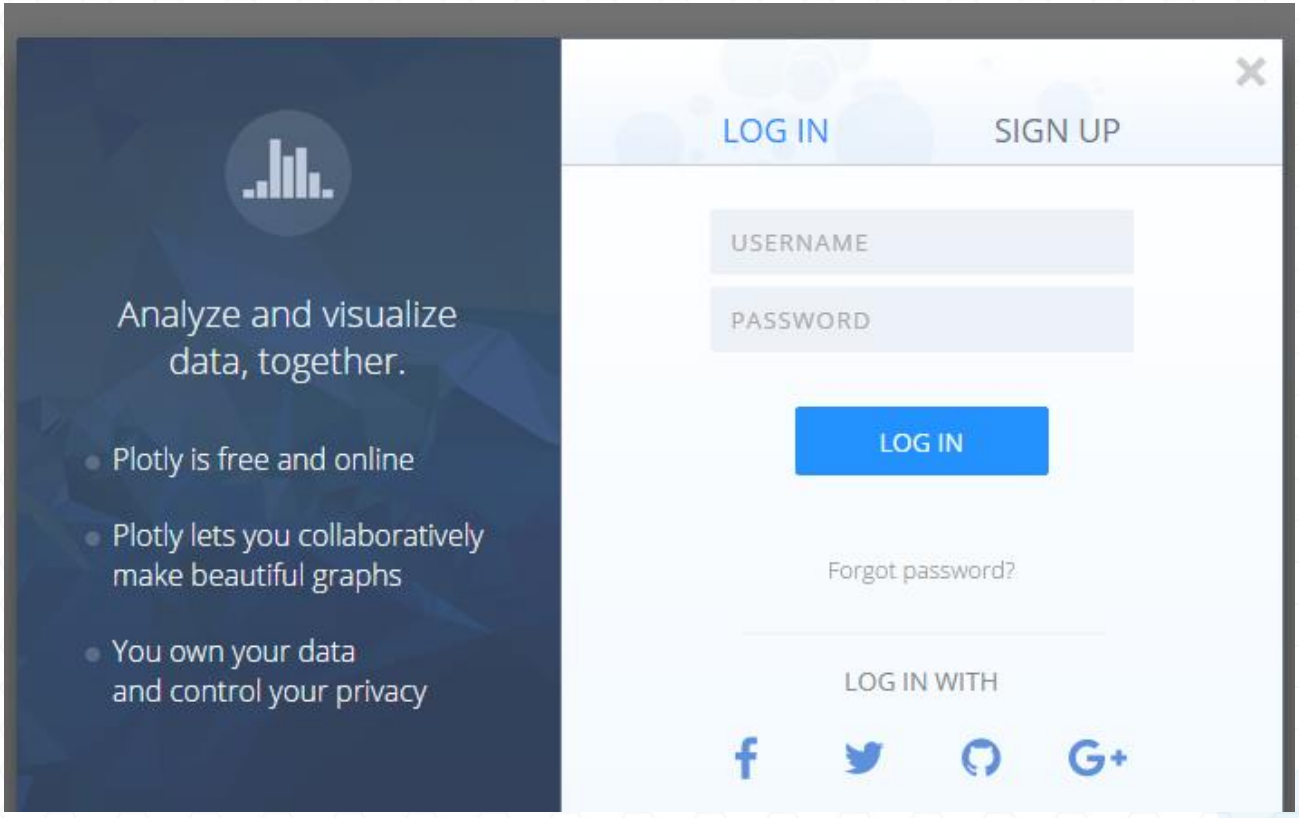
```
import plotly
from plotly.graph_objs import Scatter, Layout

plotly.offline.init_notebook_mode()

plotly.offline.iplot({
    "data": [Scatter(x=[1, 2, 3, 4], y=[4, 3, 2, 1])],
    "layout": Layout(title="hello world")
})
```



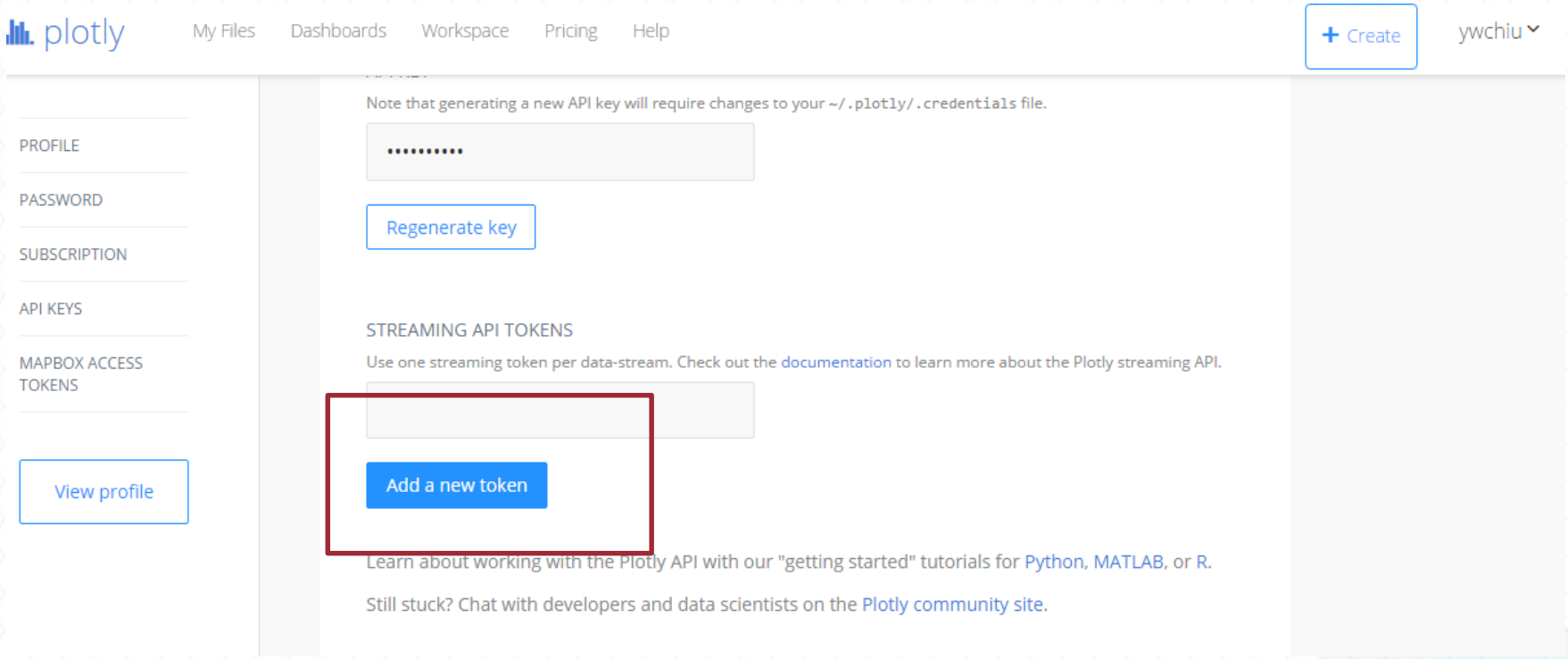
可以Offline 或 Online 繪製圖表

申請API

- https://plot.ly/accounts/login/



取得Streaming API Token



使用Plotly 繪製 Streaming 圖表

```
import numpy as np
import plotly.plotly as py
import plotly.tools as tls
import plotly.graph_objs as go

plotly.tools.set_credentials_file(username='ywchiu', api_key='<API>')


stream_1 = go.Stream(
    token='<Stream Token>',  # link stream id to 'token' key
    maxpoints=80      # keep a max of 80 pts on screen
)
```

設定圖表 Layout

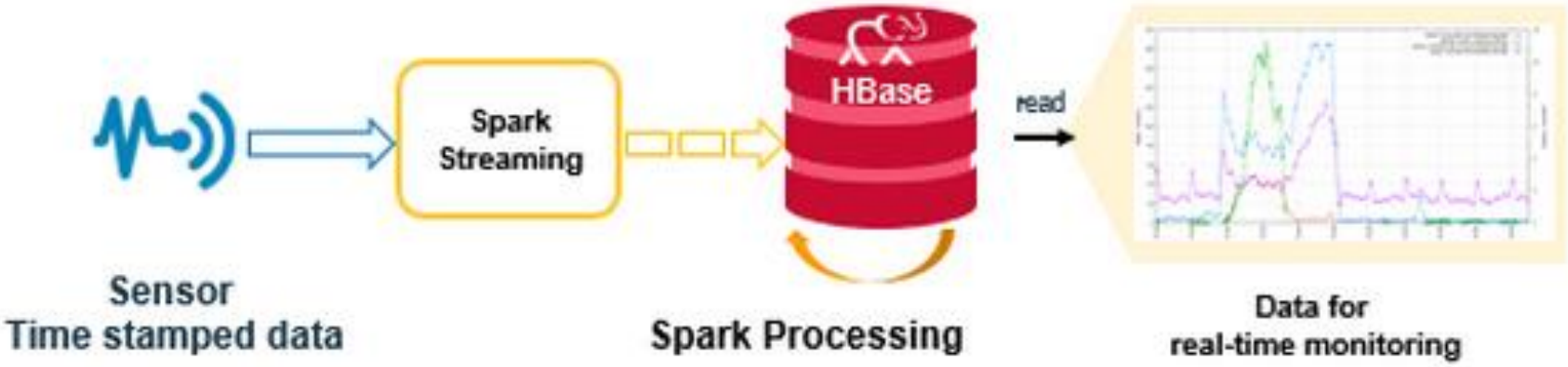
```
trace1 = go.Scatter(
    x=[],
    y=[],
    mode='lines+markers',
    stream=stream_1         # (!) embed stream id, 1 per trace
)
data = go.Data([trace1])
# Add title to layout object
layout = go.Layout(title='Time Series')
# Make a figure object
fig = go.Figure(data=data, layout=layout)
# Send fig to Plotly, initialize streaming plot, open new tab
py.iplot(fig, filename='python-streaming')
s = py.Stream('w6zijhj2sa')
s.open()
```

繪製圖表

```
import datetime
import time
i = 0    # a counter
k = 5    # some shape parameter
# Delay start of stream by 5 sec (time to switch tabs)
time.sleep(5)
import requests
while True:
    x = datetime.datetime.now().strftime('%Y-%m-%d %H:%M:%S.%f')
    y = (np.cos(k*i/50.)*np.cos(i/50.)+np.random.randn(1))[0]
    # Send data to your plot
    s.write(dict(x=x, y=y))
    time.sleep(1)  # plot a point every second
# Close the stream when done plotting
s.close()
```

建立即時分析儀表板

如何建立一個即時監控儀表板



模擬感測器資料

```
with open('/tmp/machine.log', 'wa') as f:
    while True:
        recnum = random.randint(3,100)
        time.sleep(1)
        for i in range(1, recnum+1):
            machine_id  = random.choice('12345')
            log_message = random.choice(['normal', 'warning', 'info', 'error'])
            log_value   = random.randint(1,99)
            f.write('%s,%s,%s\n'%(machine_id, log_message, log_value))
        f.flush()
```

打入 python logGenerator.py
啟動 Log 產生程序

搜集Log資料

- 觀看Log 資料
  - tail -f /tmp/machine.log
- 搜集最新Log
  - tail -f /tmp/machine.log | nc -lk localhost 9999

資料會被導入9999 Port上的服務

建立 mytable

```
import happybase
connection = happybase.Connection('localhost', autoconnect=False)

connection.open()
connection.create_table(
    'mytable',
    { 'cf1': dict(),
    }
)

connection.close()
```

執行Spark 工作

- 啟用Thrift 在 9090 上
  - /usr/hdp/current/hbase-master/bin/hbase-daemon.sh start thrift -p 9090
- 啟用Spark 工作
  - spark-submit errorMiner.py localhost 9999 1>1.log 2>1.err

啟用Spark, Streaming 以及SQL Context

```
# Start Spark Context and SQL Context
sc = SparkContext(appName="qoo")
sc.setLogLevel("ERROR")
sqlContext = SQLContext(sc)
ssc            = StreamingContext(sc, 1)
```

讀取以及處理資料

```
# Read Data from Text Stream
lines  = ssc.socketTextStream(sys.argv[1], int(sys.argv[2]))

# Process Data
fields = ("machine_id", "log_message", "log_value")
mlog   = namedtuple( 'mlog', fields )
counts = lines.map(lambda line:line.split(','))\
            .filter(lambda ele: 'error' in ele[1])\
            .map( lambda rec: mlog( rec[0], rec[1], int(rec[2])))
```

定義Schema

聚合資料

```
def aggregateRecord(rdd):
    print rdd.count()
    if rdd.count() > 0:
        dic = {}
        # Data Aggregate
        df = rdd.toDF()
        df.registerTempTable("mlog")
        agg = sqlContext.sql("SELECT machine_id, avg(log_value) FROM mlog group by machine_id")
        for k, v in agg.collect():
            dic[k] = v
```

使用Spark SQL

寫入資料進HBase

```
connection.open()
  table = connection.table('mytable')
  current_date = datetime.now()
  dt = current_date.timetuple()
  ts = time.mktime(dt)
```

資料Aggregation

```
    # put data into hbase
    table.put(str(int(ts)), {'cf1:m1' : str(dic.get('1', 0))})
    table.put(str(int(ts)), {'cf1:m2' : str(dic.get('2', 0))})
    table.put(str(int(ts)), {'cf1:m3' : str(dic.get('3', 0))})
    table.put(str(int(ts)), {'cf1:m4' : str(dic.get('4', 0))})
    table.put(str(int(ts)), {'cf1:m5' : str(dic.get('5', 0))})
  connection.close()
```

檢查Hbase 中的資料

- 進入HBase Shell
  - hbase shell
- 查詢資料
  - scan ‘mytable’

使用Flask建立API

```
def api():
    connection = happybase.Connection('localhost', autoconnect=False)
    connection.open()
    table = connection.table('mytable')

    current_date = datetime.now()
    dt = current_date.timetuple()
    ts = int(time.mktime(dt)) - 30000

    res = []
    for key, data in table.scan(row_start=str(ts)):
        res.append({'time':key, 'data':data})

    connection.close()

    return jsonify(res[-1])
```

http://192.168.233.133:5000/

使用API 建立Dashboard

```
import requests
while True:
    res = requests.get('http://192.168.233.133:5000/')
    d = res.json()
    x = d['dt']
    y = d['data']
    # Send data to your plot
    s.write(dict(x=x, y=y))

    time.sleep(1)  # plot a point every second
```

THANK YOU