系統CPU & Memory監控
Flask & Docker 實作

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GitHub

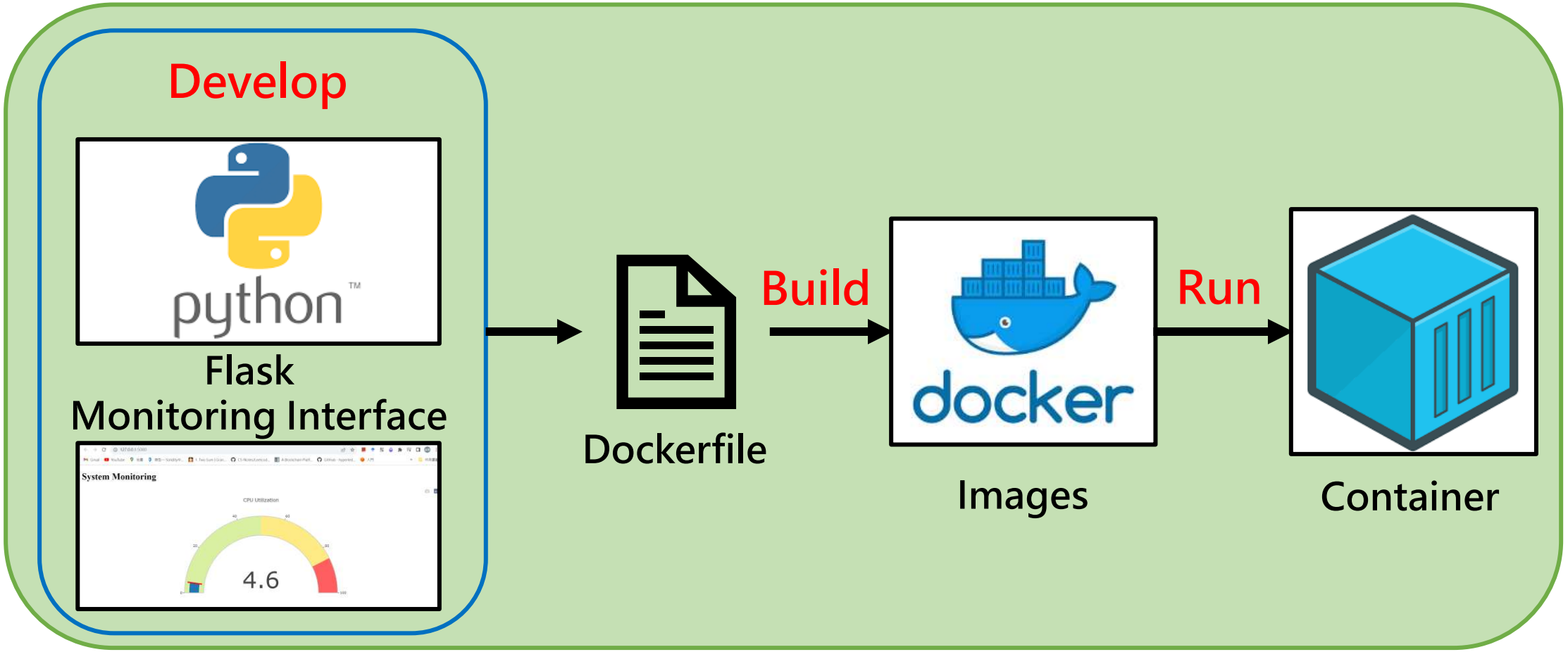
目錄

1. 簡介說明

實作說明

- 使用Python Flask框架開發系統CPU & Memory監控應用程式
- 設定port 5000 於 Local端運作並執行Python應用程式
- 使用Docker將應用程式容器化
- 撰寫Dockerfile
- 使用Dockerfile建立容器
- 使用Docker image執行Docker容器

Flow


Develop
python
Flask
Monitoring Interface
System Monitoring
CPU Utilization
4.6
Dockerfile
Build
docker
Images
Run
Container

前置準備

- 套件安裝 **pip install –r requirement.txt**
  - Flask==2.2.3
  - MarkupSafe==2.1.2
  - Werkzeug==2.2.3
  - itsdangerous==2.1.2
  - psutil==5.8.0
  - plotly==5.5.0

2.使用Python-Flask 框架撰寫 系統 CPU & Memory 監控程式

建立app.py並撰寫 cpu & memory監控

檔案總管

已開啟的編輯器

app.py

DEVOPSSCRATCHDEV2

- templates
- app.py
- Dockerfile
- requirements.txt

app.py > ...

```python
import psutil
from flask import Flask, render_template

app = Flask(__name__)

@app.route("/")
def index():
    cpu_metric = psutil.cpu_percent()
    mem_metric = psutil.virtual_memory().percent
    Message = None
    if cpu_metric > 80 or mem_metric > 80:
        Message = "High CPU or Memory Detected, scale up!!!"
    return render_template("index.html", cpu_metric=cpu_metric, mem_metric=mem_metric, mes

if __name__=='__main__':
    app.run(debug=True, host = '0.0.0.0')
```

使用 plotly套件 撰寫介面呈現畫面

檔案總管

已開啟的編輯器

index.html te... 9+

DEVOPSSCRATCHDEV2

templates

index.html 9+

app.py

Dockerfile

requirements.txt

index.html 9+

templates > index.html > ...

```html
<!DOCTYPE html>
<html>
<head>
    <title>System Monitoring</title>
    <script src="https://cdn.plot.ly/plotly-latest.min.js"></script>
    <style>
        .plotly-graph-div {
            margin: auto;
            width: 50%;
            background-color: rgba(151, 128, 128, 0.688);
            padding: 20px;
        }
    </style>
</head>
<body>
    <div class="container">
        <h1>System Monitoring</h1>
```

Local端應用程式測試

```
PS C:\Users\jerry\Desktop\mastercourse\dataEngineer\DevOpsScratch\DevOpsScratchDEV2> python app.py
 * Serving Flask app 'app' (lazy loading)
 * Environment: production
   WARNING: This is a development server. Do not use it in a production deployment.
   Use a production WSGI server instead.
 * Debug mode: on
 * Running on all addresses (0.0.0.0)
   WARNING: This is a development server. Do not use it in a production deployment.
```

點選此連結

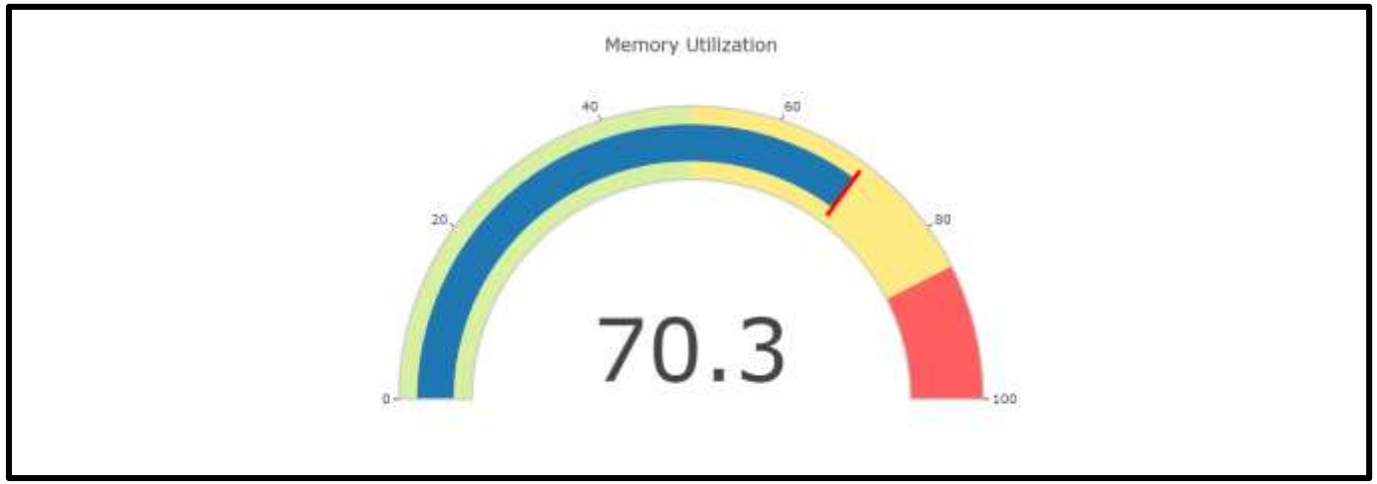
```
 * Debug mode: on
 * Running on all addresses (0.0.0.0)
   WARNING: This is a development server. Do not use it in a production deployment.
 * Running on http://127.0.0.1:5000
 * Running on http://192.168.91.86:5000 (Press CTRL+C to quit)
 * Restarting with watchdog (windowsapi)
 * Debugger is active!
 * Debugger PIN: 485-589-407
```

成功畫面

CPU

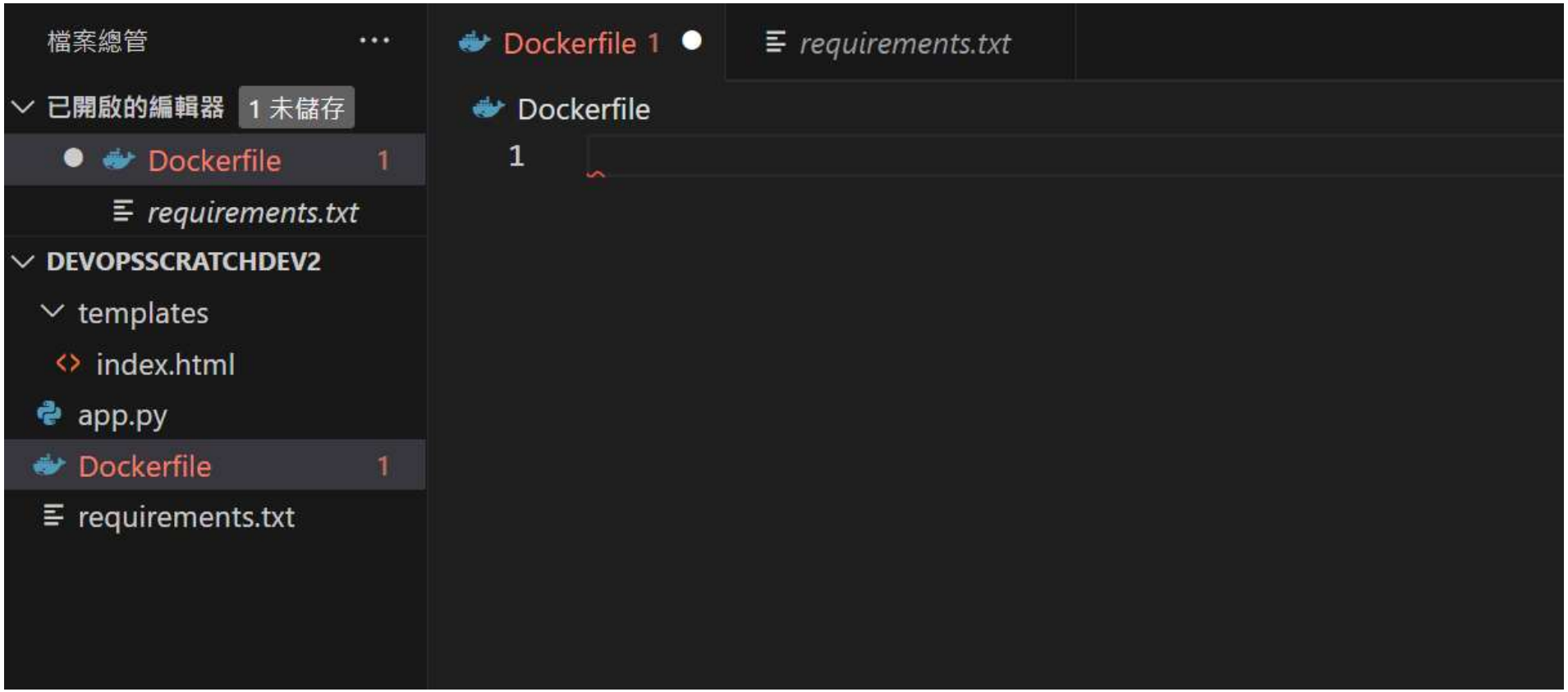
可看到自己電腦當前的CPU及Memory使用量

Memory



3. 撰寫Dockerfile

建立名為 Dockerfile 的檔案



撰寫Dockerfile

Dockerfile > ...

```
# 使用Docker官方的 python 基礎版 images
FROM python:3.9-buster

# 在容器中設定工作目錄
WORKDIR /app

# 複製requirement.txt
COPY requirements.txt .

# 安裝requirement.txt中的套件
RUN pip3 install --no-cache-dir -r requirements.txt

COPY . .

# 設定HOST為 0.0.0.0
ENV FLASK_RUN_HOST=0.0.0.0

# 設定port為5000
EXPOSE 5000

# 執行 flask run 命令
CMD ["flask", "run"]
```

FROM:
指定base image
WORKDIR:
指定docker執行起來時候的預設目錄位置
COPY:
從原本的開發資料夾將檔案複製到image中
RUN:
Dockerfile建立image內部再跑的指令
ENV:
設定環境
EXPOSE:
指定所有發布的port
CMD:
指定Instance啟動後所要執行的指令

4. 部署系統 CPU & Memory 監控程式至Docker image

將應用程式部署到Docker建立image

指令: Docker build -t <imageName>

```
PS C:\Users\jerry\Desktop\mastercourse\dataEngineer\DevOpsScratch\DevOpsScratchDEV2> docker build -t my-flask
-app .
[+] Building 164.9s (10/10) FINISHED
 => [internal] load build definition from Dockerfile                                                    0.0s
 => => transferring dockerfile: 431B                                                                    0.0s
 => [internal] load .dockerignore                                                                       0.0s
 => => transferring context: 2B                                                                         0.0s
 => [internal] load metadata for docker.io/library/python:3.9-buster                                    2.2s
 => [1/5] FROM docker.io/library/python:3.9-buster@sha256:bae5b428ebf32d01a902718b0a58874cbf33d7a4b6  126.5s
 => => resolve docker.io/library/python:3.9-buster@sha256:bae5b428ebf32d01a902718b0a58874cbf33d7a4b6a6  0.0s
 => => sha256:b1e7e053c9f6f57c6d95002167a6d57aed6aacf04dd2f8e681cb4f74a7ca4381 51.87MB / 51.87MB       58.7s
 => => sha256:bae5b428ebf32d01a902718b0a58874cbf33d7a4b6a65b7cd7b21d48b0d2e2f1 988B / 988B             0.0s
 => => sha256:191a38be55f72871359ebb522ab9621b872e67cac9b4b1834ccf1d2bce3a749d 2.01kB / 2.01kB         0.0s
 => => sha256:3b1c264c0ad4598c25048a6dbd3030086cc5c74000e11d04ac27944cb116aabb 17.58MB / 17.58MB       14.9s
 => => sha256:2646d4308aee325505bf575b2ecbafb8ef5088d6727585cb6e8215a1534b2472 7.51kB / 7.51kB         0.0s
 => => sha256:ac8bb7e1a32398e26c129ce64e2ddc3e7ec6c34d93424b247f16049f5a91cff4 50.45MB / 50.45MB       56.9s
```

建立過程

```
=> => sha256:a2e1e233599c00054fb839db78b4d42e6f12f36b64280aa62d482a3ad0ad7109 191.88MB / 191.88MB    117.4s
=> => extracting sha256:ac8bb7e1a32398e26c129ce64e2ddc3e7ec6c34d93424b247f16049f5a91cff4               2.2s
=> => sha256:0ebfe287e9761b9b7dd1703470ff3473a62fe75238f3de01282165f8725968af 6.15MB / 6.15MB         62.1s
=> => sha256:e4e5f05940354b6c226635bb38623cb858415f00f6f856b25d064a5891f887f8 18.00MB / 18.00MB       73.1s
=> => extracting sha256:3b1c264c0ad4598c25048a6dbd3030086cc5c74000e11d04ac27944cb116aabb               0.5s
=> => extracting sha256:b1e7e053c9f6f57c6d95002167a6d57aed6aacf04dd2f8e681cb4f74a7ca4381               2.6s
=> => sha256:508cf9d1df6776c6d10cd077eb4546b9bf3bb774ed9c6051da6849961ea49fa2 242B / 242B             62.6s
=> => sha256:b0eda9c97fd4a2d42571513f0c205e1ae4276f12b3700716064327bdd7a93000 2.85MB / 2.85MB         65.5s
=> => extracting sha256:a2e1e233599c00054fb839db78b4d42e6f12f36b64280aa62d482a3ad0ad7109               7.4s
=> => extracting sha256:0ebfe287e9761b9b7dd1703470ff3473a62fe75238f3de01282165f8725968af               0.3s
=> => extracting sha256:e4e5f05940354b6c226635bb38623cb858415f00f6f856b25d064a5891f887f8               0.7s
=> => extracting sha256:508cf9d1df6776c6d10cd077eb4546b9bf3bb774ed9c6051da6849961ea49fa2               0.0s
=> => extracting sha256:b0eda9c97fd4a2d42571513f0c205e1ae4276f12b3700716064327bdd7a93000               0.2s
=> [internal] load build context                                                                        0.0s
=> => transferring context: 562B                                                                        0.0s
=> [2/5] WORKDIR /app                                                                                   0.5s
=> [3/5] COPY requirements.txt .                                                                        0.0s
```

建立docker image完成

```
 => [4/5] RUN pip3 install --no-cache-dir -r requirements.txt                                    32.7s
 => [5/5] COPY . .                                                                                0.0s
 => exporting to image                                                                            2.9s
 => => exporting layers                                                                           2.9s
 => => writing image sha256:3af02193fbc7ae82c4ef65b25edc9c332c796f6b1f234a3e9f5480c42165a063      0.0s
 => => naming to docker.io/library/my-flask-app                                                   0.0s

Use 'docker scan' to run Snyk tests against images to find vulnerabilities and learn how to fix them
PS C:\Users\jerry\Desktop\mastercourse\dataEngineer\DevOpsScratch\DevOpsScratchDEV2>
```

查看image

```
PS C:\Users\jerry> docker images
REPOSITORY      TAG         IMAGE ID       CREATED          SIZE
my-flask-app    latest      3af02193fbc7   24 seconds ago   1.09GB
sqlc/sqlc       latest      e5c3b6c57c08   10 days ago      98.2MB
postgres        12-alpine   57609cf5d1df   5 weeks ago      230MB
postgres        14-alpine   955d825eef13   5 weeks ago      235MB
PS C:\Users\jerry>
```

5. 啟動Docker container運作系統 CPU & Memory 監控程式

執行容器

指令: docker run –p 5000:5000 <image ID or Repository Name >

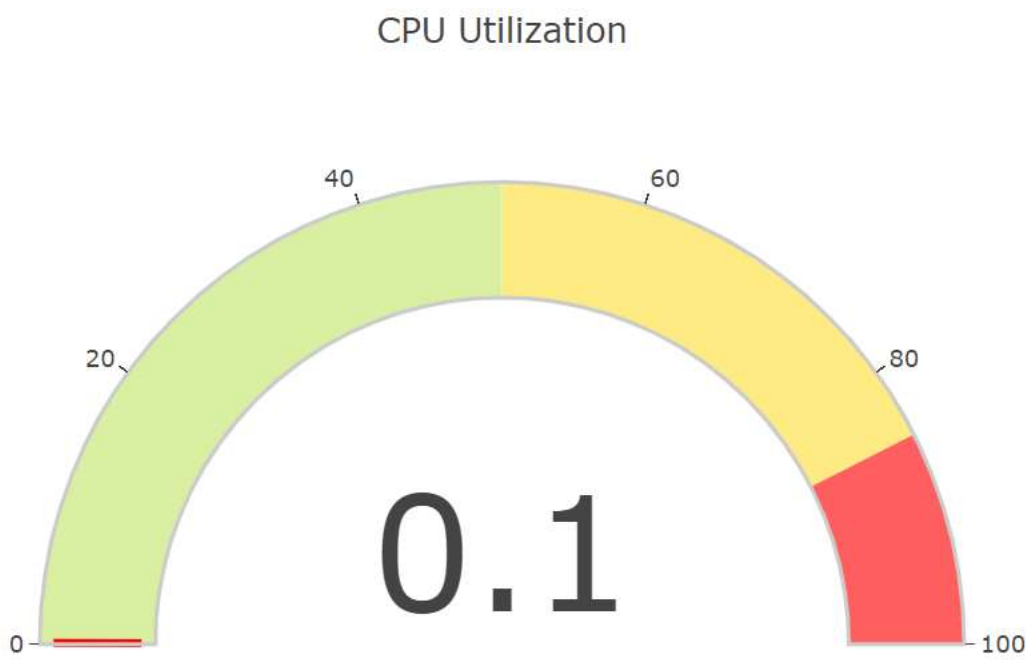
```
PS C:\Users\jerry\Desktop\mastercourse\dataEngineer\DevOpsScratch\DevOpsScratchDEV2> docker images
REPOSITORY     TAG         IMAGE ID       CREATED          SIZE
my-flask-app   latest      3af02193fbc7   6 minutes ago    1.09GB
sqlc/sqlc      latest      e5c3b6c57c08   10 days ago      98.2MB
postgres       12-alpine   57609cf5d1df   5 weeks ago      230MB
postgres       14-alpine   955d825eef13   5 weeks ago      235MB
PS C:\Users\jerry\Desktop\mastercourse\dataEngineer\DevOpsScratch\DevOpsScratchDEV2> docker run -p 5000:5000 3af02193fbc7
 * Debug mode: off
WARNING: This is a development server. Do not use it in a production deployment. Use a production WSGI server instead.
 * Running on all addresses (0.0.0.0)
 * Running on http://127.0.0.1:5000
 * Running on http://172.17.0.2:5000
Press CTRL+C to quit
172.17.0.1 - - [17/Sep/2023 11:17:10] "GET / HTTP/1.1" 200 -
```

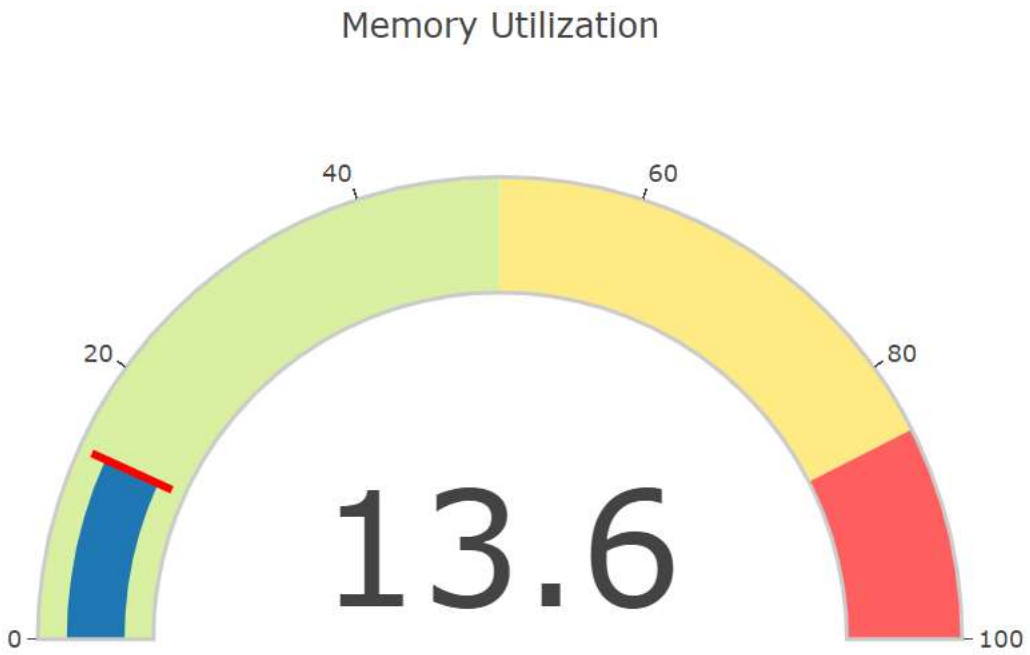
點選

-p 5000:5000 = -p Local端port : docker前面所設定的port

成功部署到Docker並執行

System Monitoring





End