智慧製造專題與實作報告

Edge computing implementation with Docker
以Docker實作邊緣運算系統

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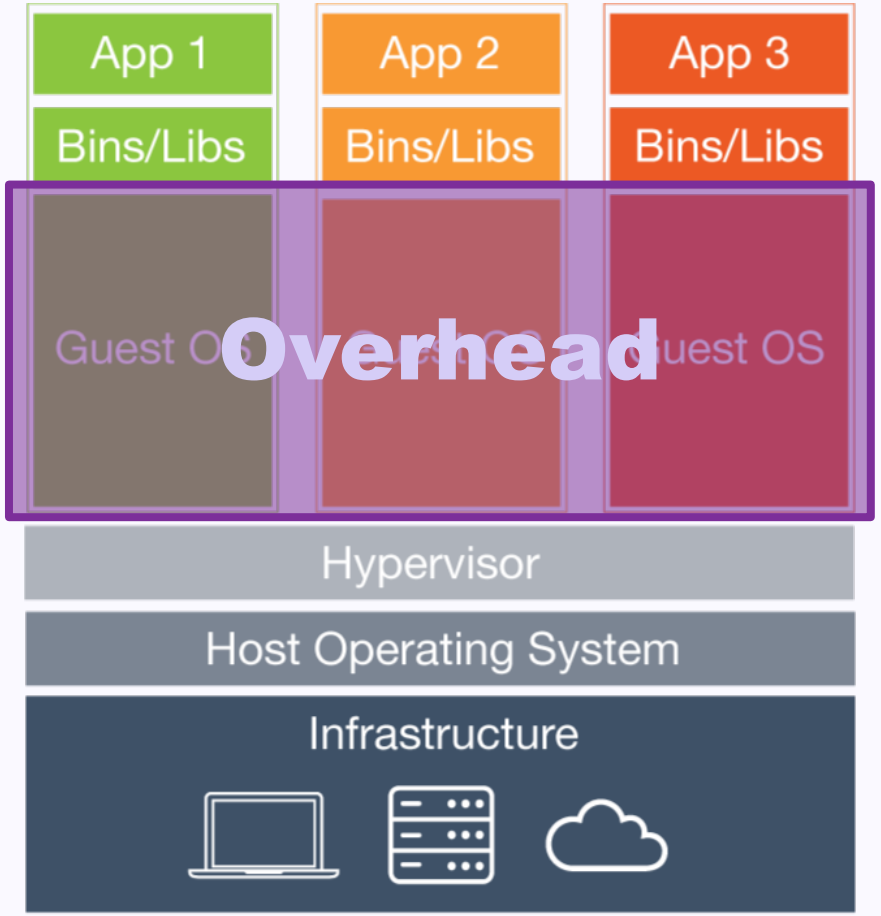
大綱

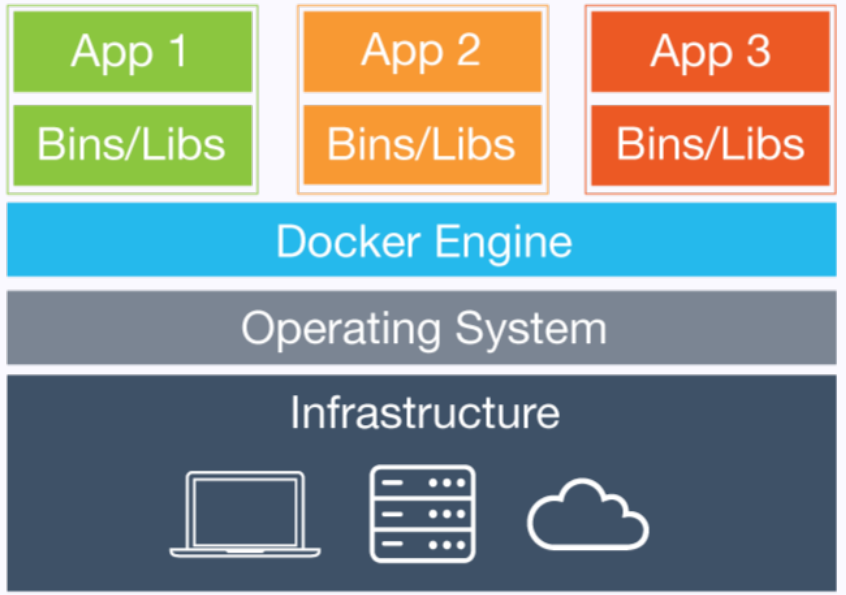
- What is Container / Docker? (5 mins)
- Why Docker? (5 mins)
- Docker Hands-On (20 mins)

Docker Explained

Docker Explained

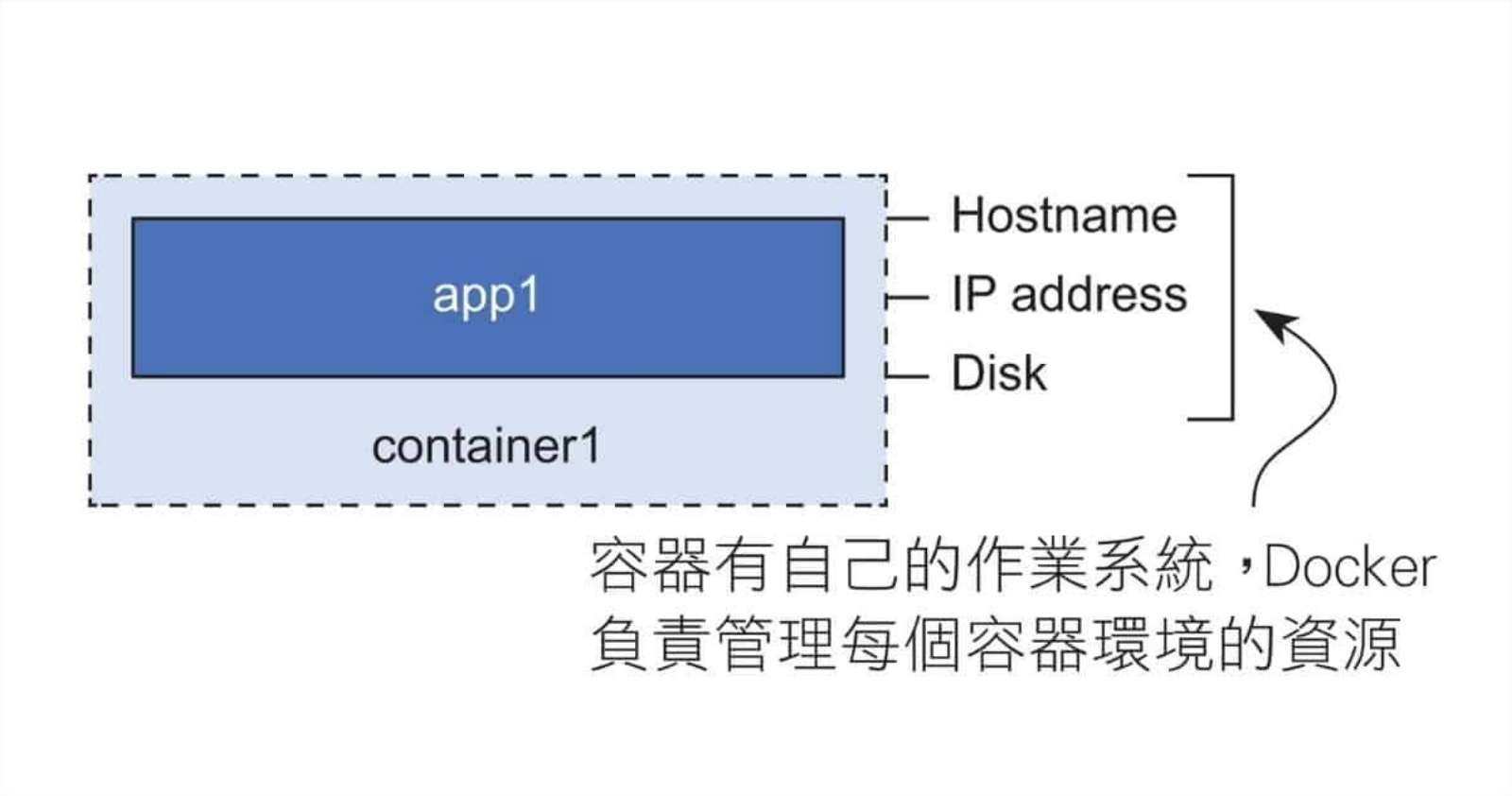


Virtual machines

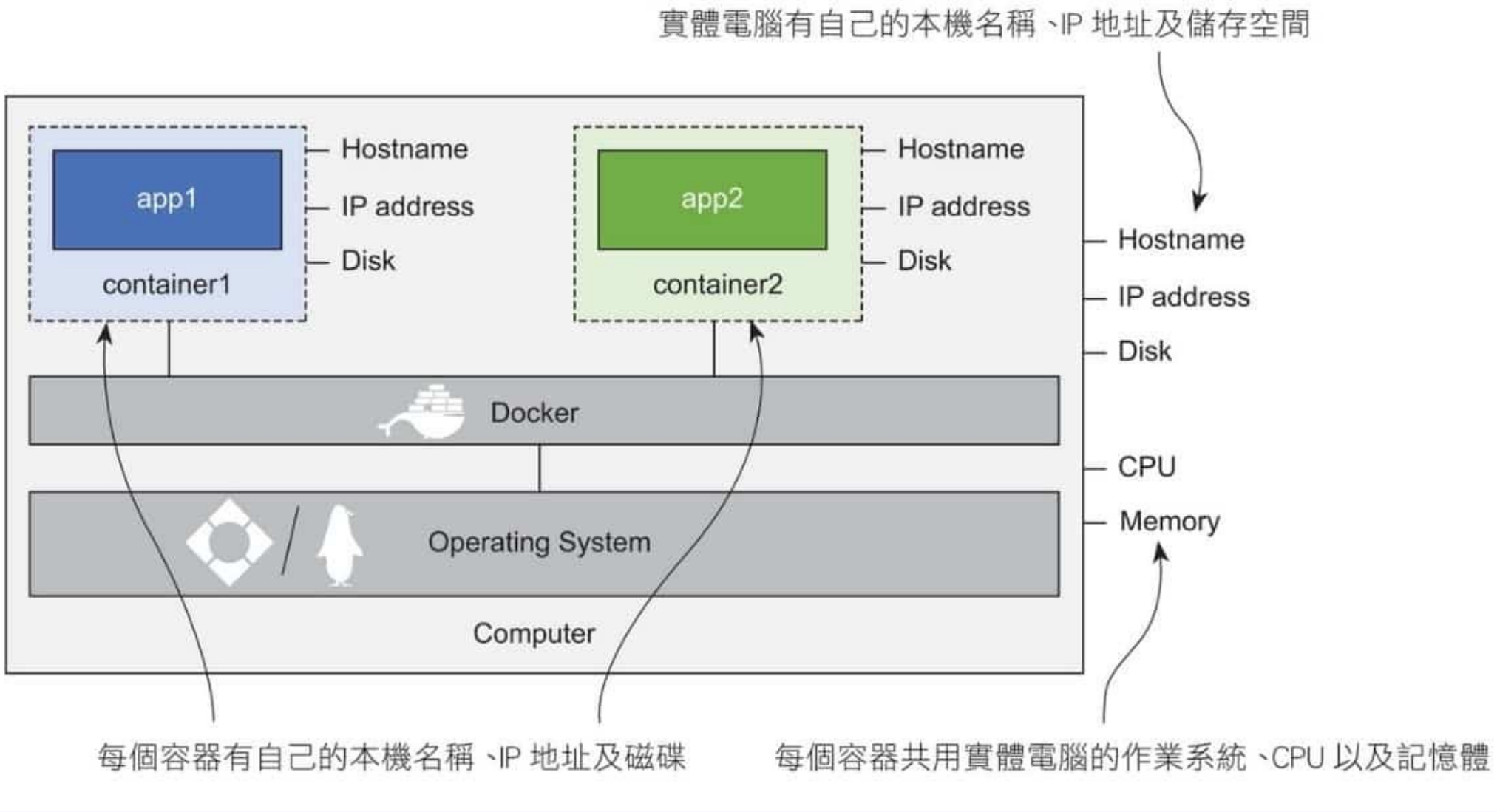


Containers

Docker Explained



Docker Explained



Docker key use cases

#1 部署應用程式到雲端服務

#2 微服務架構 Microservices

#3 原生雲端應用程式 Cloud Native

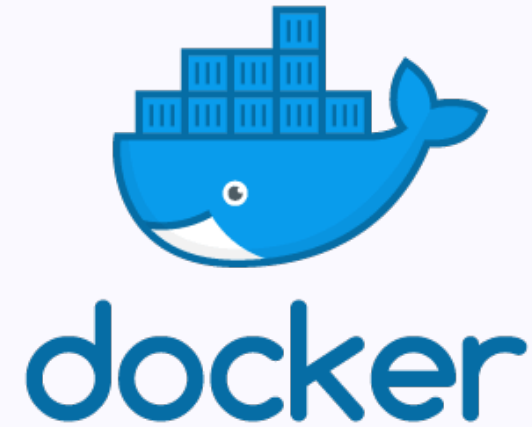
#4 Serverless架構

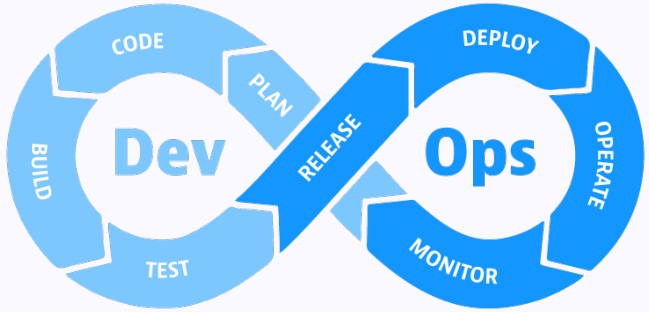
#5 DevOps數位轉型

Why Docker?

Advantages of Docker

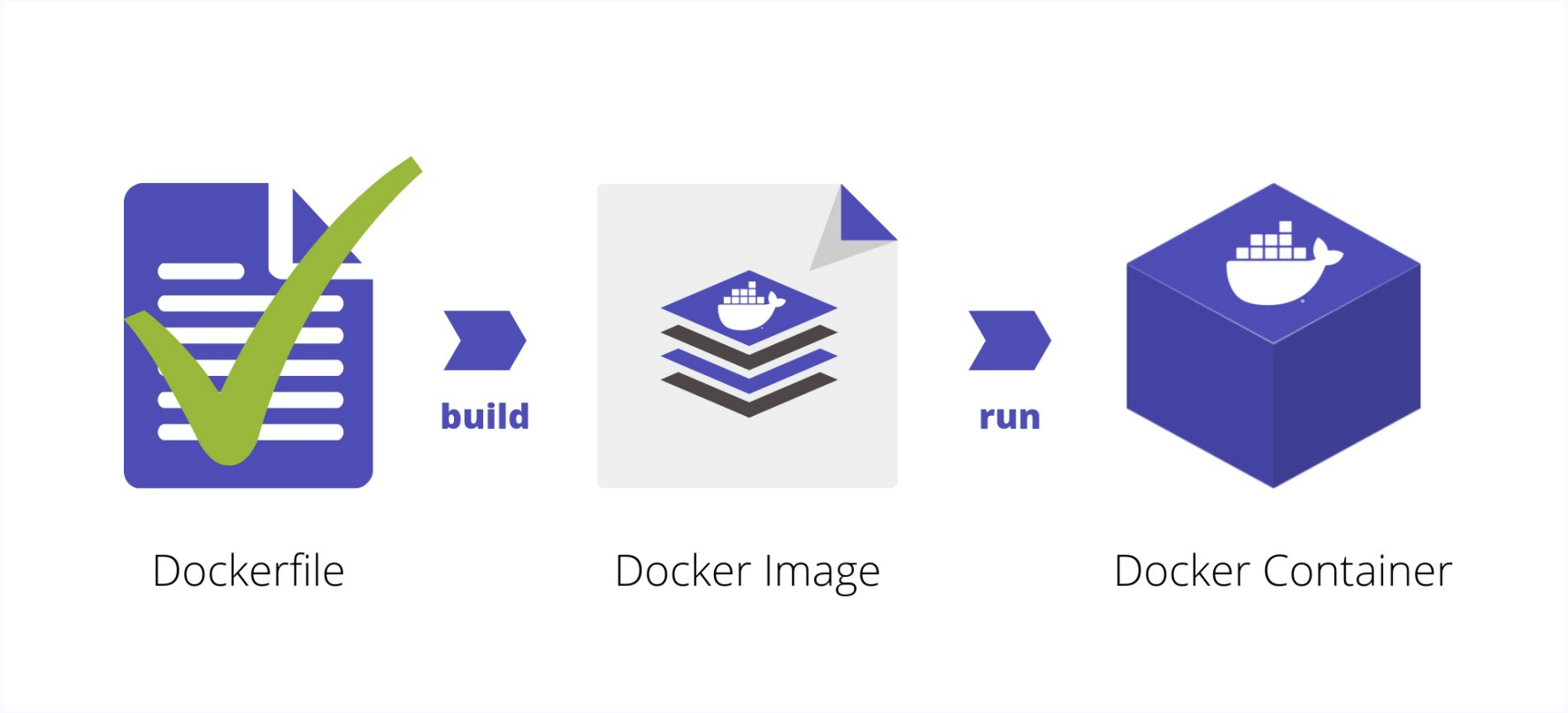
- Portability
- Performance
- Agility
- Isolation
- Scalability
- Security





Docker Hands-On in 20mins

Docker Flow



Usual docker commands (Part I)

docker run 執行容器

```
> docker run --name webserver -p 5000:80 nginx
```

執行一個Nginx的Web伺服器，並將電腦上的 5000 port 導到容器的 80 port

docker stop 停止容器運行

```
> docker container stop webserver
```

docker start 運行已停止的容器

```
> docker container start webserver
```

docker rm 刪除容器

```
> docker rm webserver
```

Usual docker commands (Part II)

docker container ls 列出容器清單 (等同 docker ps -a)

```
> docker container ls -a
```

docker image ls 列出映像清單

```
> docker image ls
```

docker start 運行已停止的容器

```
> docker container start webserver
```

docker rm 刪除容器

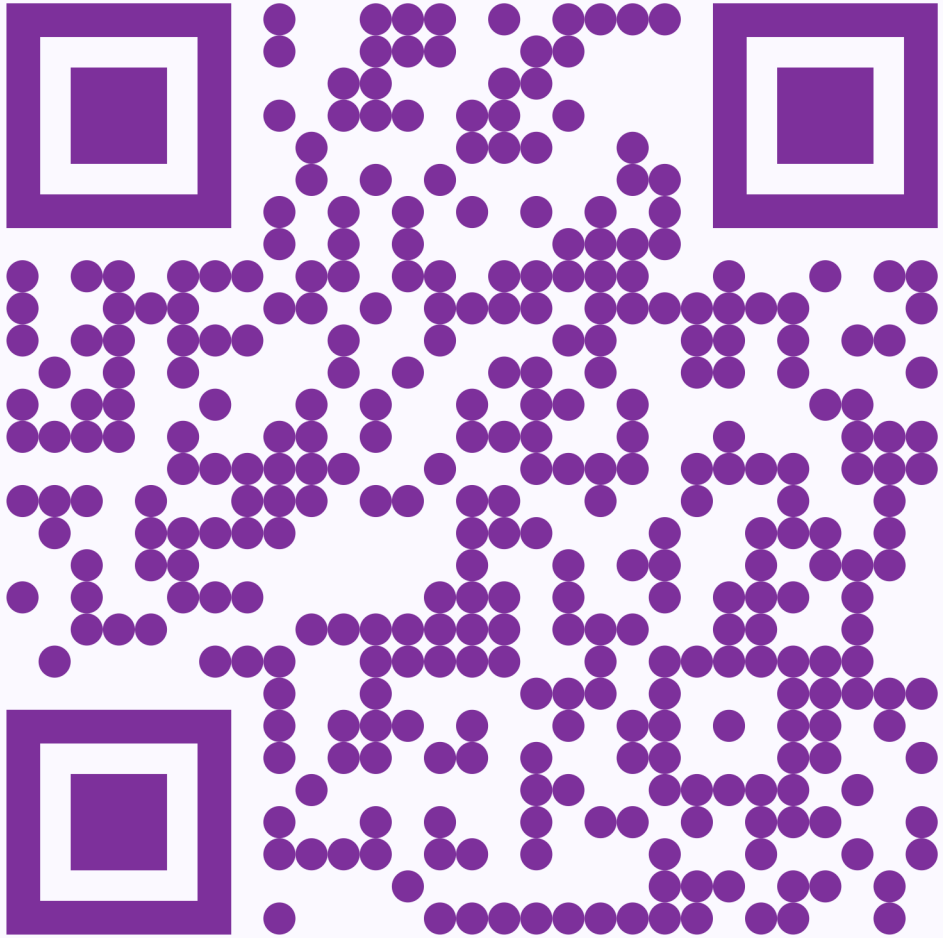
```
> docker rm webserver
```

#1 Hello World!

Before we start

Quick Notes

https://hackmd.io/@kcchien/HyZXzXzIc



Before we start

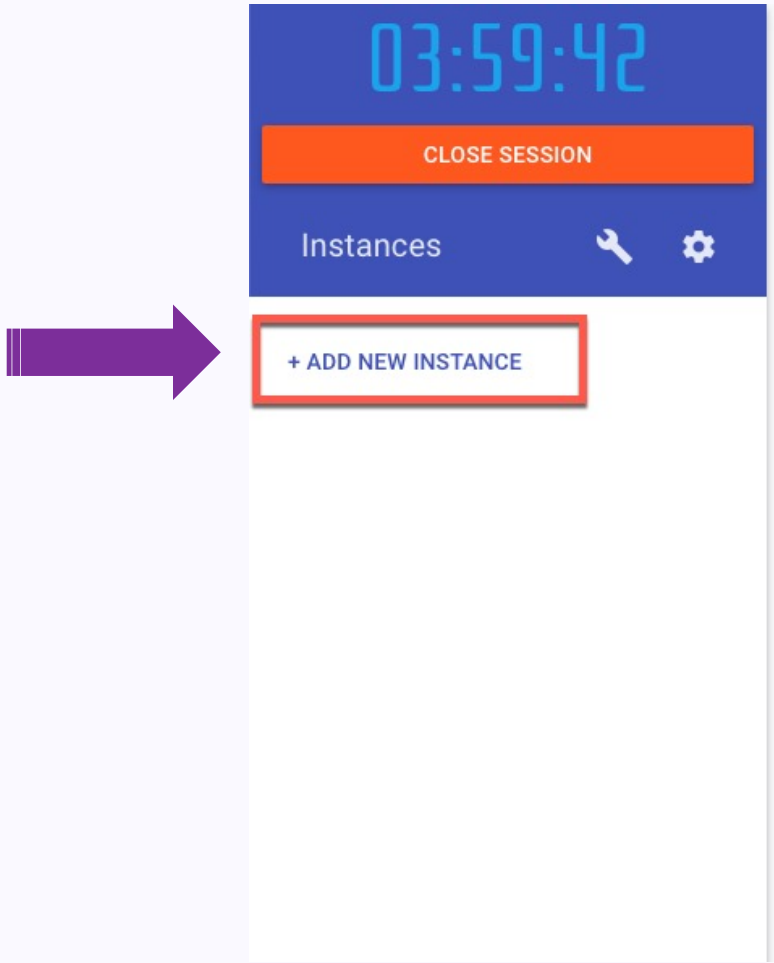
- Play with Docker

  https://labs.play-with-docker.com/

aims001

aims12345

Before we start



Add instances to your playground.

Sessions and all their instances are deleted after 03:59:42 hours.

Command list

docker run 執行容器

```
> docker run hello-world
```

docker stop 停止容器運行

```
> docker container stop hello-world
```

docker start 運行已停止的容器

```
> docker container start hello-world
```

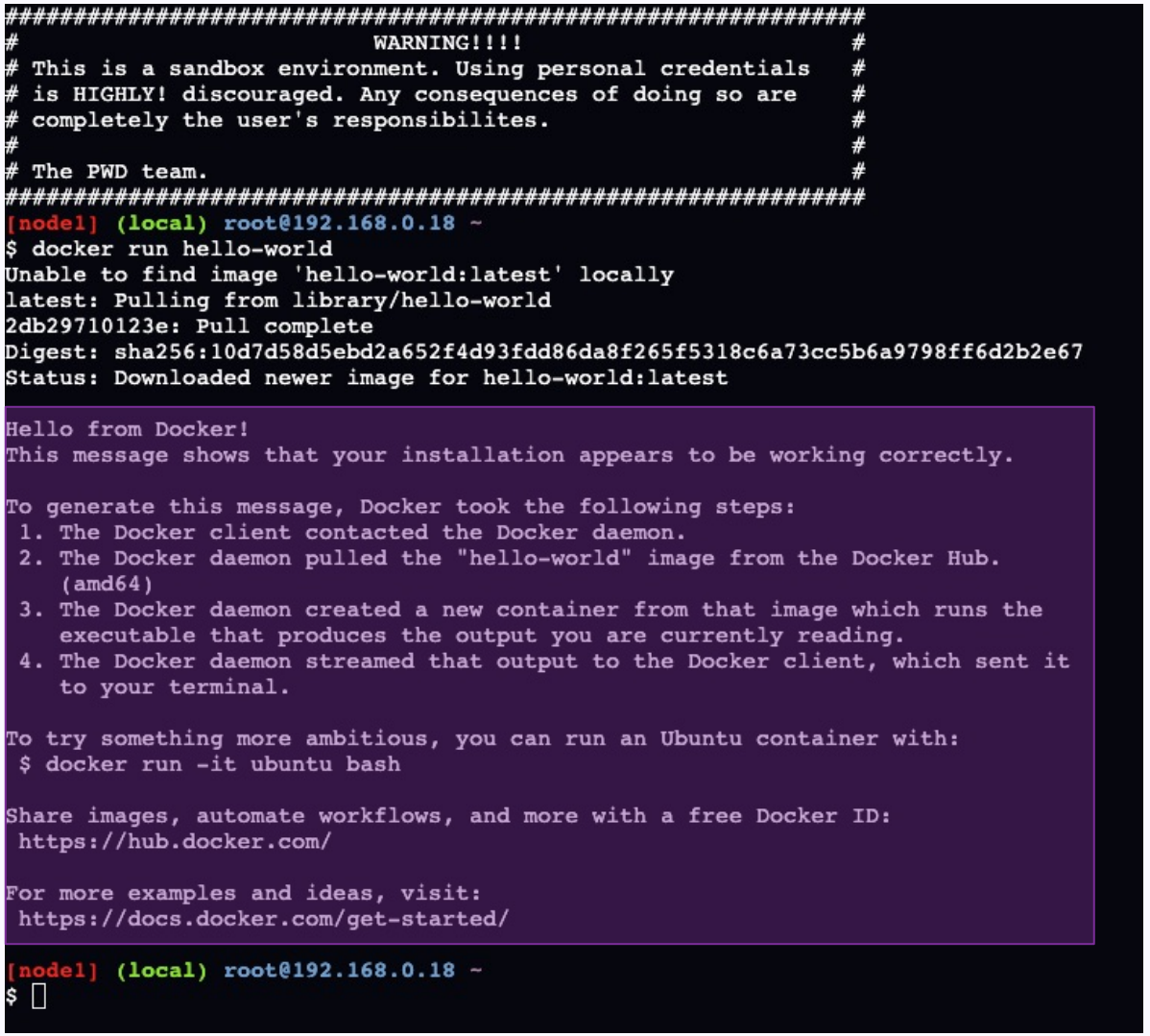
docker rm 刪除容器

```
> docker rm hello-world
```

Hello World!

> docker run hello-world

docker hub即時下載名稱為
“hello-world” 的映像檔，並立即生成一個container執行，執行內容很簡單，就是印出一篇文字訊息



#2 Web Server

Command list

docker run 執行容器

```
> docker run --name webserver -p 5000:80 nginx
```

執行一個Nginx的Web伺服器，並將電腦上的 5000 port 導到容器的 80 port

docker stop 停止容器運行

```
> docker container stop webserver
```

docker start 運行已停止的容器

```
> docker container start webserver
```

docker rm 刪除容器

```
> docker rm webserver
```

#3 Node-RED

Deploy Node-RED

從 Node-RED 官方 docker hub 下載映像部署

```
> docker run -it -p 1880:1880 -v node_red_data:/data --name mynodered nodered/node-red
```

進階運用 docker-compose

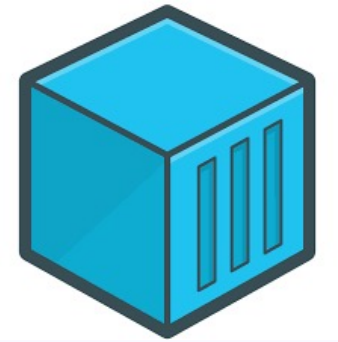
#3 Node-RED
+
Grafana
+
InfluxDB

Deploy Node-RED

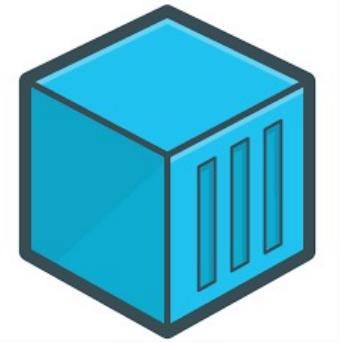
下載docker-compose.yaml

```
> wget https://github.com/kcchien/aims-docker-lab/raw/main/docker-compose.yaml
```

nodered
port 1880



grafana
port 3000



influxDB
port 8086

```yaml
version: "3"
services:
  nodered:
    image: nodered/node-red:latest
    container_name: nodered
    restart: always
    ports:
      - "1880:1880"
    networks:
      - grafana_network
    volumes:
      - nodered_data:/data
    environment:
      - TZ=Asia/Taipei
    depends_on:
      - grafana

  grafana:
    image: grafana/grafana
    container_name: grafana
    restart: always
    ports:
      - 3000:3000
    networks:
      - grafana_network
    volumes:
      - grafana_data:/var/lib/grafana
    environment:
      - GF_SECURITY_ADMIN_USER=admin
      - GF_SECURITY_ADMIN_PASSWORD=password
    depends_on:
      - influxdb

  influxdb:
    image: influxdb:latest
    container_name: influxdb
    restart: always
    ports:
      - 8086:8086
    networks:
      - grafana_network
    volumes:
      - influxdb_data:/var/lib/influxdb
    environment:
      - INFLUXDB_DB=grafana
      - INFLUXDB_USER=admin
      - INFLUXDB_USER_PASSWORD=password
      - INFLUXDB_ADMIN_ENABLED=true
      - INFLUXDB_ADMIN_USER=admin
      - INFLUXDB_ADMIN_PASSWORD=password

networks:
  grafana_network:

volumes:
  nodered_data:
  grafana_data:
  influxdb_data:
```

Command list

啟動所有容器

```
> docker-compose up -d
```

-d 參數代表要執行在背景的方式

停止所有容器運行

```
> docker-compose stop
```

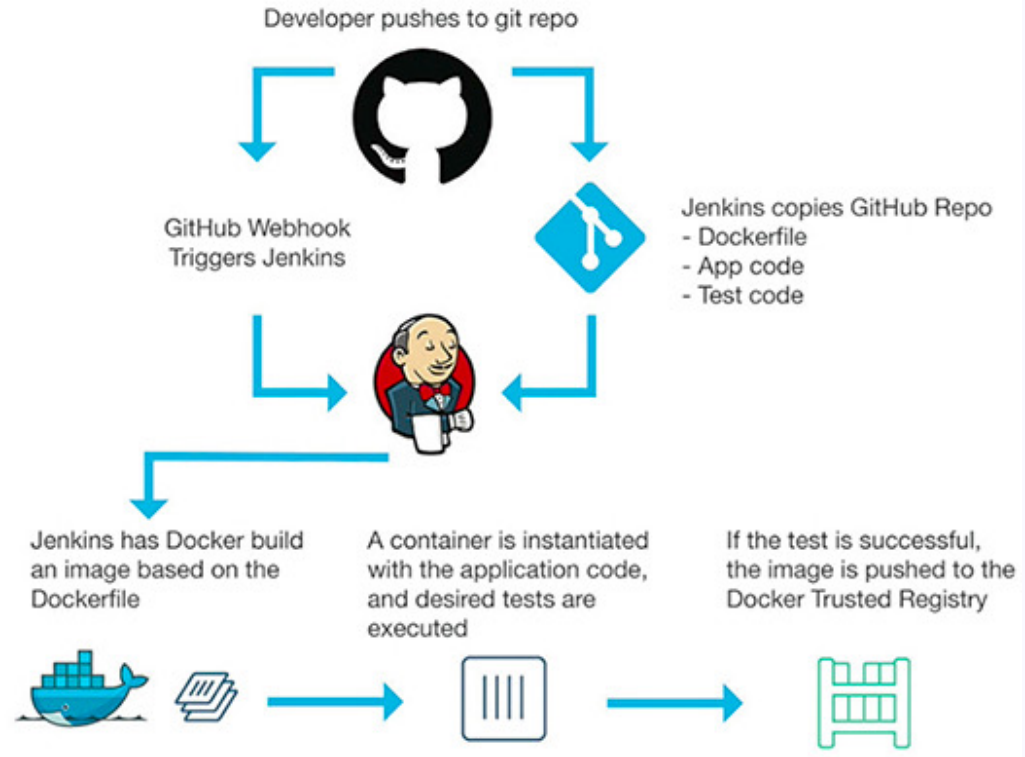
刪除所有已停止的容器

```
> docker-compose rm
```

Summary

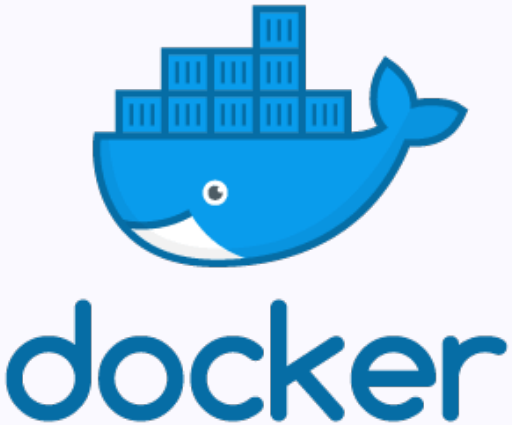
Benefit from using docker in IoT deployment

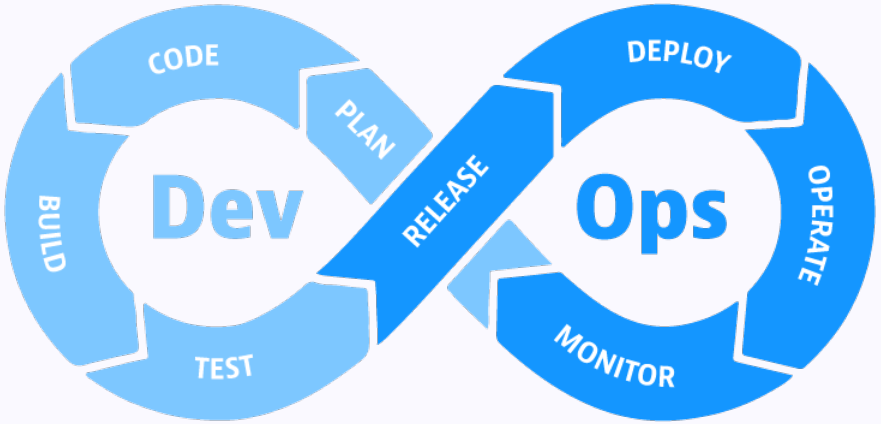
- Portability
- Lightweight
- Easy application upgrades
- Simplicity and faster configuration
- Reuse
- Security



Summary

透過這些現代化開發方法與技術，可以讓工廠的機聯網系統，可以讓工廠擁有更具彈性、可擴充彈性，在影響最小的情況下，進行新的功能更新與部署，也同時可以提高機聯網網路的安全性，讓工廠可以隨著科技技術的更新，同步成長。





Resources

- docker official site
  https://www.docker.com/
- docker hub
  https://hub.docker.com/
- Play with Docker
- https://labs.play-with-docker.com/
- Tensorflow with Docker
- https://www.tensorflow.org/install/docker/

Thank You