docker容器技術課程

IoT端點應用

Philipz
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Docker.Taipei 共同發起人

2014 COSCUP/iThome Summit 講者

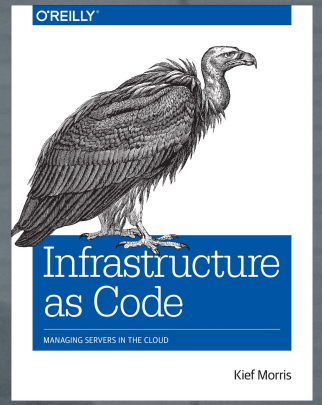
2015 Microsoft Azure 開發者大會 講者

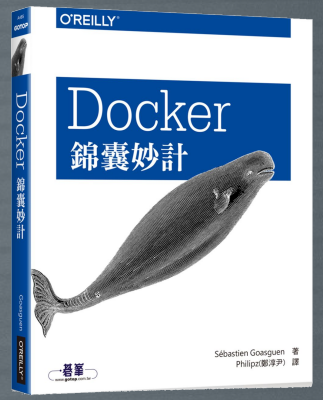
2016 COSCUP Docker 進階工作坊

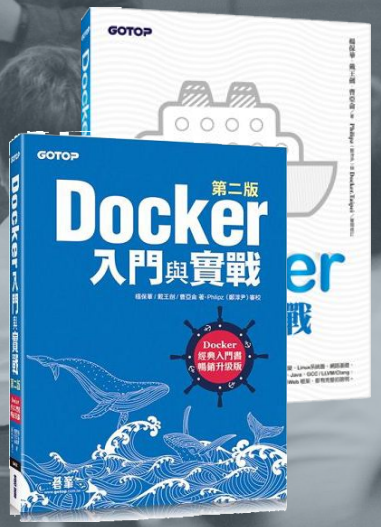
2016 元智大學資工系 Docker 專題演講

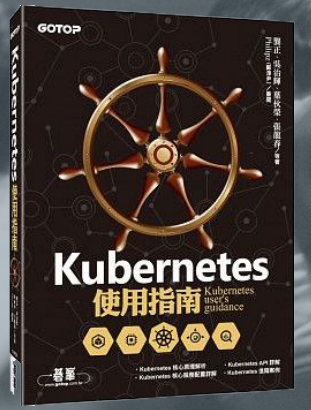
2016 義守大學資工系 Docker 研習營

2017 逢甲大學資工系 Docker 研習班









CERTIFICATE
OF APPRECIATION

鄭淳尹 老師

於西元 2017 年 3 月 19 日擔任 2017HackNTU
數據分析黑客松 Tech Talk 講師，內容精湛，嘉惠
特頒此狀 以茲感謝

Hackntu 數據分析 黑客松

2017HackNTU
臺大黑客松 總召

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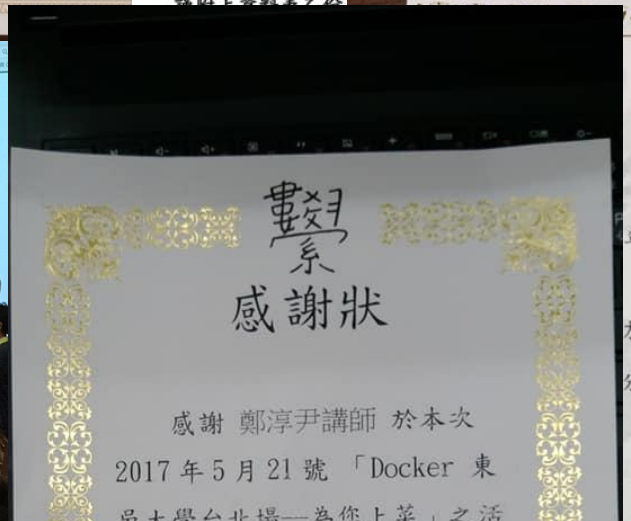
鄭淳尹先生 惠鑑:

素仰 先生學術淵博，特邀先生蒞臨本校作專題演講，承蒙慨允，謹申謝悃。

專題講座時間訂為
1401B 室，敬請 屆
金鳳教授研究室休

東吳大學 數學系
感 謝 狀

謝 鄭淳尹先生 蒞臨本系
題 演 講



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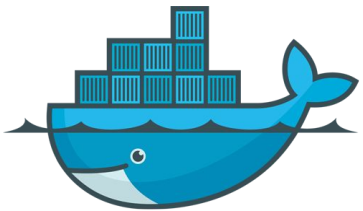
金湯尼、Philipz

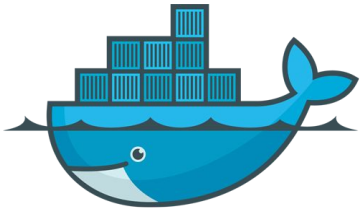
Docker Use Cases on Raspberry Pi

課程大綱

1. 容器與 Raspberry Pi
2. Qemu & Docker
3. Autobuild ARM image
4. MQTT & Docker on RPi
5. Docker Compose for IoT MQTT
6. Send MQTT to Adafruit IO
7. 結語



1. 容器與 Raspberry Pi



Why RPi + Docker

1st credit card-sized PC

HW/SW split….

Rapidly develop IoT Apps

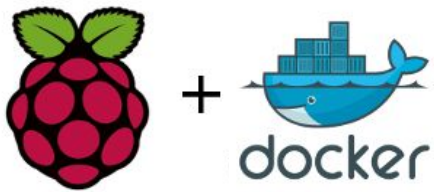
Portable WYSIWYR

ARM is Rising!!!

Docker on Raspbian

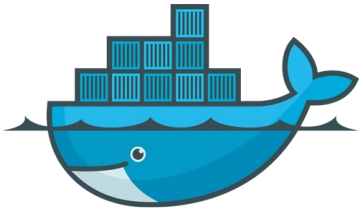
https://www.raspberrypi.org/blog/docker-comes-to-raspberry-pi/
https://docs.docker.com/engine/installation/linux/docker-ce/debian/

curl -sSL https://get.docker.com/ | sh




cti 中天新聞
25美元電腦
再掀電腦DIY風潮
6月29日 週六
熱血科技青年拿到電腦
23:16:20
得5連勝，本季安打數達80太平洋聯盟排名第6，

2. Qemu & Docker



QEMU

Cross platfrom - X86, ARM, MIPS, SPARC…

Trick, Dirty, Boring, High learning curve

Scaleway ARM VPS 

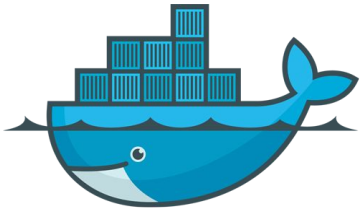
docker run -it -v /usr/bin/qemu-arm-static:/usr/bin/qemu-arm-static philipz/rpi-raspbian bash

Uniform Development by Docker & QEMU

Creating ARM image on X86

1. docker run & apt install
2. docker commit
3. docker push or save/load
4. docker run on RPi

3. Autobuild ARM image



Docker Autobuild

Public Docker Hub

Private Docker Registry, Distribution

Building ARM containers on any x86 machine, even DockerHub

GitHub source code

Resin.io - IoT DevOps platform

resin.io


resin.io
Product
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Customers
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Support
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Company
Sign Up
Log In
IoT software deployment done right
Resin.io brings the benefits of Linux containers to the IoT. Develop iteratively, deploy safely, and manage at scale.
Get started now
Learn more
Request a live demo

An open source project by resin.io

balena

Changelog Docs

balena

A Moby-based container engine for IoT

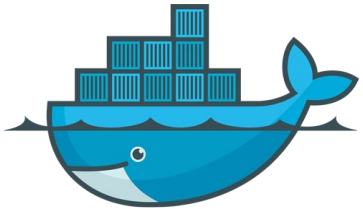
```
curl -sfL https://balena.io/install.sh | sh
```

Or download

Star 50 Tweet

17.06-rev1 - See whats new

4. MQTT & Docker on RPi



MQTT

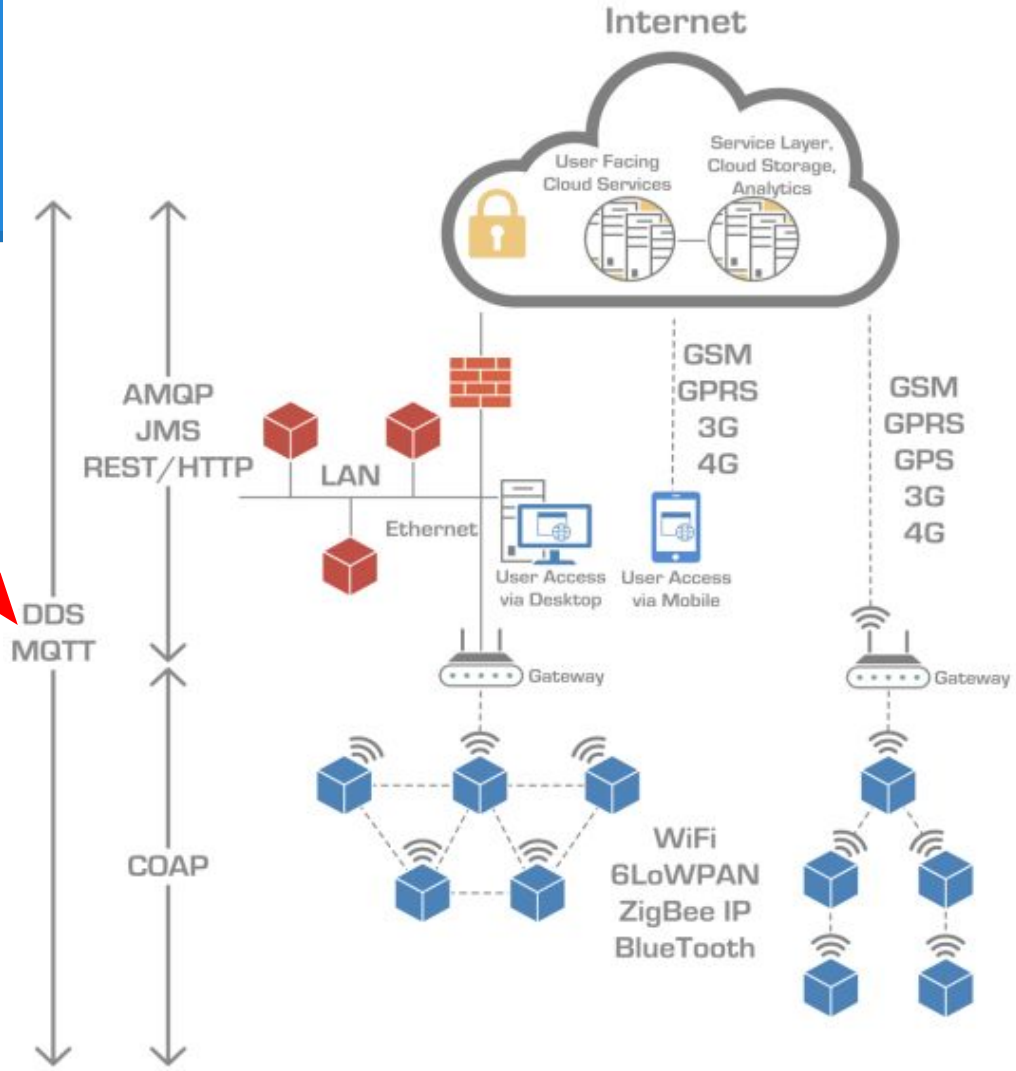
From IBM

IoT Protocol

Pub/Sub, QoS

Arduino, mbed

Mosquitto, Xively

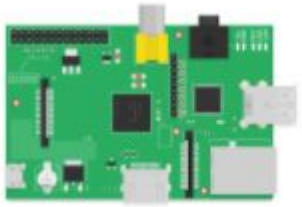


MQTT PubSub Prototype

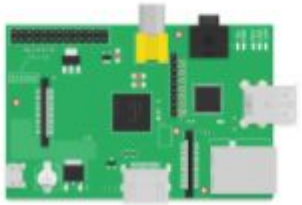
MQTT Pub

MQTT Sub

MQTT Gateway



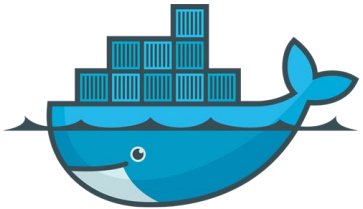
MQTT Pub



MQTT Sub

MQTT Gateway

5. Docker Compose for IoT MQTT

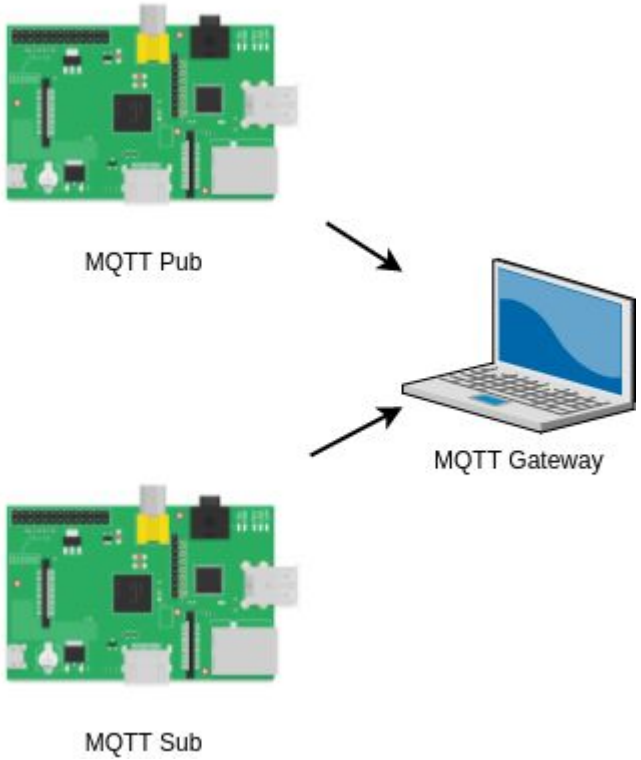


Only One Command

docker-compose.yml

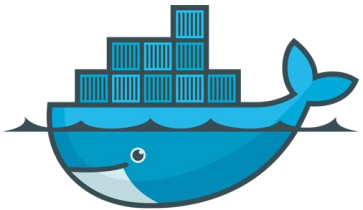
&

docker-compose up



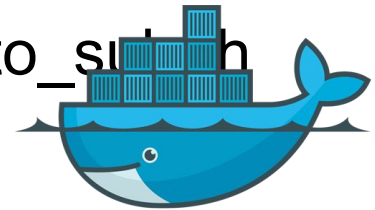
Compose File Sample (1/3)

```
version: "2"
services:
  broker:
    container_name: broker
    image: philipz/mosquitto
    networks:
      - mqtt
    ports:
      - "1883:1883"
```



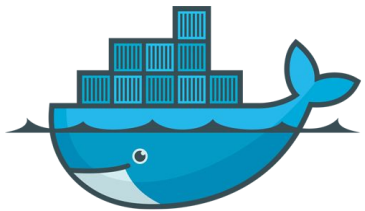
Compose File Sample (2/3)

```
  Sub:
    depends_on:
      - broker
    container_name: sub
    image: philipz/rpi-raspbian-mqtt
    networks:
      - mqtt
    command: qemu-arm-static /bin/sh -c 'mosquitto_sub -h
broker -t /test'
```

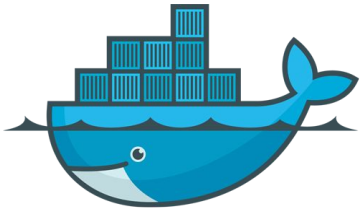


Compose File Sample (3/3)

```
  Pub:
    depends_on:
      - Sub
    container_name: pub
    image: philipz/rpi-raspbian-mqtt
    networks:
      - mqtt
    command: qemu-arm-static /bin/sh -c 'mosquitto_pub -h broker -t
/test -m Hello_World,Philipz!'
networks:
  mqtt:
```



6. Send MQTT to Adafruit IO



RPi CPU Temp

cat /sys/class/thermal/thermal_zone0/temp

docker run -ti --rm -v /sys/class/thermal/thermal_zone0/temp:/sys/class/thermal/thermal_zone0/temp philipz/rpi-raspbian-mqtt bash

https://io.adafruit.com

https://github.com/adafruit/io-client-python

Python on Raspberry Pi

1. $ docker run -ti --rm philipz/rpi-raspbian-mqtt bash
2. $ mosquitto_sub -h 192.168.2.11 -t Home/RPI3/Temp
3. $ docker run -ti --rm -v $(pwd)/Class4_6:/data -v /sys/class/thermal/thermal_zone0/temp:/sys/class/thermal/thermal_zone0/temp python:3.6-slim bash
4. $ pip install adafruit-io
5. $ python measurecputemp.py

Adafruit

Adafruit was founded by MIT engineer, Limor "Ladyada" Fried. Her goal was to create the best place online for learning electronics and making the best designed products for makers of all ages and skill levels.

Connect

You have been invited to use Adafruit IO on Zapier!

ADAFRUIT IO

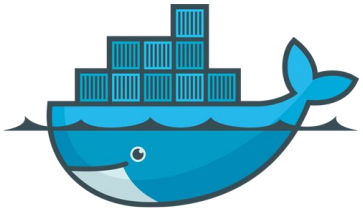
Adafruit IO is a system for logging data from embedded devices. Our focus is on ease of use and enabling simple data connections with little programming required. IO includes client libraries that wrap our REST API, as well as basic support for the MQTT protocol.

YOU WERE INVITED BY: BRENNEN@ADAFRUIT.COM

The Adafruit IO team invites you to test their Zapier integration before it's available for everyone. Neat! Accept the invite and build a Zap with Adafruit IO to get started.

If you know and trust the developers behind this email address, then

7. 結語



Building Docker Image by Onbuild

https://hub.docker.com/_/python/

Support multi-architectures, like amd64, arm32v5, arm32v7, arm64v8, i386, ppc64le, s390x, windows-amd64.

Crontab to run the Docker image by schedule.

*/10 * * * * root docker run -it XXXXX mqtt.py

```
 ---> 6b9181f32891
Error removing intermediate container c2702bd608f7: nosuchcontainer: No such container: c2702bd608f796
2e2939b88af88f15241ee45d5d003c81105890da670df6e203
Step 5 : RUN cross-build-start
 ---> Running in 1d0c6ff52fd3
 ---> a92560a622a5
Error removing intermediate container c2702bd608f7: nosuchcontainer: No such container: c2702bd608f796
2e2939b88af88f15241ee45d5d003c81105890da670df6e203
Step 6 : RUN apt-get update && apt-get install -y mosquitto-clients
 ---> Running in b94e9a36c402
Get:1 http://archive.raspbian.org jessie InRelease [14.9 kB]
Get:2 http://archive.raspbian.org jessie/main armhf Packages [12.5 MB]
Fetched 12.5 MB in 12s (1019 kB/s)
Reading package lists...
Reading package lists...
Building dependency tree...
The following extra packages will be installed:
  libc-ares2 libmosquitto1 libssl1.0.0
The following NEW packages will be installed:
  libc-ares2 libmosquitto1 libssl1.0.0 mosquitto-clients
0 upgraded, 4 newly installed, 0 to remove and 34 not upgraded.
Need to get 999 kB of archives.
After this operation, 2542 kB of additional disk space will be used.
Get:1 http://archive.raspbian.org/raspbian/ jessie/main libssl1.0.0 armhf 1.0.1t-1+deb8u2 [852 kB]
Get:2 http://archive.raspbian.org/raspbian/ jessie/main libc-ares2 armhf 1.10.0-2 [71.3 kB]
Get:3 http://archive.raspbian.org/raspbian/ jessie/main libmosquitto1 armhf 1.3.4-2 [36.3 kB]
Get:4 http://archive.raspbian.org/raspbian/ jessie/main mosquitto-clients armhf 1.3.4-2 [39.3 kB]
debconf: delaying package configuration, since apt-utils is not installed
Fetched 999 kB in 1s (621 kB/s)
```

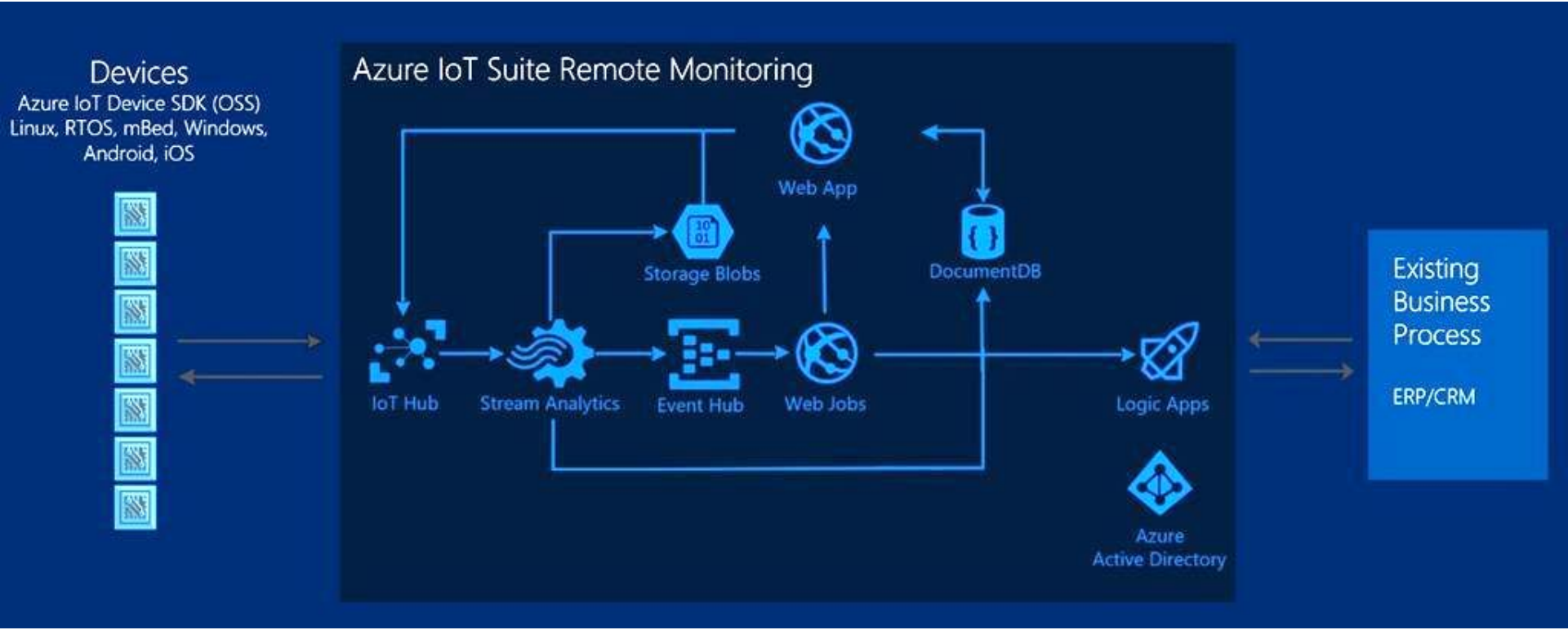
```
d1441af18b34: Download complete
d1441af18b34: Pull complete
de960315361d: Pull complete
7c8cf00d3023: Pull complete
62f54b56e513: Pull complete
fd71d99720f5: Pull complete
Digest: sha256:a34385886a63ceb07f04af3fbaa206c37adf3f2e82a2f5d2580f87c5c4b1cac2
Status: Downloaded newer image for registry.gitlab.com/philipz/rpi-raspbian-mqtt:20170817
$ docker-compose up -d
Creating network "rpiraspbianmqtt_mqtt" with the default driver
Pulling broker (philipz/mosquitto:latest)...
latest: Pulling from philipz/mosquitto
Digest: sha256:5844e3d8a7cd175576d2117ff825b0c916e6b69cadb27f6d8490e35a3a4436be
Status: Downloaded newer image for philipz/mosquitto:latest
Pulling Sub (philipz/rpi-raspbian-mqtt:latest)...
latest: Pulling from philipz/rpi-raspbian-mqtt
Digest: sha256:6d5647fe968630ec23a0a89d212d3e7fe294238f119e4ed5ecf1007adf69f957
Status: Downloaded newer image for philipz/rpi-raspbian-mqtt:latest
Creating broker ...
Creating broker

Creating broker ... done
Creating sub ...
Creating sub

Creating sub ... done
Creating pub ...
Creating pub

Creating pub ... done
$ docker-compose ps
 Name              Command               State           Ports
------------------------------------------------------------------------
broker   /bin/sh -c mosquitto             Up       0.0.0.0:1883->1883/tcp
pub      qemu-arm-static /bin/sh -c ...   Exit 0
sub      qemu-arm-static /bin/sh -c ...   Up
$ bash && ./test.sh
Passed
Job succeeded
```

It’s not The End.



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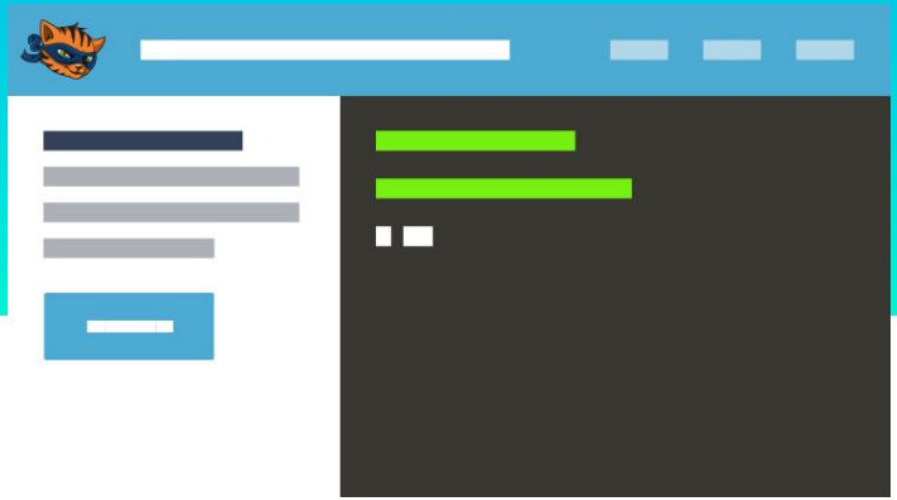
Interactive Technical Learning Platform for Software Engineers



Learn these technologies (with more to come)

ker_p

Play with Docker Classroom

The Play with Docker classroom brings you labs and tutorials that help you get hands-on experience using Docker. In this classroom you will find a mix labs and tutorials that will help Docker users, including SysAdmins, IT Pros, and Developers. There is a mix of hands-on tutorials right in the browser, instructions on setting up and using Docker in your own environment, and resources about best practices for developing and deploying your own applications.

We recommend you start with one of our Getting Started Guides, and then explore the individual labs that explore many advanced features of Docker

Getting Started Guides

For a comprehensive approach to understanding Docker, choose your preferred journey.

Getting Started Walk-through for IT Pros and System Administrators
Learn more about Docker, how it works and how it can help you deploy secure, scalable applications and save money along the way.

Getting Started Walk-through for Developers
Learn the core concepts of Docker and how it can make building apps faster, easier, and more secure.

Or for a full list of individual labs on this site, check out our labs page

Full list of individual labs


Thank you
Docker可省下比金錢更寶貴的時間！