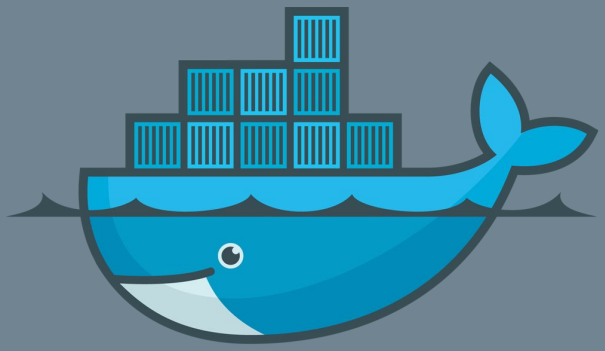


逢甲大學 docker 研習班

Docker.Taipei Philipz(鄭淳尹)

2017-01-18

https://github.com/philipz/workshop_fcu

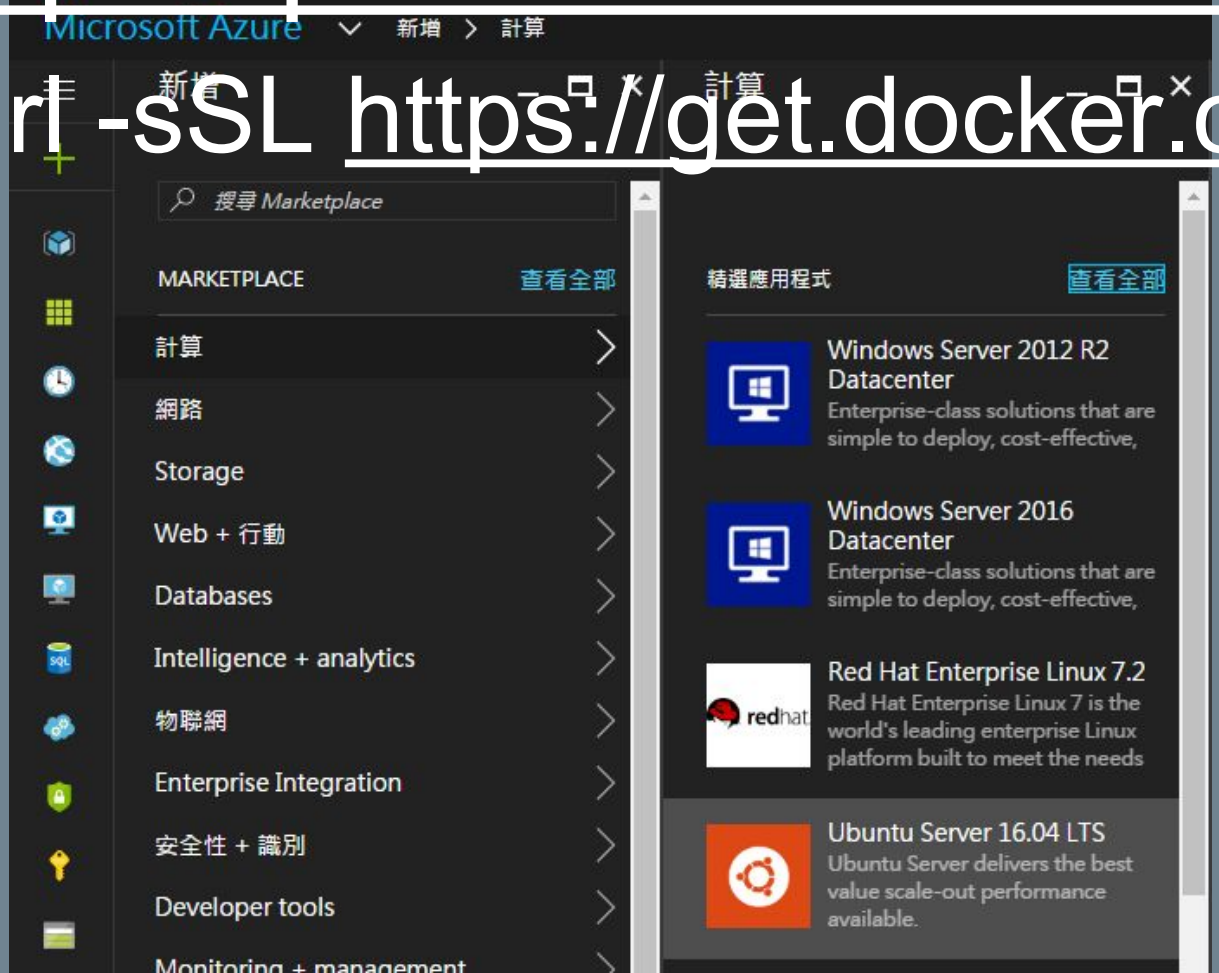
Today Topics

1. Docker Machine introduction & CLI
2. Docker Machine to create cloud VM
3. Docker Swarm introduction & CLI
4. Machine and Swarm Cluster
5. Docker Swarm networking
6. Docker Swarm playground & Swarm service
7. The future of cloud computing and cloud service scope.

Microsoft Azure

https://portal.azure.com/

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



Install Docker Compose

sudo curl -L "https://github.com/docker/compose/releases/download/1.9.0/docker-compose-$(uname -s)-$(uname -m)" -o /usr/local/bin/docker-compose

and

sudo chmod +x /usr/local/bin/docker-compose

docker-compose -v

Review Docker Compose

GitHub: workshop_fcu/compose_wp_proxy

WordPress example of previous week

Add new service - Nginx Reverse Proxy

docker-compose scale wordpress=2

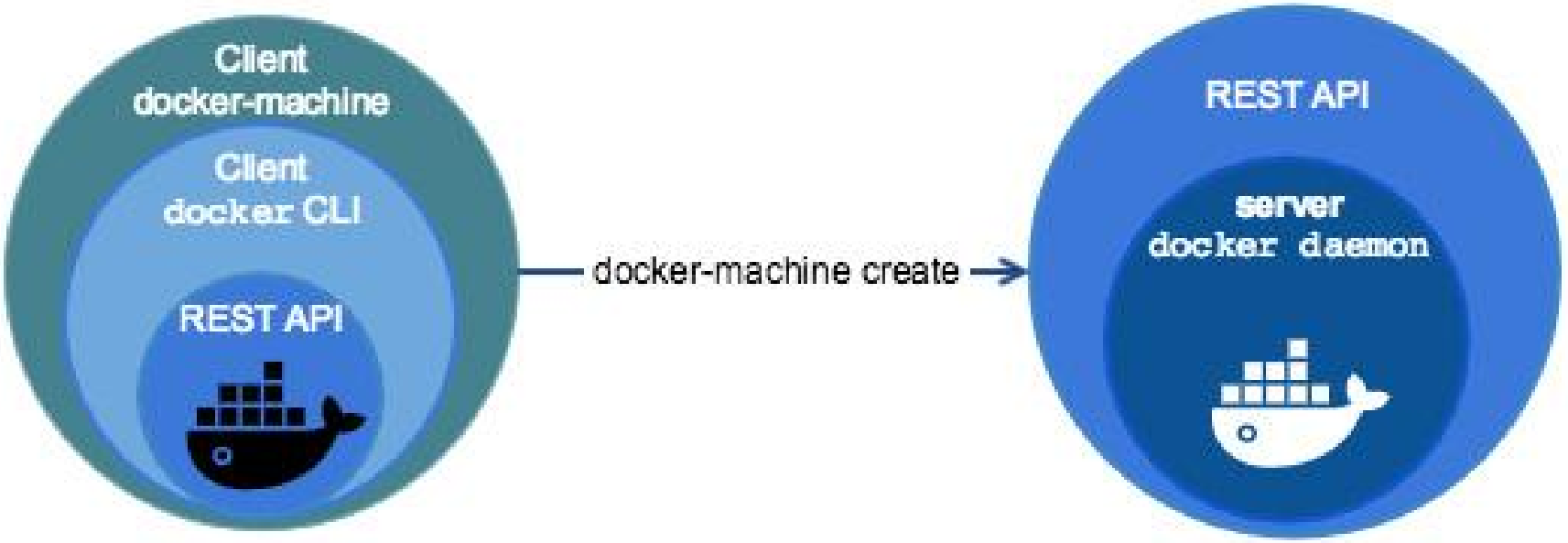
DNS-based service discovery

$nslookup wordpress

1.1 Docker Machine Introduction

Docker Machine

- Combind AWS CLI, Azure CLI, VMware CLI……
- Learn One, Run Everywhere
- VMware vSphere
  a. Install govc
     go get github.com/vmware/govmomi/govc
     go install github.com/vmware/govmomi/govc
  b. docker-machine create vmdocker --driver vmwarevsphere --vmwarevsphere-datacenter DCNAME --vmwarevsphere-vcenter ESX_IP --vmwarevsphere-username root --vmwarevsphere-password PASSWORD --vmwarevsphere-datastore DSNAME --vmwarevsphere-network VMNETWORK
- Azure • AWS • VirtualBox


Client
docker-machine
Client
docker CLI
REST API
docker-machine create
REST API
server
docker daemon


docker run image
vmware
vSphere
Microsoft
Azure
amazon
web services

1.2 Docker Machine Command-line

Install Docker Machine

sudo curl -L "https://github.com/docker/machine/releases/download/v0.8.2/docker-machine-$(uname -s)-$(uname -m)" -o /usr/local/bin/docker-machine

and

sudo chmod +x /usr/local/bin/docker-machine

docker-machine -v

Docker Machine commands (1/2)

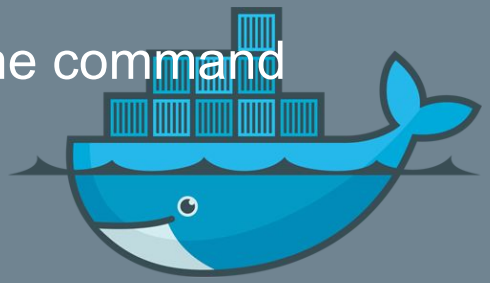
Commands:

active	Print which machine is active
config	Print the connection config for machine
create	Create a machine
env	Display the commands to set up the environment for the Docker client
inspect	Inspect information about a machine
ip	Get the IP address of a machine
kill	Kill a machine
ls	List machines
provision	Re-provision existing machines
regenerate-certs	Regenerate TLS Certificates for a machine
restart	Restart a machine

Docker Machine commands (2/2)

Commands:

rm	Remove a machine
ssh	Log into or run a command on a machine with SSH.
scp	Copy files between machines
start	Start a machine
status	Get the status of a machine
stop	Stop a machine
upgrade	Upgrade a machine to the latest version of Docker
url	Get the URL of a machine
version	Show the Docker Machine version or a machine docker version
help	Shows a list of commands or help for one command



2. Docker Machine to create cloud VM

Azure VM

- Azure CLI
- 使用 Docker 電腦搭配 Azure 驅動程式
- 使用 Azure CLI 選取 Linux VM 映像

$ docker run -it microsoft/azure-cli

azure login, then enter the code

azure vm image list-skus

azure vm image list eastasia canonical ubuntuserver 16.04.0-LTS

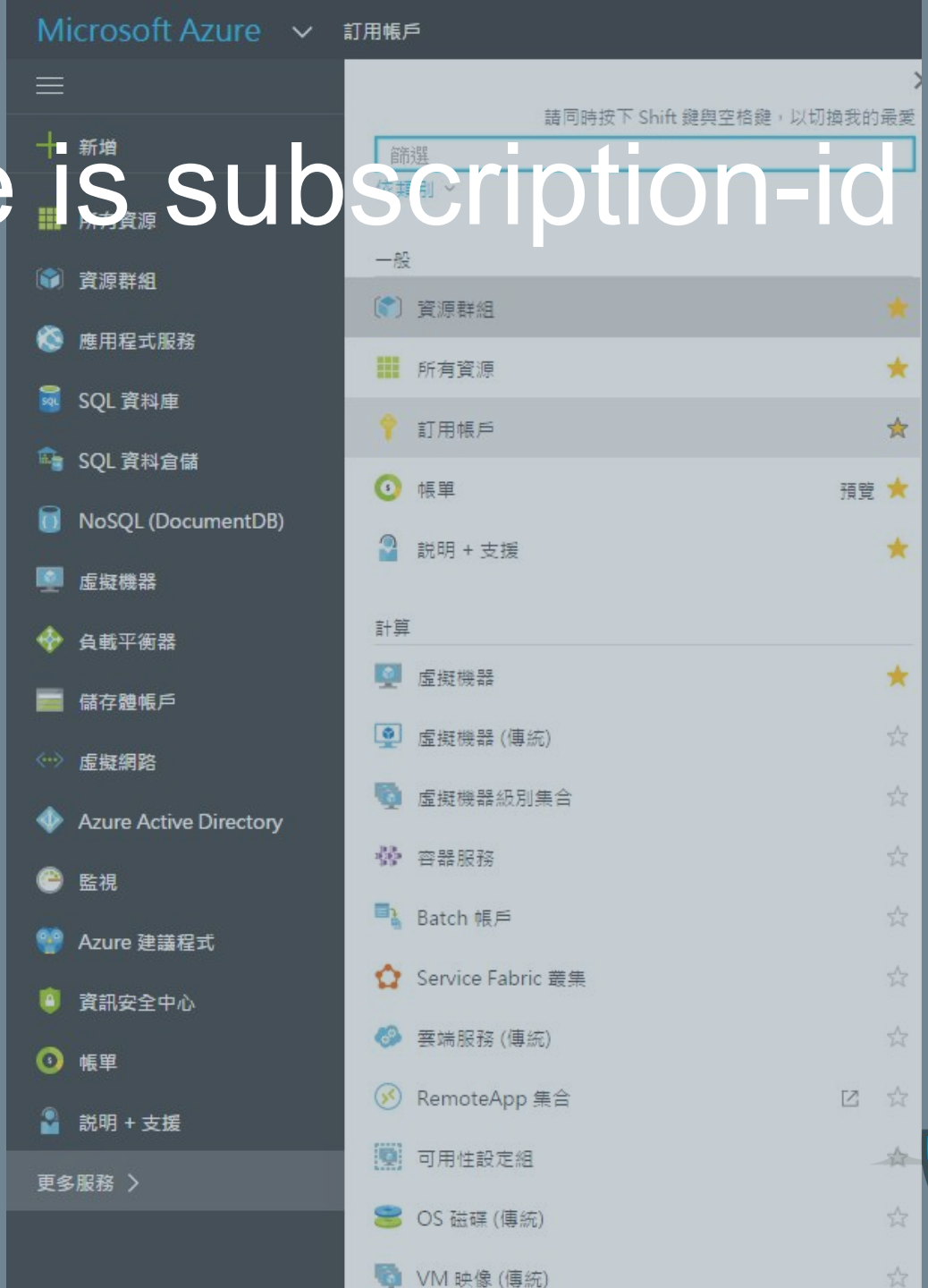
azure vm docker create

azure vm sizes --location "eastasia" | more

Machine Create

- Azure VM Size
- docker-machine create -d azure --azure-subscription-id="XXXXX" --azure-location="eastasia" --azure-image canonical:ubuntuserver:16.04.0-LTS:16.04.201611150 --azure-size Standard_D1_v2 --engine-install-url https://get.docker.com docker-0-0-1
- VM size list
- VM size pricing

Where is subscription-id ?



docker-machine ssh docker-0-0-1

sudo usermod -aG docker $USER

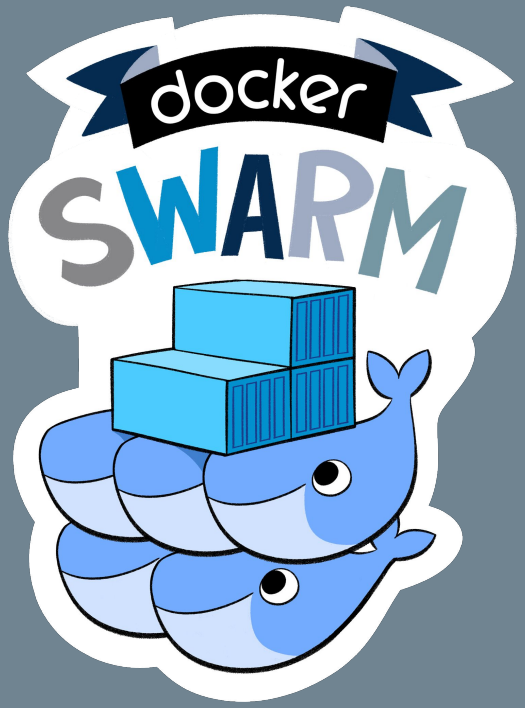
3.1 Docker Swarm Introduction

Docker Swarm

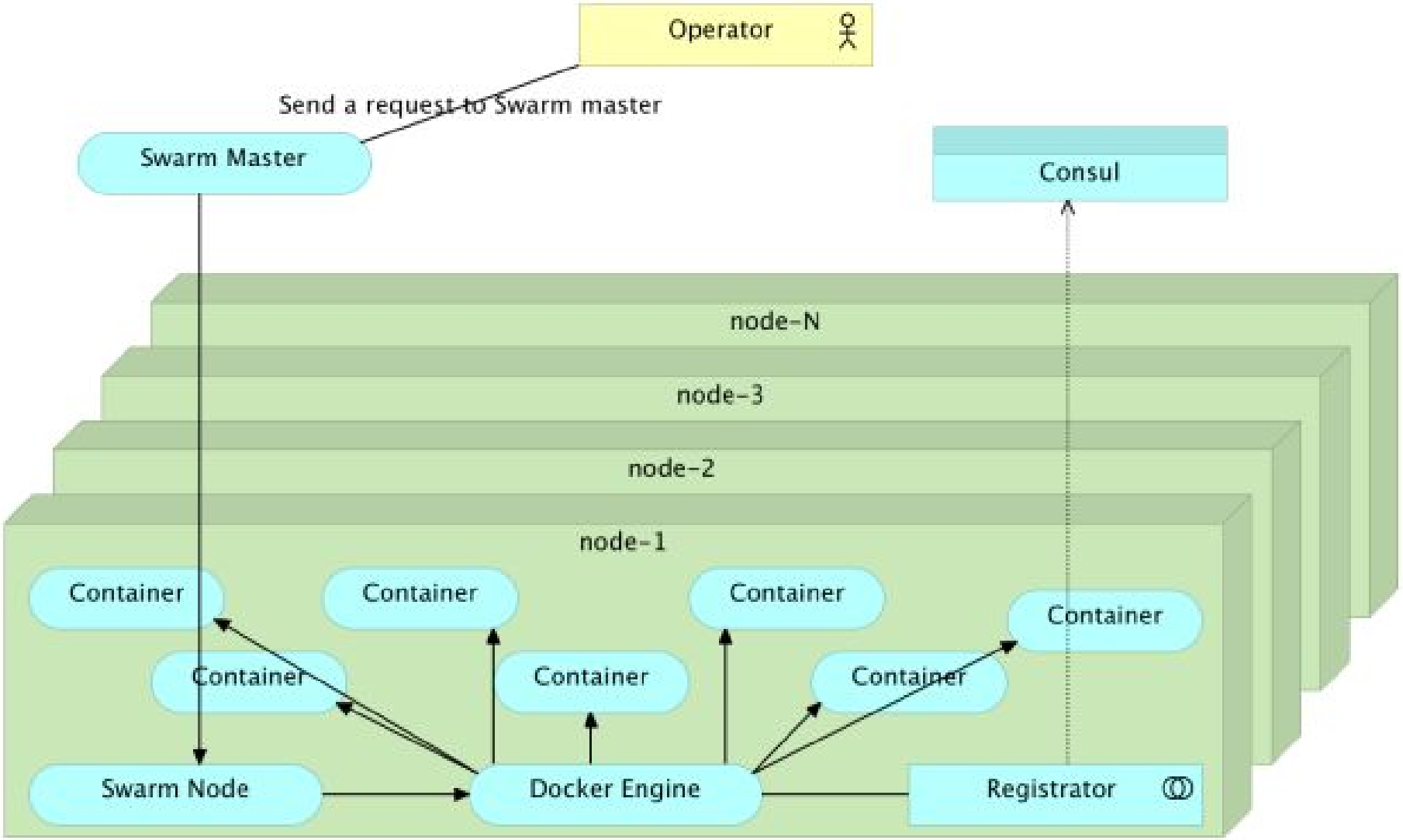
- Docker-native clustering system
- From v1.12 is default feature.
- Docker overlay network

[Play Swarm by Docker in Docker]

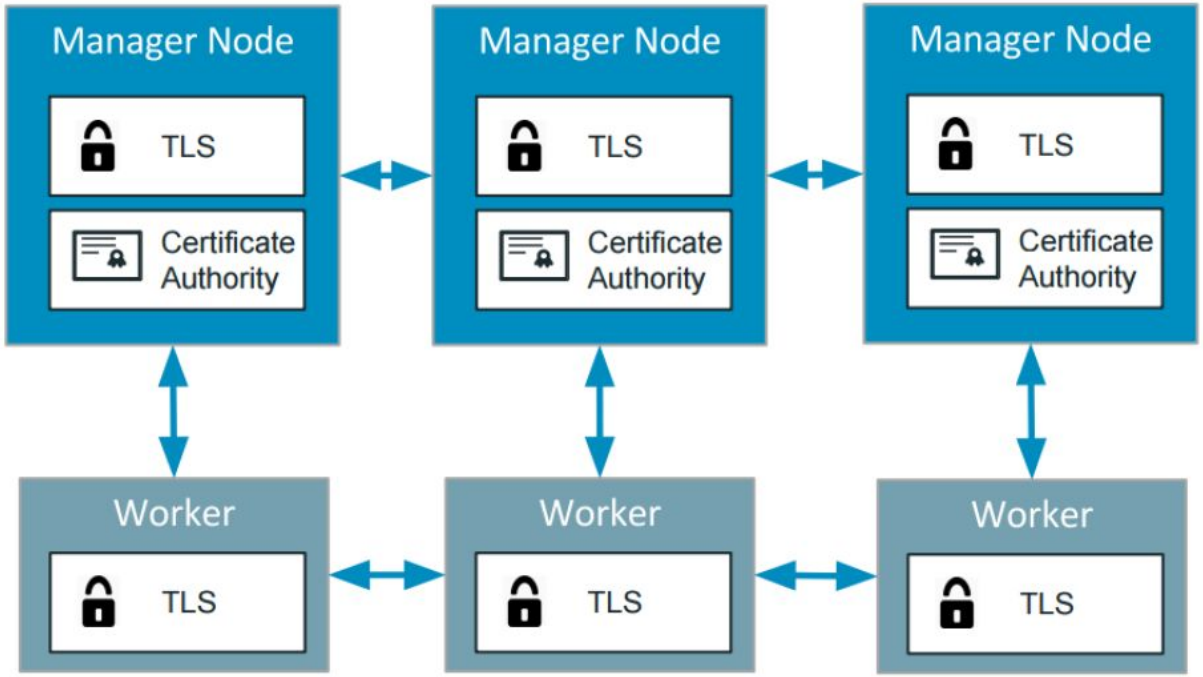
kubernetes



Old Swarm Architecture



New Swarm Mode (1/2)

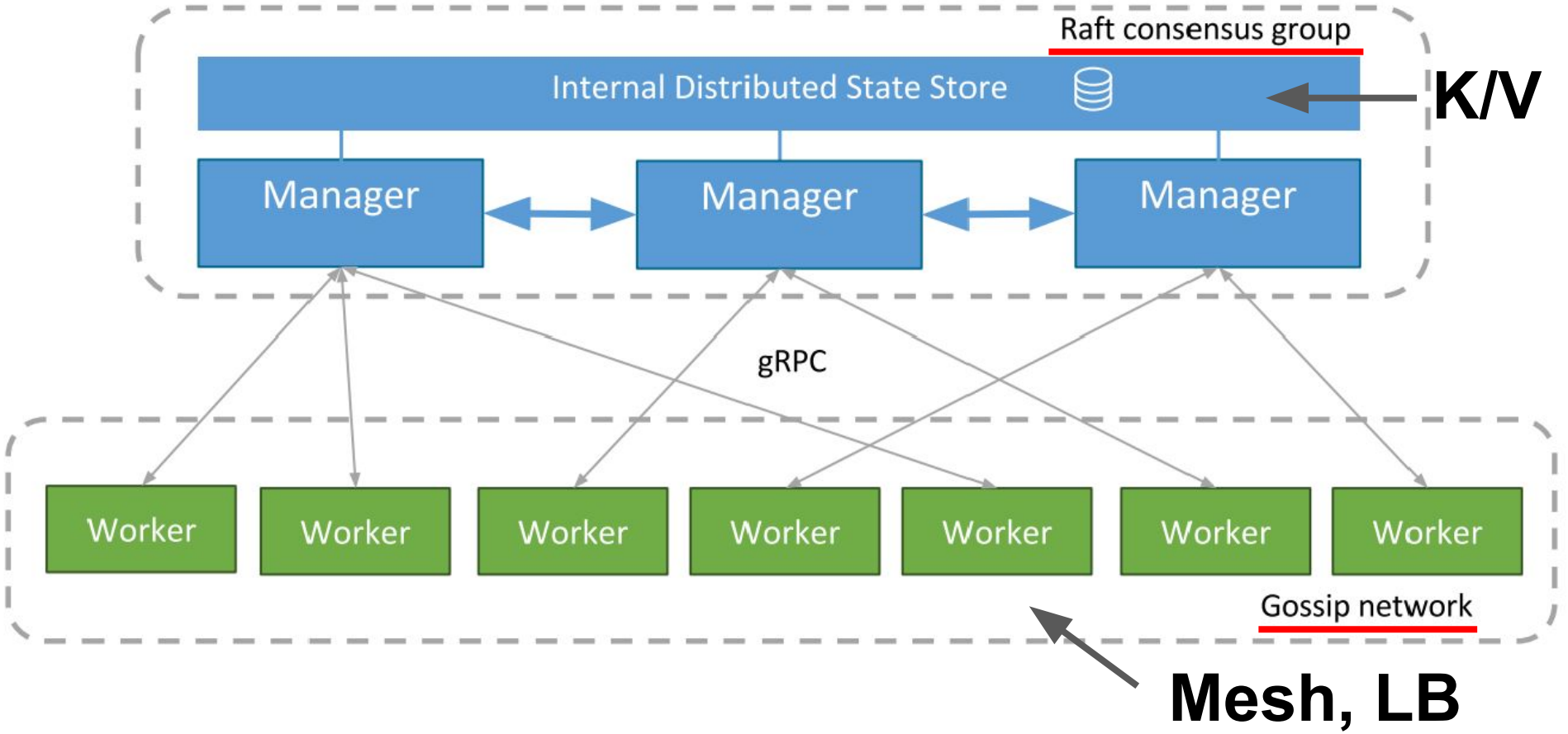


- Cryptographic node identity
- Automatic encryption and mutual auth (TLS)
- Automatic cert rotation
- External CA integration

[Byzantine Generals Problem]

New Swarm Mode (2/2)

Consul, HashiCorp



3.2 Docker Swarm Command-line

Docker Swarm commands

Commands:

init	Initialize a swarm
join	Join a swarm as a node and/or manager
join-token	Manage join tokens
update	Update the swarm
leave	Leave the swarm (workers only)

Manager also can leave

$ docker swarm -h

4. Docker Machine and Swarm Cluster

Machine Create Again

- docker-machine create -d azure --azure-subscription-id="XXXXX" --azure-location="eastasia" --azure-image canonical:ubuntuserver:16.04.0-LTS:16.04.201611150 --azure-size Standard_D1_v2 --engine-install-url https://get.docker.com docker-0-0-2

- docker-machine create again

Create Swarm Cluster

Check version: $ docker -v

$ docker info

$ docker swarm init

```
docker swarm join \
    --token SWMTKN-1-44ze8j7xkq5t \
    192.168.0.4:2377
```

$ docker-machine ssh docker-0-0-2

COPY & PASTE

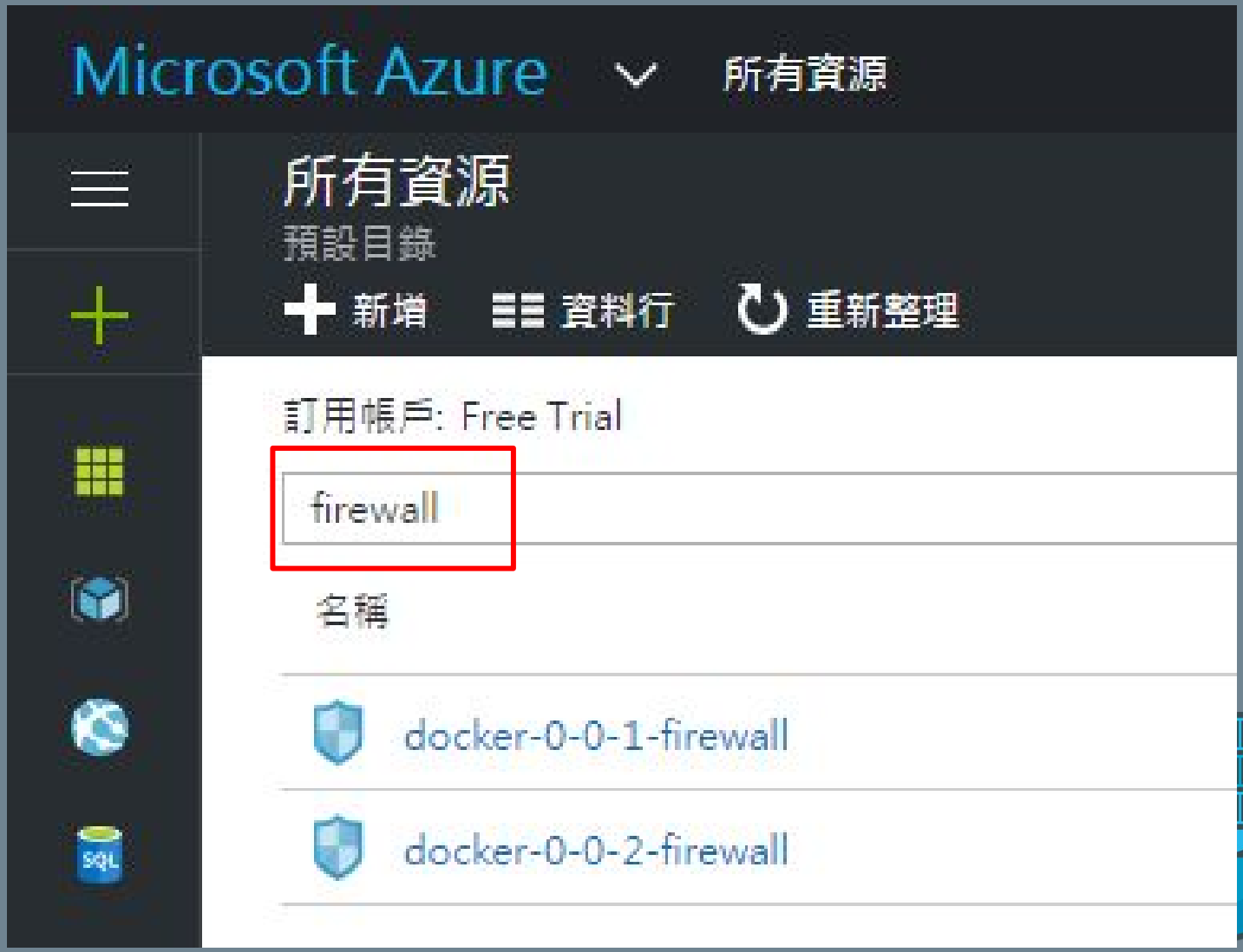
$ docker-machine ssh docker-0-0-3

docker swarm join docs

It’s so EASY!!!


docker-machine-vnet
虛擬網路
刪除
搜尋 (Ctrl+/)
概觀
活動記錄
存取控制 (IAM)
標記
設定
位址空間
已連線的裝置
子網路
DNS 伺服器
程式集
資源群組
docker-machine
位置
東亞
訂用帳戶名稱
Free Trial
訂用帳戶 ID
38ac9a31-2f7f-4ada-9483-6d284a16e7...
位址空間
192.168.0.0/16，及另外 2 個
DNS 伺服器
Azure 提供的 DNS 服務
2 連線的裝置
裝置
類型
IP 位址
子網路
docker-0-0-1-nic
網路介面
192.168.0.4
docker-machine
docker-0-0-2-nic
網路介面
192.168.0.5
docker-machine

Finding Firewall



Communication Ports

Docker Remote API: 2376 Swarm Listen Port: 2377

Container network discovery: 7946 TCP/UDP

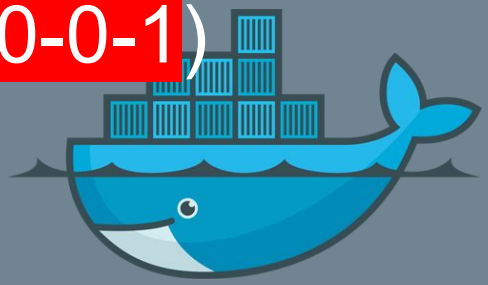
Container overlay network: 4789 UDP

優先順序	名稱	來源	目的地	服務	動作	
100	SSHAllowAny	任何	任何	SSH (TCP/22)	Allow	...
300	DockerAllowAny	任何	任何	自訂 (TCP/2376-2377)	Allow	...
310	DockerNode	任何	任何	自訂 (任何/7946)	Allow	...
320	overlay	任何	任何	自訂 (任何/4789)	Allow	...
330	web	任何	任何	自訂 (任何/80)	Allow	...

Check Swarm Cluster

```
$ docker info
    Managers: 1
    Nodes: 2
$ docker node ls
ID                           HOSTNAME      STATUS  AVAILABILITY  MANAGER
STATUS
29zkgygdq6el0ylwtov5xksy2    docker-0-0-2  Ready   Active
bbf3b27xkybups1foh750qf15 *  docker-0-0-1  Ready   Active        Leader

$ eval $(docker-machine env docker-0-0-1)
```



Docker node commands

Commands:

demote	Demote one or more nodes from manager in the swarm
inspect	Display detailed information on one or more nodes
ls	List nodes in the swarm
promote	Promote one or more nodes to manager in the swarm
rm	Remove one or more nodes from the swarm
ps	List tasks running on a node
update	Update a node

```
$ docker node ls
$ docker promtoe docker-0-0-2
$ docker node ls
$ docker demtoe docker-0-0-2
$ docker node ls
```

5. Docker Swarm Networking

Docker Built-In Network Drivers

- Bridge
- Overlay
- MACVLAN
- Host
- None

Docker Plug-In Network Drivers

- weave
- calico

Docker Plug-In IPAM Drivers

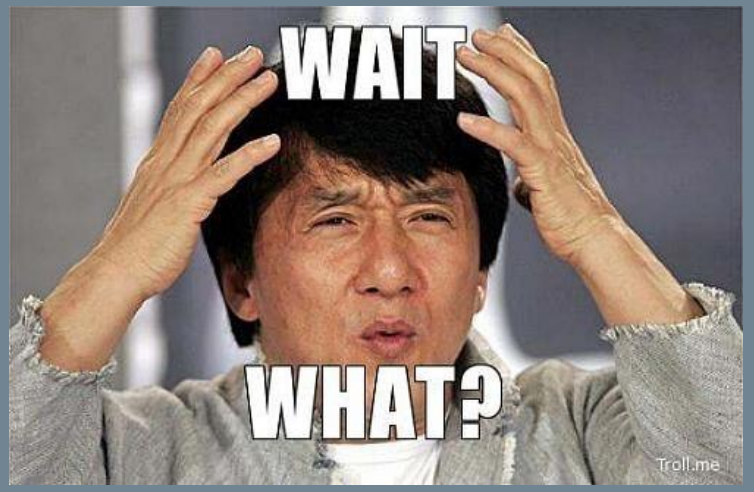
- infoblox

No more “link”, just use network.

Docker Reference Architecture: Designing Scalable, Portable Docker Container Networks

Exercise

```
$ docker network ls
$ docker network create --driver overlay my-network
$ docker network inspect my-network
$ docker service create \
  --replicas 3 \
  --name my-web \
  --network my-network \
  nginx:alpine
$ docker service ps my-web
$ docker network inspect my-network
$ docker ps
$ docker exec -ti XXXXX sh
$ nslookup my-web
```



$nslookup tasks.my-web

6. Docker Swarm playground & Swarm service

Docker service commands

Commands:

create	Create a new service
inspect	Display detailed information on one or more services
ps	List the tasks of a service
ls	List services
rm	Remove one or more services
scale	Scale one or multiple services
update	Update a service

Service Create Exercise

```
$ docker network create --driver overlay wp_db
$ docker network inspect wp_db
$ docker service create \
  --name db --network=wp_db \
        -e MYSQL_ROOT_PASSWORD=wordpress \
        -e MYSQL_DATABASE=wordpress \
        -e MYSQL_USER=wordpress \
        -e MYSQL_PASSWORD=wordpress \
        mysql:5.7

$ docker service create \
  --name wp -p 80:80 --network=wp_db \
        -e WORDPRESS_DB_HOST=db:3306 \
        -e WORDPRESS_DB_PASSWORD=wordpress \
        wordpress:4.5
```

Service Rolling updates

```
$ docker service scale wp=3
$ docker service update \
  --image wordpress:4.6 \
  --update-delay 10s \
  --update-parallelism 1 \
  wp
$ docker service ps wp
```

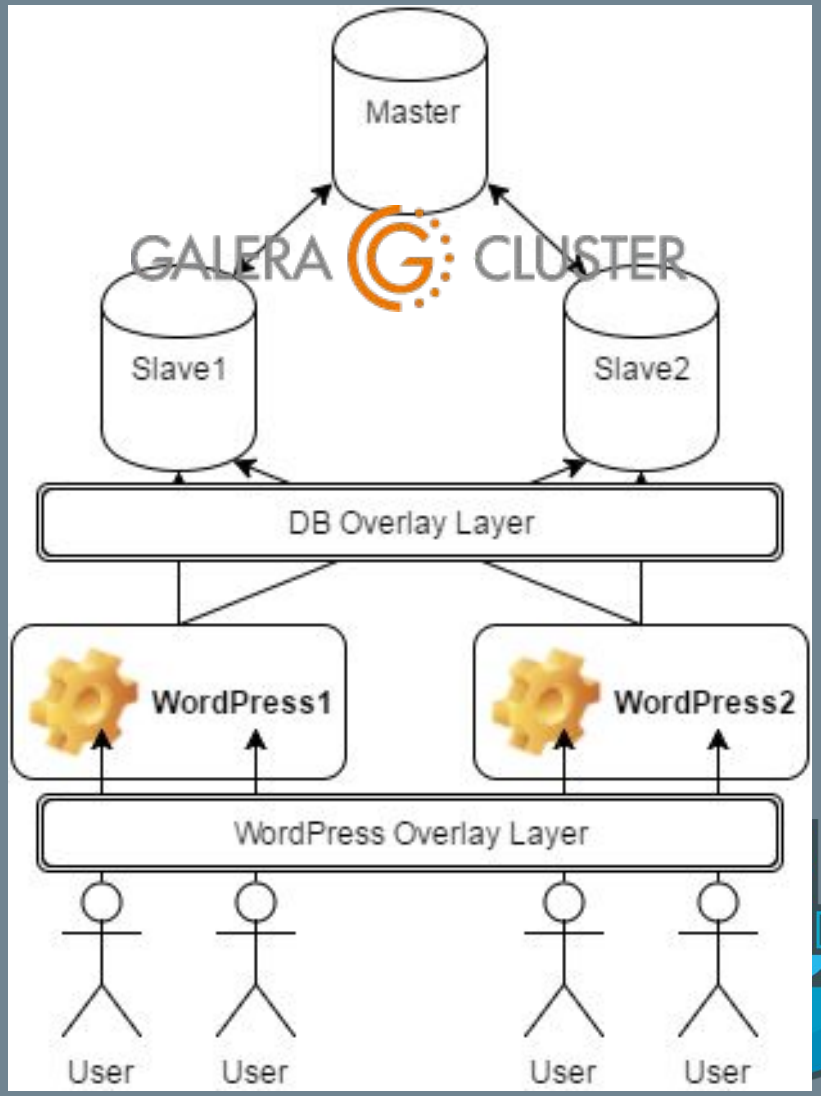
docker service update docs

Swarm & MySQL Cluster

Docker Swarm for MySQL Cluster & WordPress

Katacoda online lab.

1. Getting Started Galera with Docker, part 1
2. Getting Started Galera with Docker, part 2



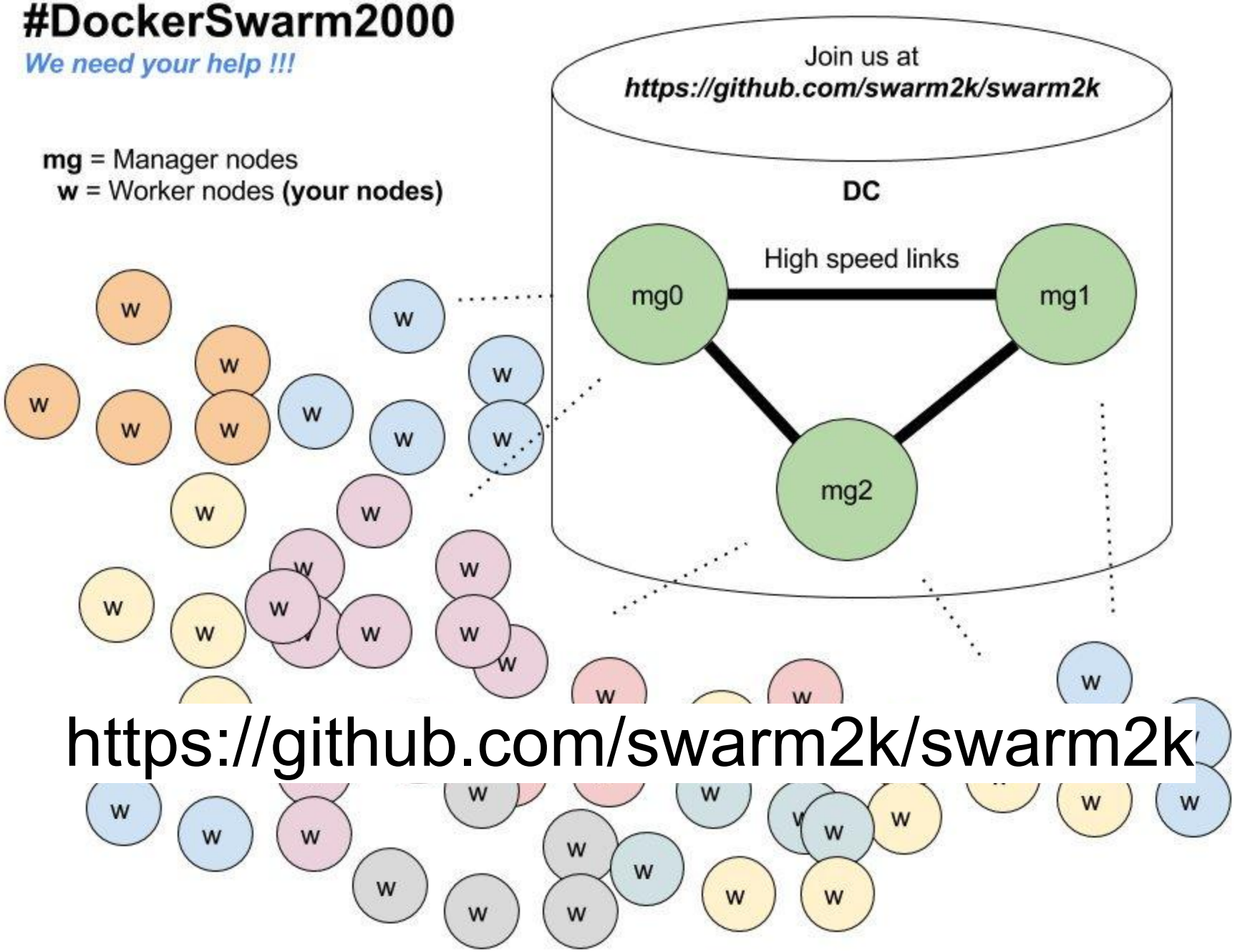
More Advanced Docker Workshop

Play Bigger!!!
ALL Docker Machines
Join Together!!!

A Global-Scale Collaborative Experimental Project on the Docker Swarm mode

#DockerSwarm2000

We need your help !!!



https://github.com/swarm2k/swarm2k

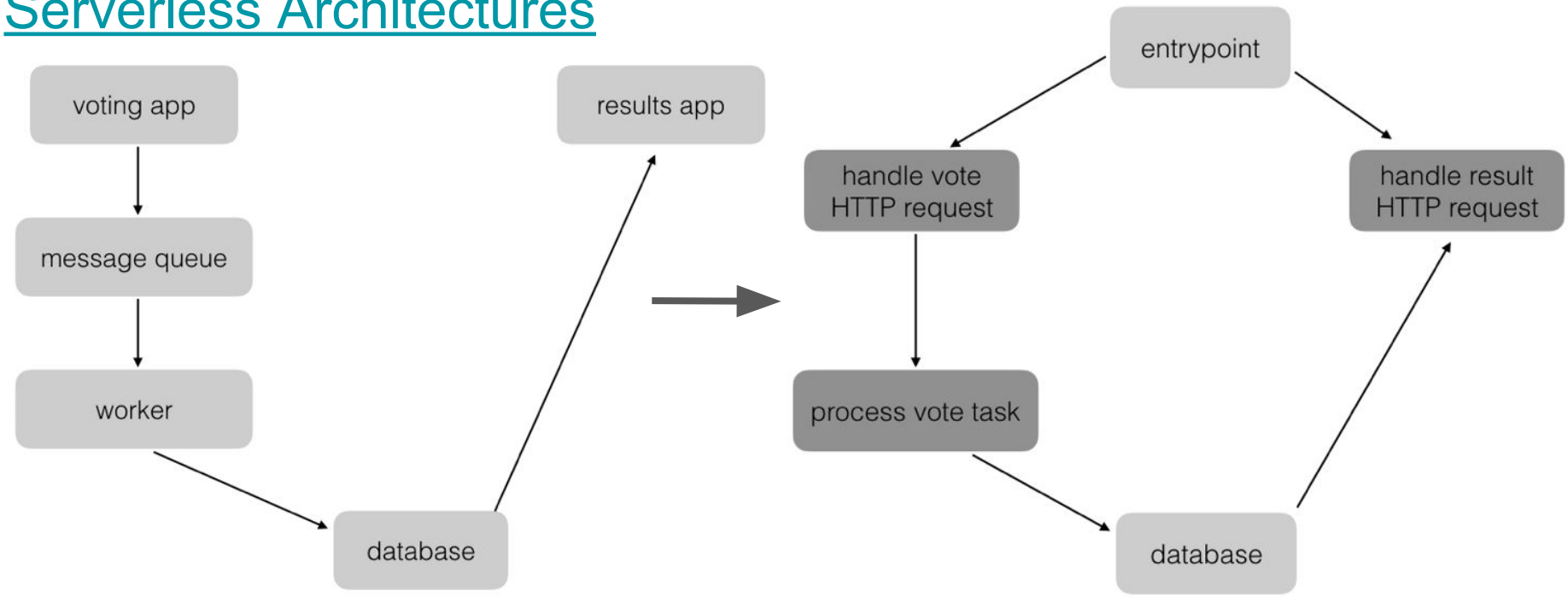
7. The Future of Cloud Computing

Serverless Arch. & Docker

[Building Serverless Apps With Docker]

[Serverless Docker Example Voting App]

[Serverless Architectures]




Container is the SAME.
LIVE. DIE. REPEAT.

Container Orchestration

Docker Swarm

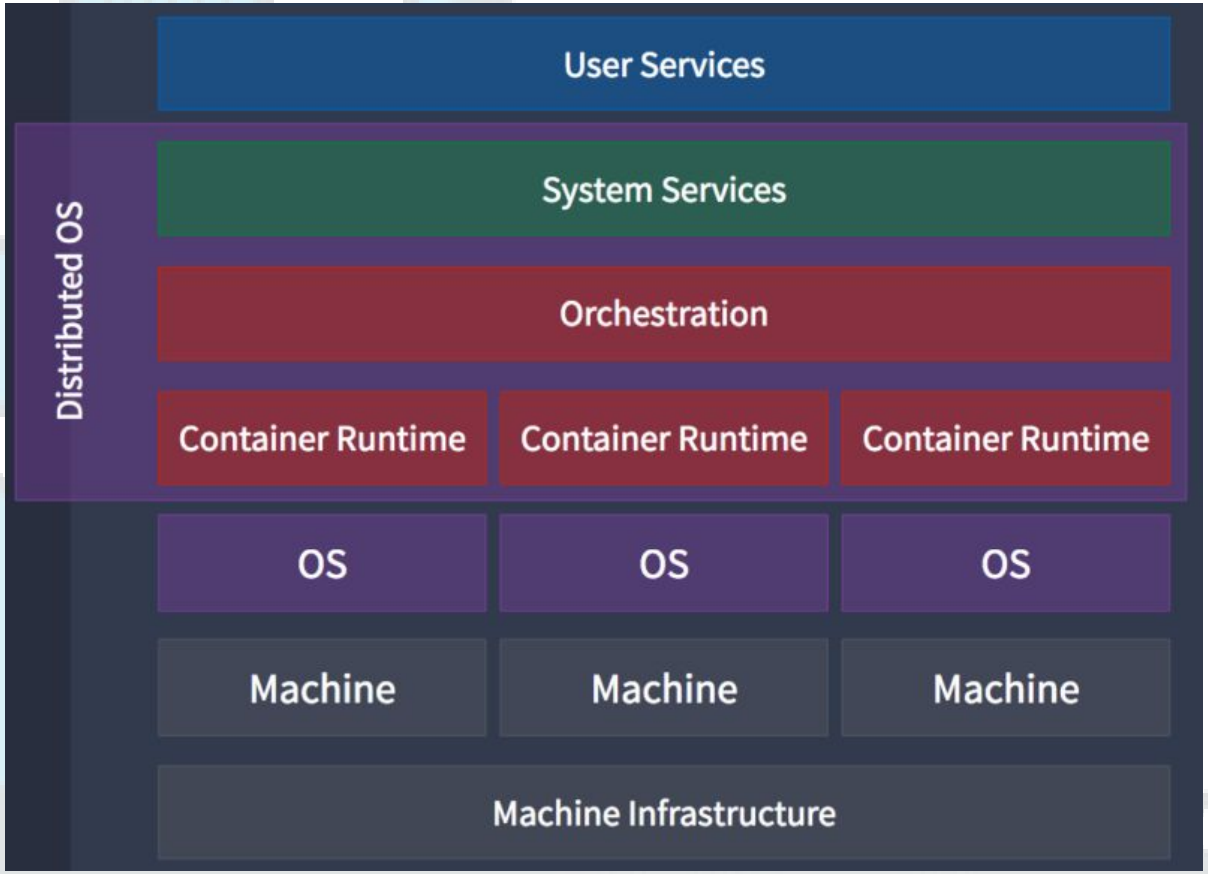
<u>Kubernetes</u>

DC/OS

Rancher

Docker Datacenter

???



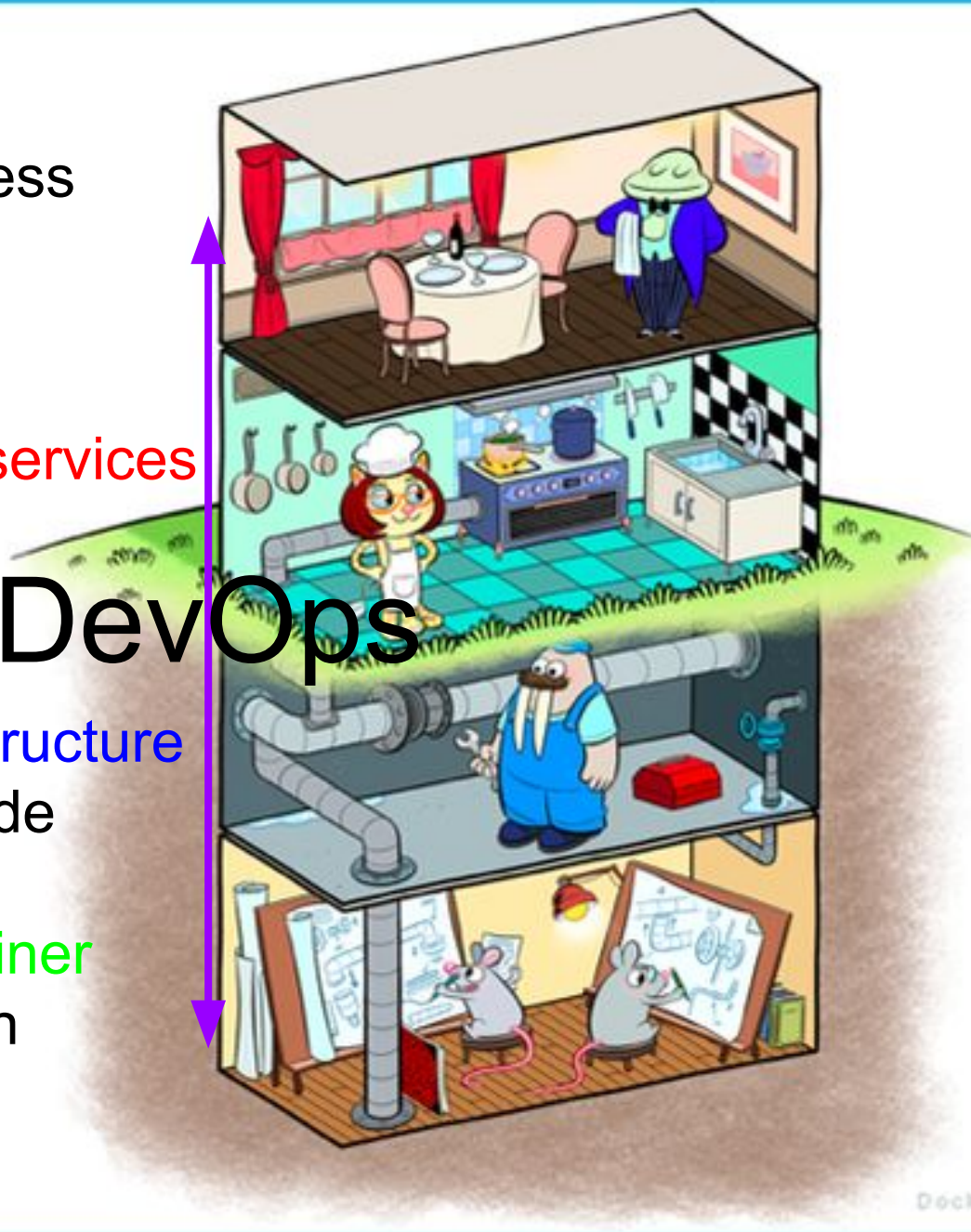
The Docker Stack

Business model

Microservices

Infrastructure as Code

Container Design



The Docker Stack

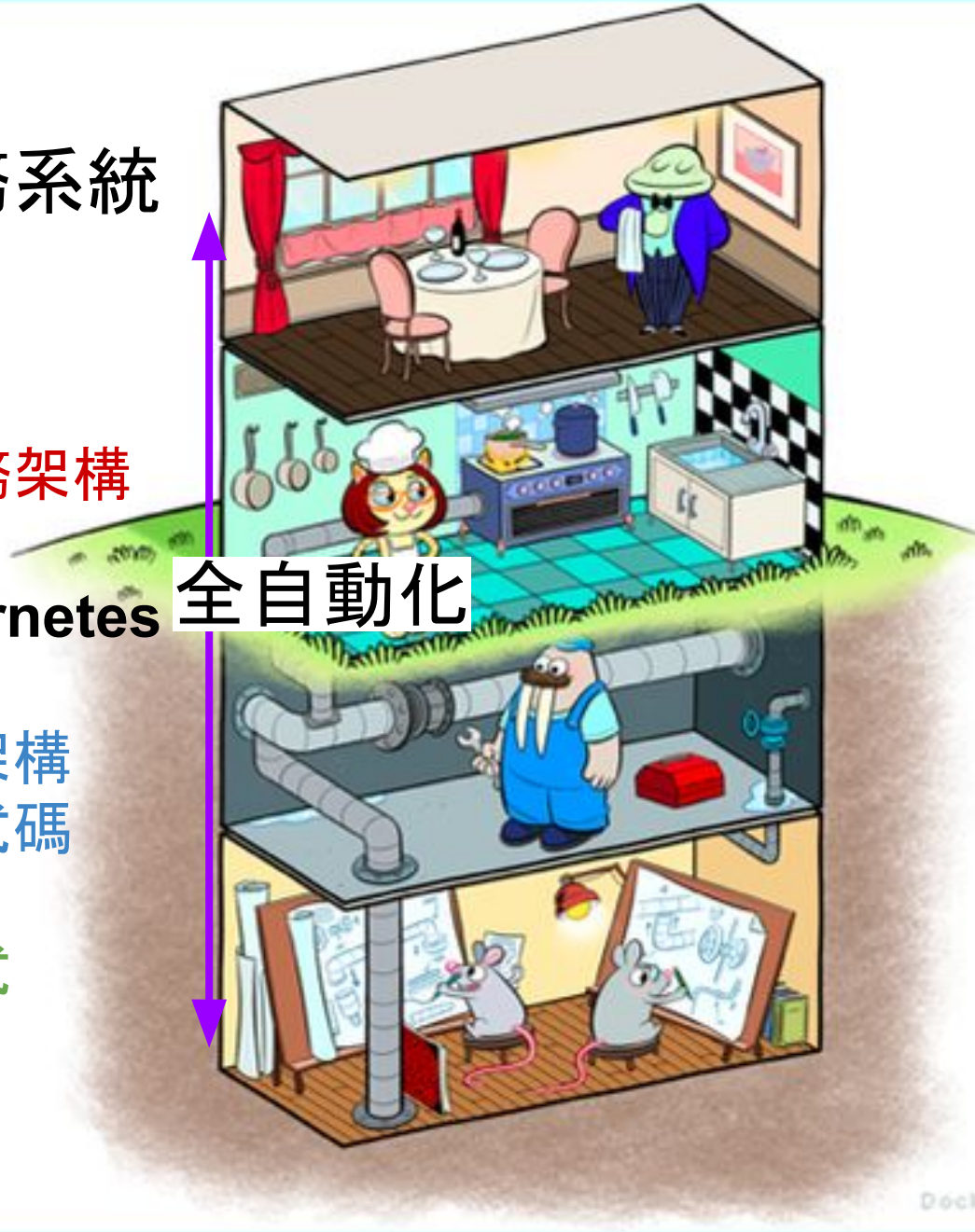
*業務系統

微服務架構

Kubernetes 全自動化

基礎架構
即程式碼

容器式
設計



System architecture
= Organizational architecture

大量自動化、系統人員減少

Conway's Law

DevOps in the Enterprise

Microservices AntiPatterns

Microservices in action

奇谈怪论:从容器想到去IOE、去库存和独角兽

容器化技术构建一个“反脆弱”的交易系统

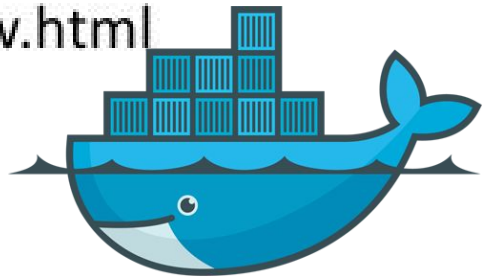
Conway's Law

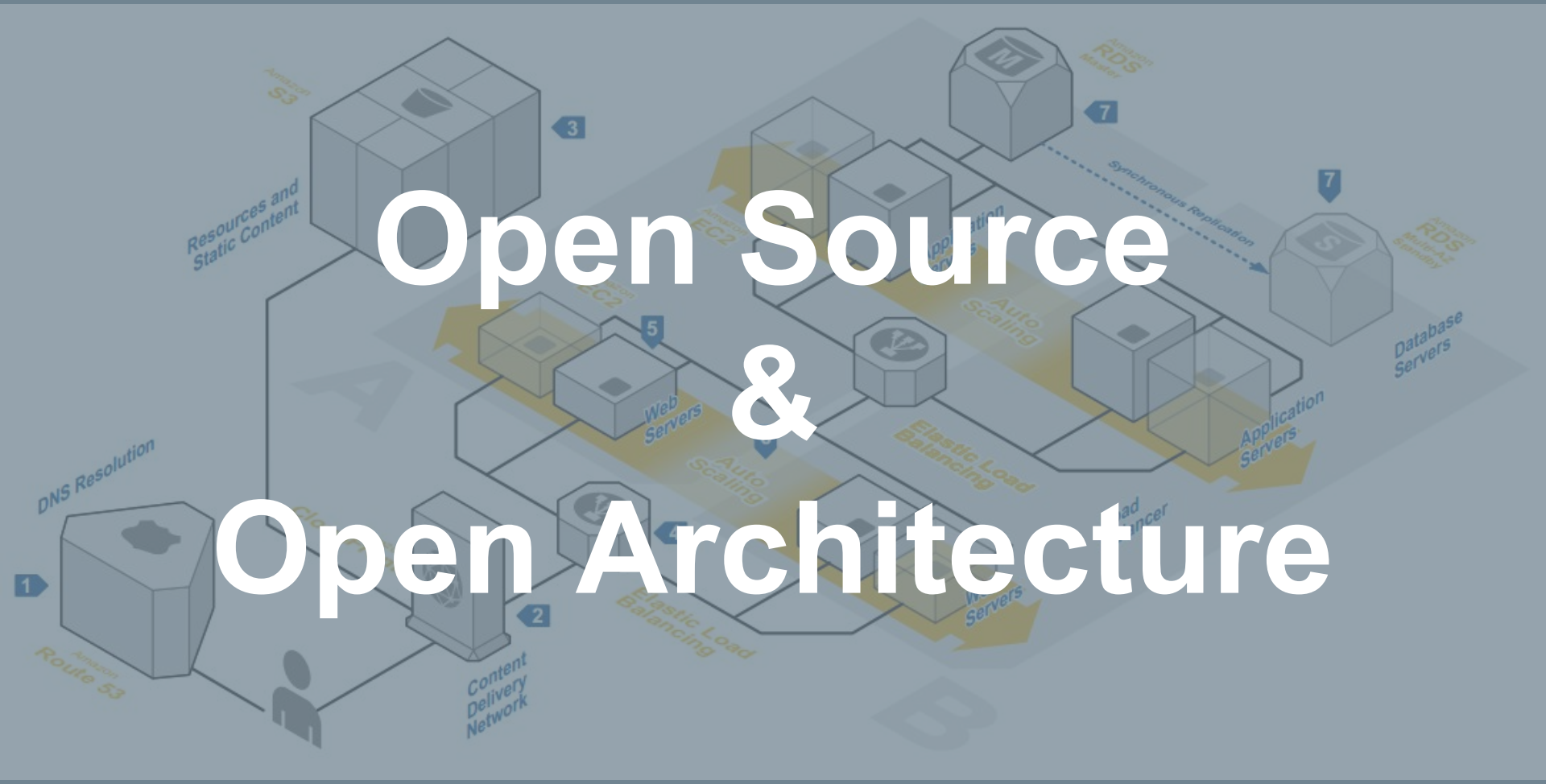
organizations which design systems (in the broad sense used here) are constrained to **produce designs which are copies of the communication structures**

of these organizations

Melvin Conway, Datamation, **1968**

http://www.melconway.com/Home/Conways_Law.html



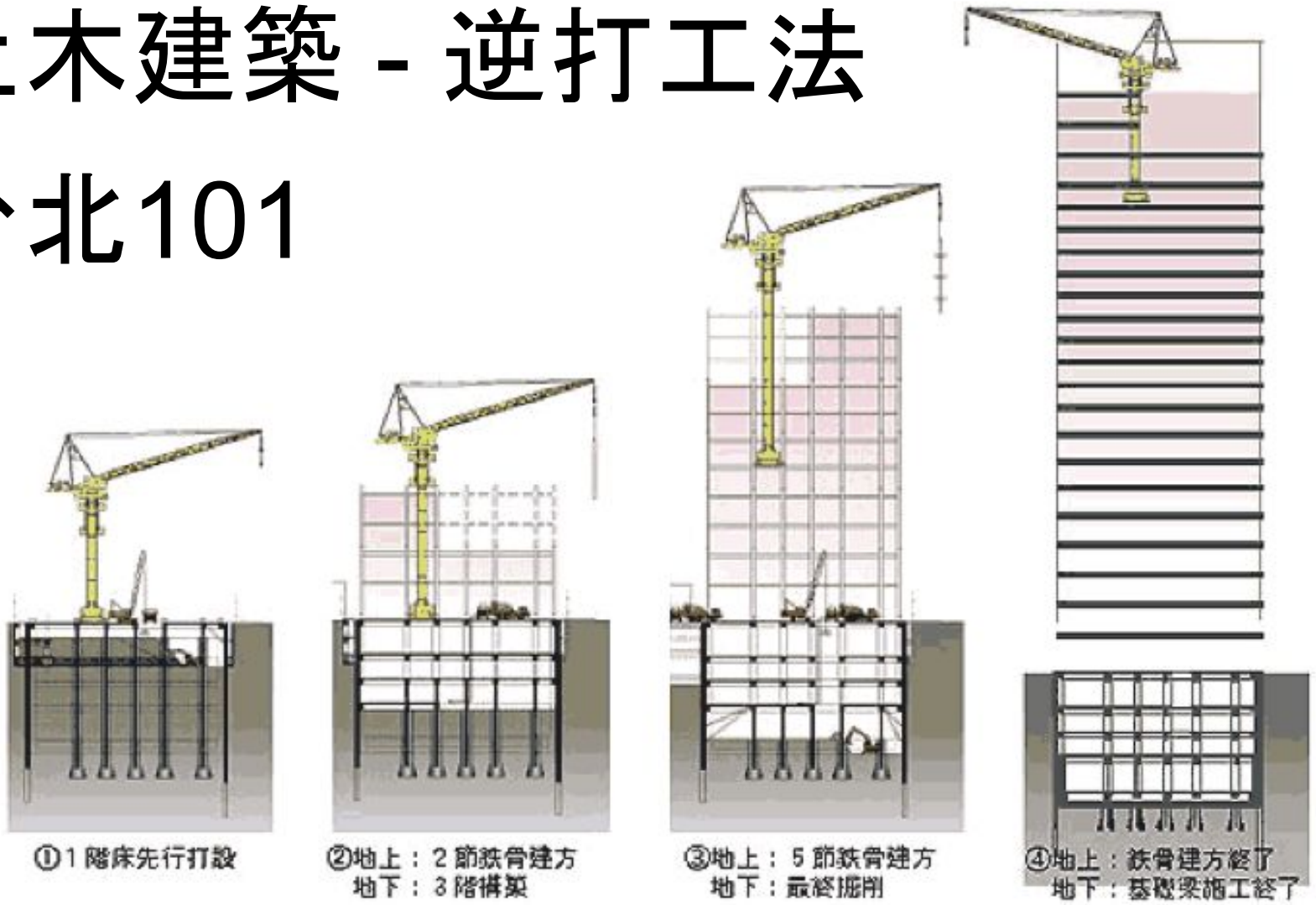


Open Source & Open Architecture

Top-down Approach

土木建築 - 逆打工法

台北101



	引爆点	开发技术载体	软件架构风格	客户端发布	服务器端交付
Mainframe	IBM System/360（第一代多用途计算主机），首次分离"架构"与"实现"的概念	打孔机、汇编、Fortran 77	一体	"笨终端" – Dumb Terminal	见过并且活着的人已经不多。。。
C/S	X86/PC、RISC、摩尔定律、HP/Sun/传说中的 SGI 和 NexT 工作站	Unix、4GL、Sybase、高级语言、X/Motif、DCE RPC、DCOM、CORBA-IIOP	2 层架构、关系型数据库主导	软件 CD 安装、升级	软件 CD 安装升级、数据库迁移
Multi-tiered	互联网/Web	Struts+Spring+Hibernate、Tomcat、WebLogic、Websphere、Oracle、PHP、Ruby...	3 层至多层 – 展示层、整合层、业务逻辑层、持久层、存储层。。。	浏览器刷新一下页面	手工部署脚本、JAR、WAR、存储过程等等，数据库迁移。开始有 CI
SOA + RIA	互联网技术进入企业	SOAP、REST、Flash/AIR、AJAX、RMI/其他 Remoting、WSDL、UDDI。。。	对于用户像 C/S，对于开发者是 Multi-tiered	浏览器刷新一下、升级（例如通过 AIR）等	同上
Distributed	Web 2.0、NoSQL（BigTable）、云	函数类、动态、脚本语言，非关系型数据库，一致性算法（Raft、Paxos、Zookeeper），响应式服务器（nginx、Node.js。。。）	Reactive 响应式架构、Heroku 12-factors	多元化 – 手机 App、内嵌浏览器（例如 Webkit、Chromium）的富终端、网站	自动化部署 – Chef、Puppet、Ansible，CI/CD，DevOps 开始
Containerized	LXC、Docker	同上，但更规范（通过 PaaS 如 K8S – 遵循其最佳实践）	同上，但更规范	同上	同上，加不可变基础设施（immutable infrastructure）运维，加基于容器编排技术的 CI/CD
Serverless?	Amazon Lambda	脚本类语言更容易	透明	同上	仅需交付源代码

docker

Online Self-paced exam.

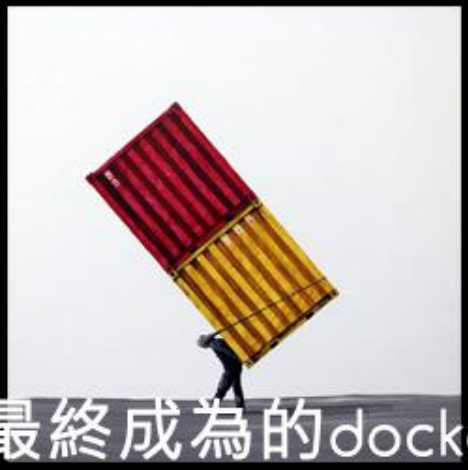
老闆眼中的docker

外界認為的docker

dxxr Inc.眼中的docker

原本以為的docker

實際上的docker



最終成為的docker

Thanks Microsoft Taiwan provide Azure with Lab environment.

m(_ _)m

Hope You Love Docker
So long!