Managing Kubernetes

2021-04-23
written by whatwant

Agenda

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※ 참고 : https://home.modulabs.co.kr/product/managing-kubernetes/

1 week
Docker and Kubernetes

Docker

A Brief History of Containers: From the 1970s Till Now

1979: Unix V7 – chroot 도입

2000: FreeBSD Jails – 서비스와 고객 서비스를 구분하기 위해 여러 개의 독립적이고 작은 시스템(jails)으로 분할

2001: Linux VServer - Jails와 유사하게, 리소스(파일 시스템, 네트워크 주소, 메모리)를 분할 할 수 있는 운영 체제 가상화를 Linux 커널 패치로 구현

2004: Solaris Containers – 첫 번째 공개 베타 출시

2005: Open VZ (Open Virtuzzo) - 가상화, 격리, 리소스 관리 및 체크 포인트를 위해 패치 된 Linux 커널을 사용하는 Linux 용 운영 체제 수준의 가상화 기술

2006: Process Containers - 2006년 Google 출시. 리소스 사용량(CPU, Mem, Disk I/O, NW)을 제한, 계산 및 격리하도록 설계. 1년 후 "cgroups"으로 이름 변경.

2008: LXC (LinuX Containers) – 컨테이너 관리자의 가장 완벽한 최초 구현. cgroups & namespace를 사용하여 구현.

2011: Warden – CloudFoundry에서 초기는 LXC를 사용하고 나중에 자체 구현으로 대체. cgroups, namespace 및 프로세스 수명주기 관리 서비스 포함.

2013: LMCTFY (Let Me Contain That For You) – Linux 애플리케이션 컨테이너를 제공하는 Google 컨테이너 스택의 오픈 소스 버전. 2015년 중단.

2013: Docker - 컨테이너 인기 폭발. 초기 단계 LXC 사용, 추후 자체 라이브러리 libcontainer로 대체.

2014: Kubernetes (Google)

2015: Kubernetes to CNCF

2016: The Importance of Container Security Is Revealed – DevSecOps

2017: Container Tools Become Mature – 컨테이너 도구의 성숙

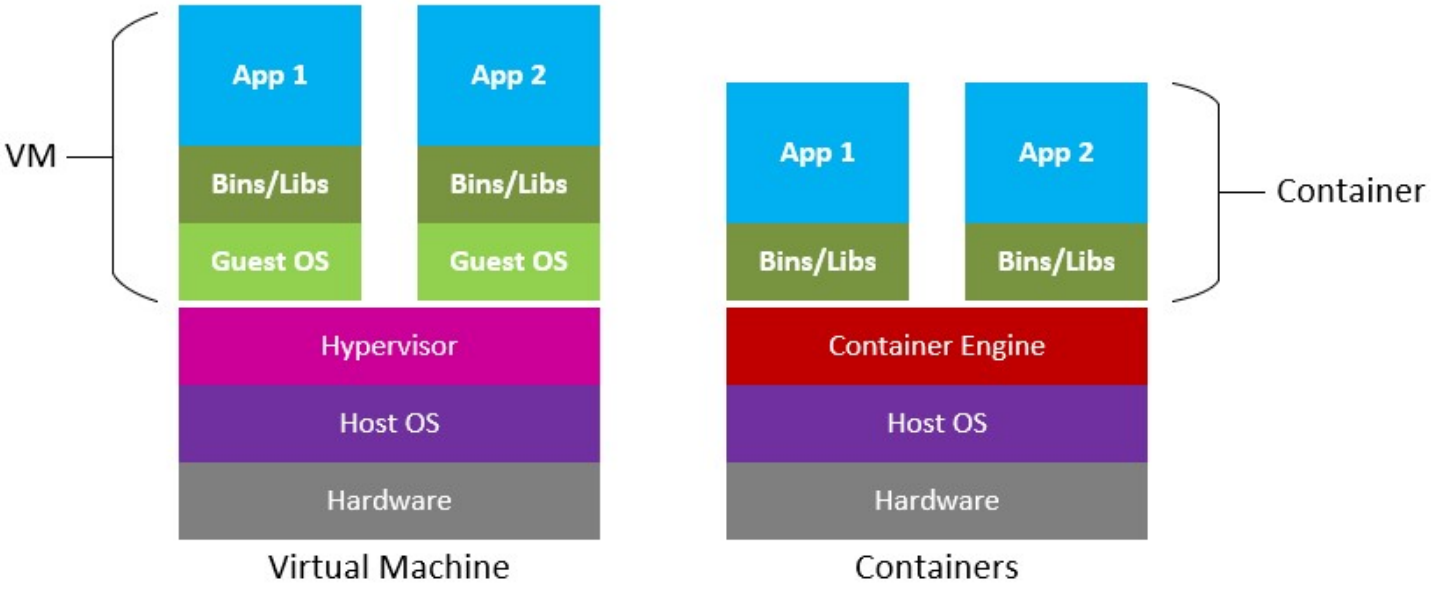
2017: containerd to CNCF (Docker)

2018: The Gold Standard – 시장 표준

2019: A Shifting Landscape - 변화

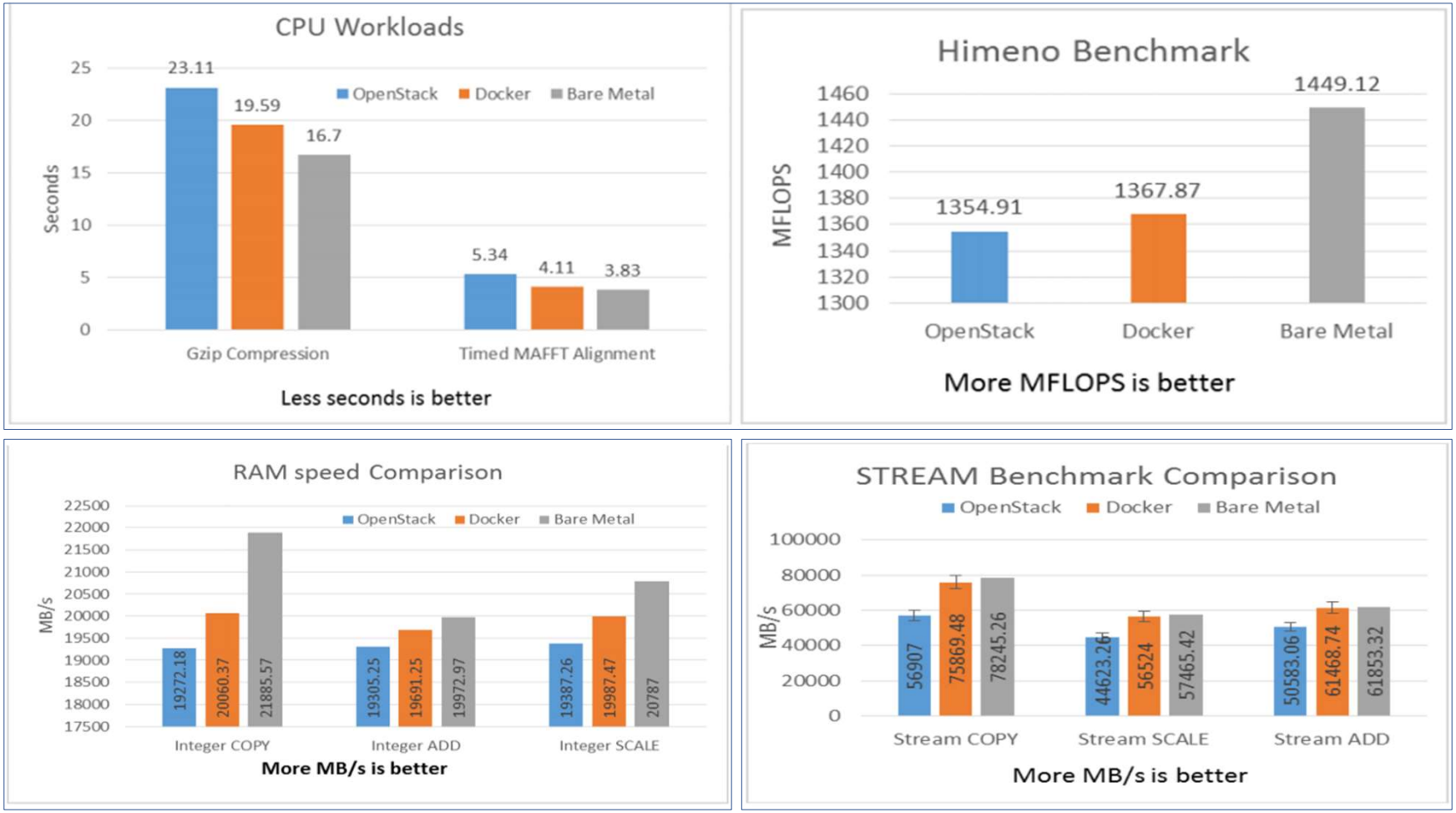
※ 참고 : https://blog.aquasec.com/a-brief-history-of-containers-from-1970s-chroot-to-docker-2016

Virtual Machine vs. Containers



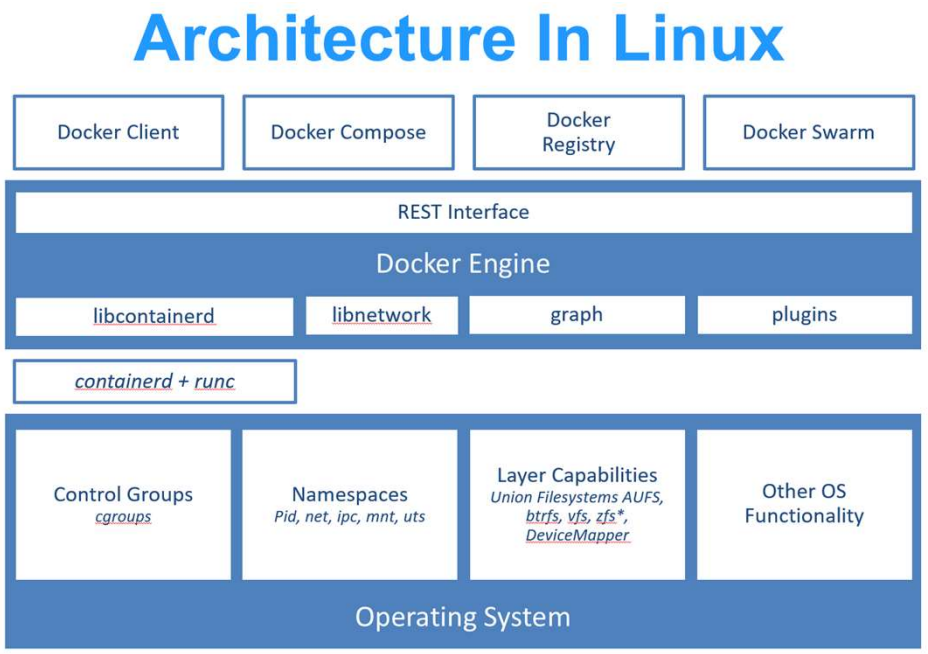
※ 참고 : https://cloudblogs.microsoft.com/opensource/2019/07/15/how-to-get-started-containers-docker-kubernetes/

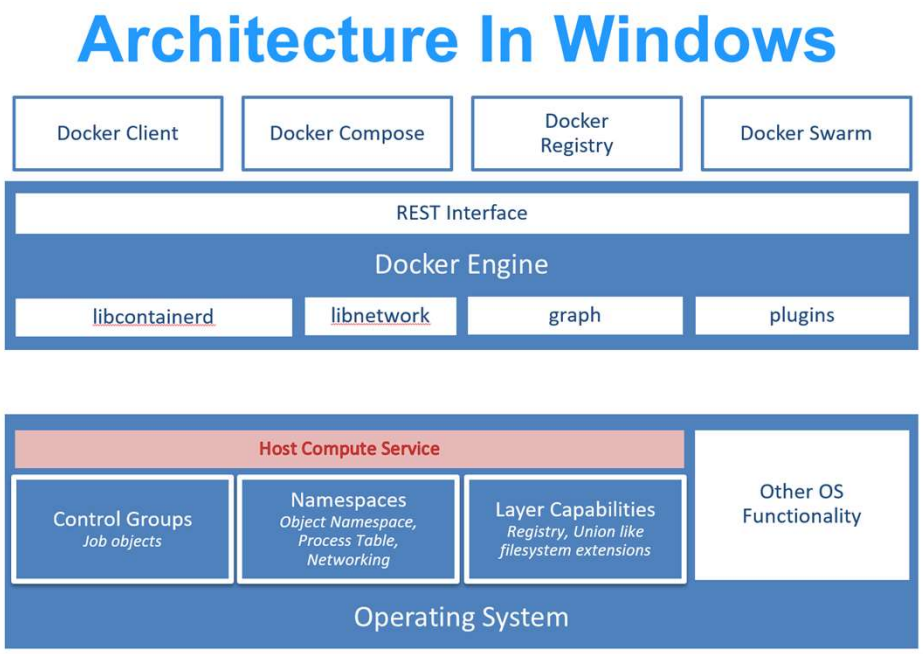
Docker Container vs. Openstack Virtual Machine vs. Bare Metal Server



※ 참고 : http://ijeecs.iaescore.com/index.php/IJEECS/article/view/7925

Docker Container Architecture

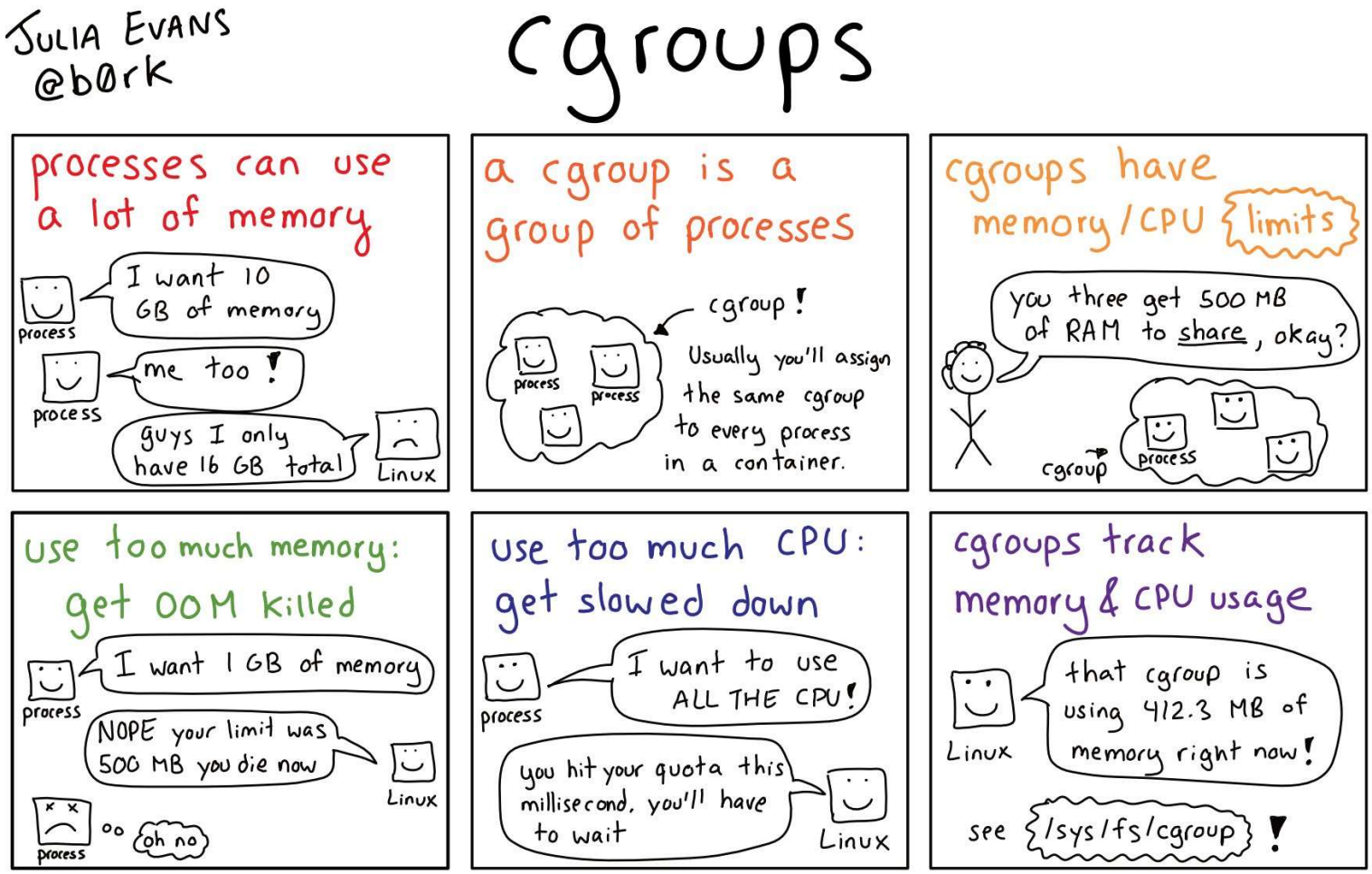




▶ HCS (Host Compute Service) : Hyper-V의 저수준 컨테이너 관리 API

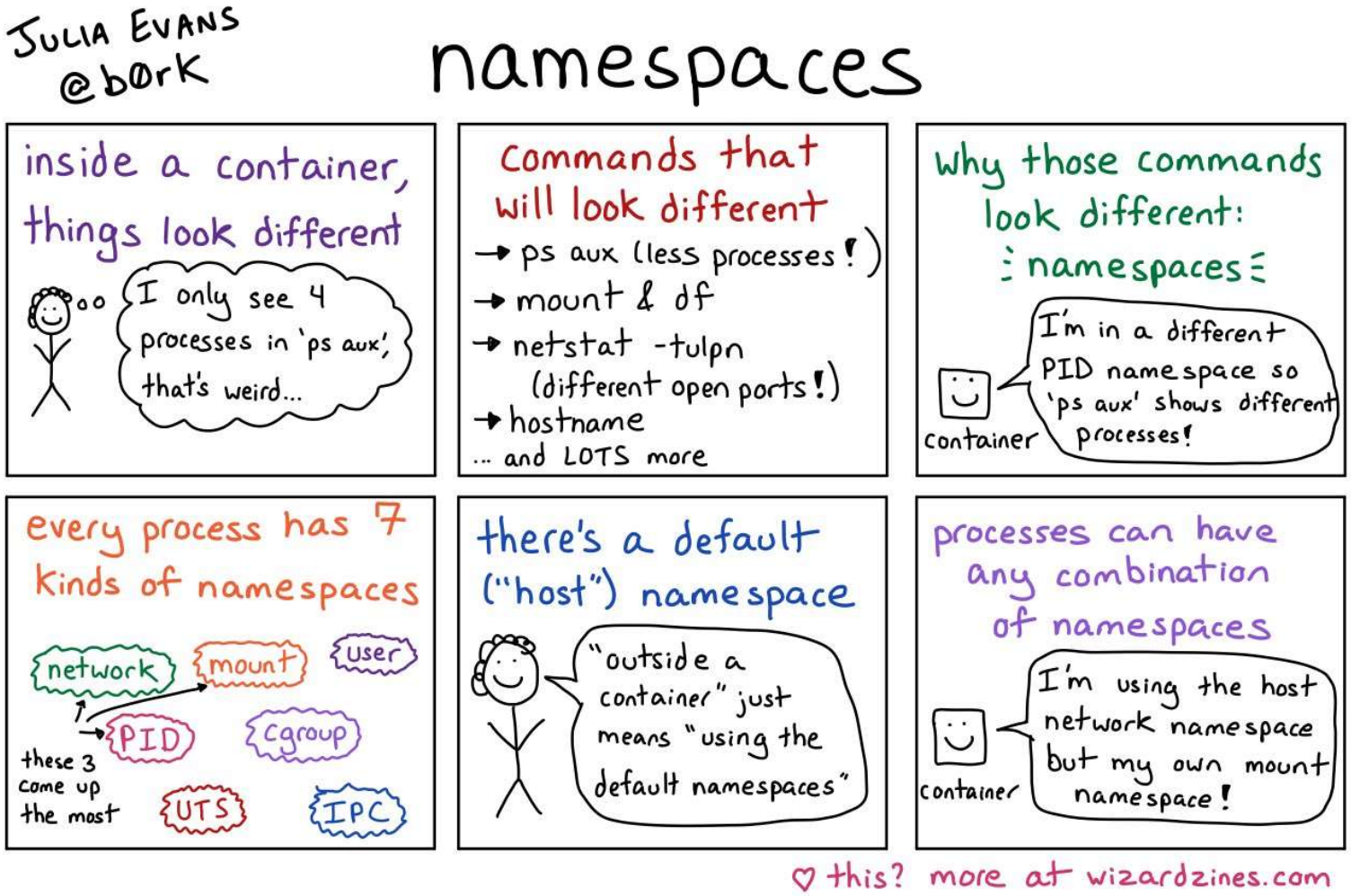
※ 참고 : https://docs.microsoft.com/ko-kr/virtualization/windowscontainers/deploy-containers/containerd

cgroup



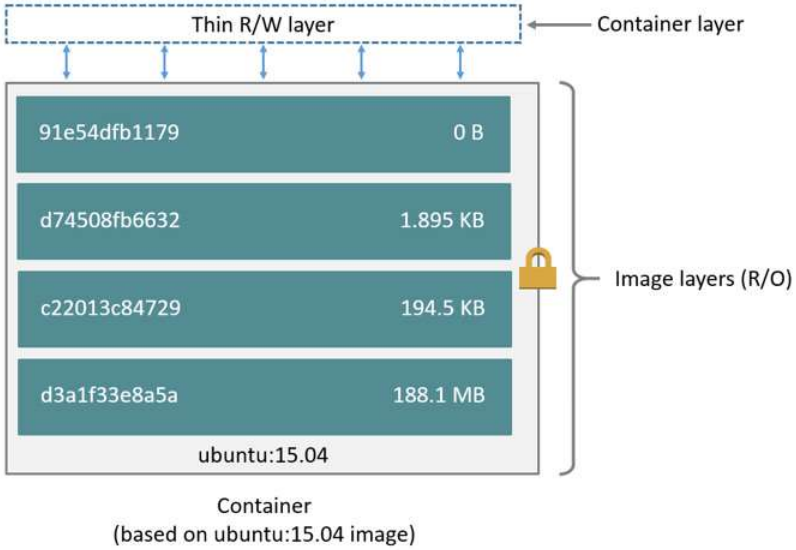
※ 참고 : https://twitter.com/b0rk/status/1214341831049252870

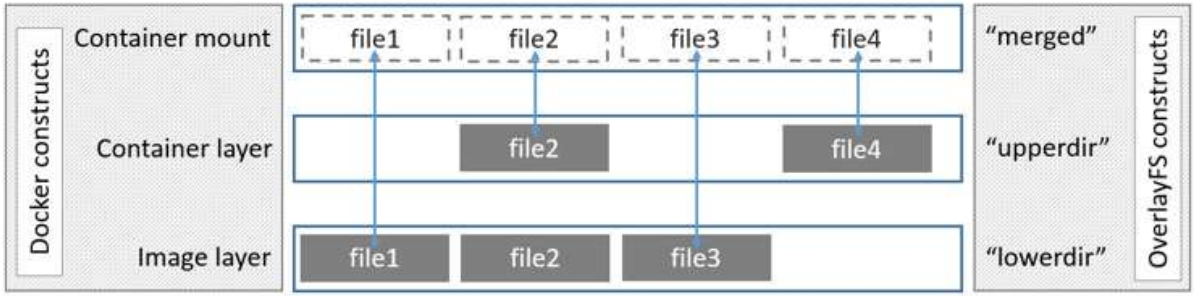
namespace



※ 참고 : https://twitter.com/b0rk/status/1240364585766576128

Docker Storage Driver





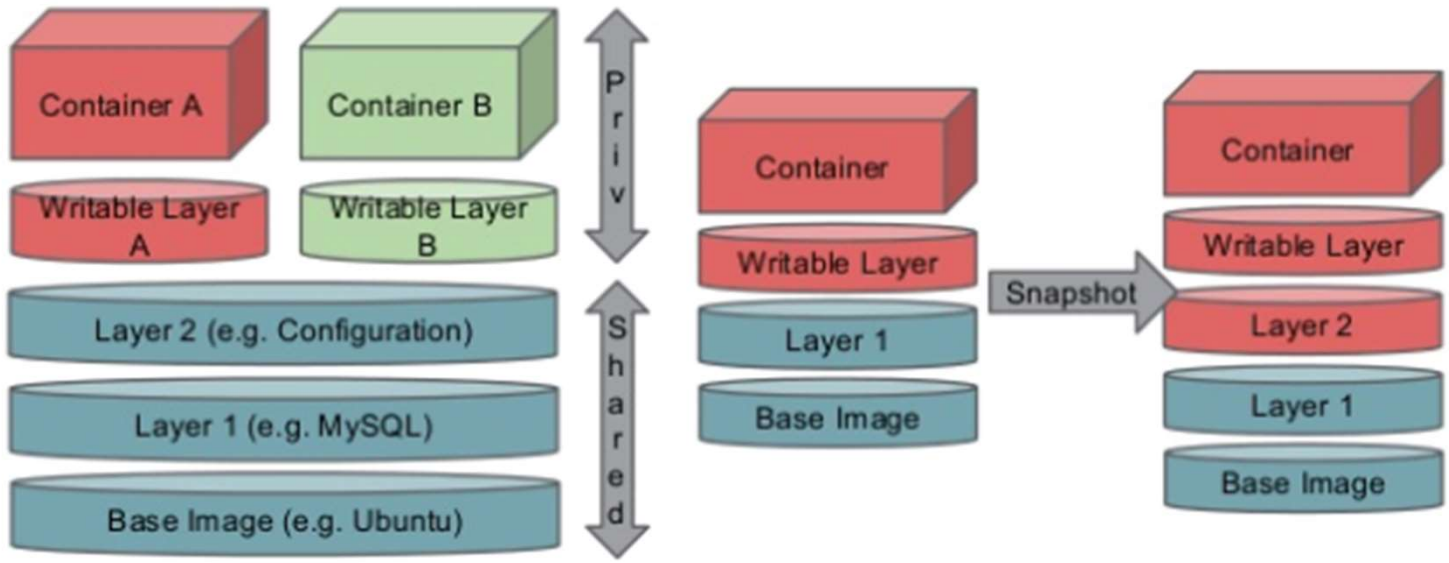
How the overlay driver works

[Docker supports the following storage drivers]

- **overlay2** : 기본 드라이버
- **aufs** : Docker 18.06 및 이전 버전에서 사용
- **fuse-overlayfs** : Rootless 지원 안되는 호스트에서 Rootless Docker를 사용할 때
- **devicemapper** : production 환경을 위해서는 direct-lvm 필요.
- **btrfs** and **zfs** : "snapshots" 같은 고급 기능을 지원하지만 설치와 유지보수가 까다로움.
- **vfs** : 테스트 목적으로만 사용하는 것을 권장

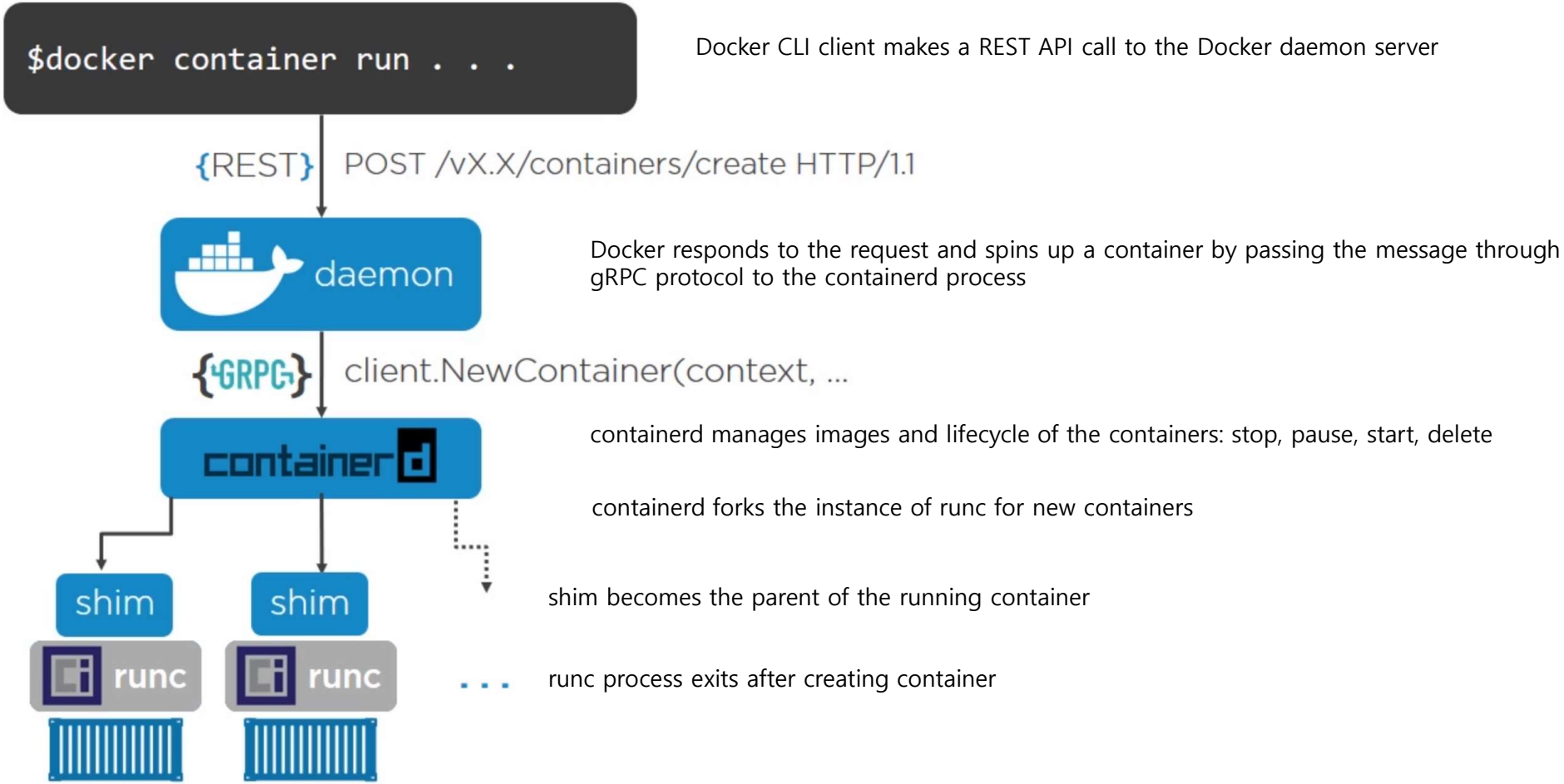
※ 참고 : https://docs.docker.com/storage/storagedriver/overlayfs-driver/

Docker Storage Driver



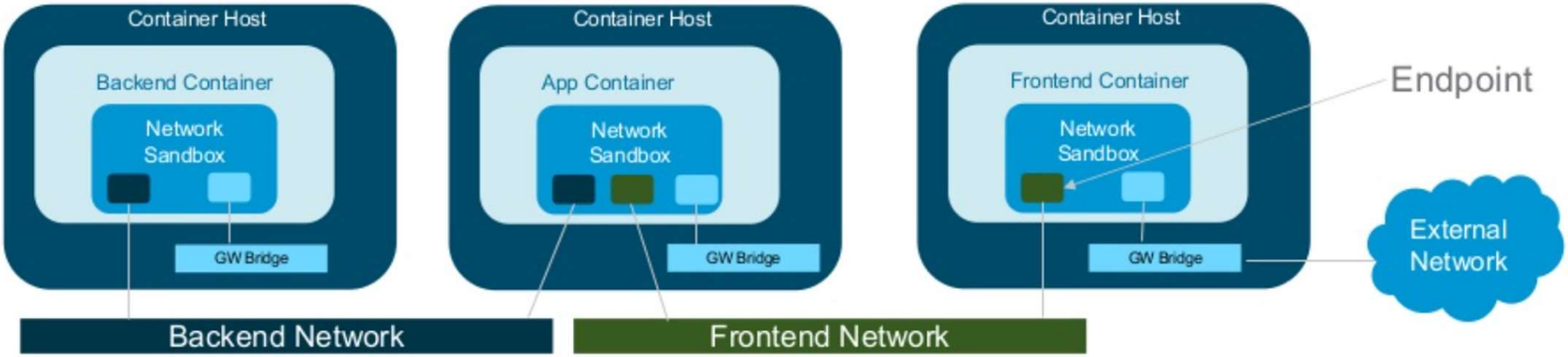
※ 참고 : https://docs.docker.com/storage/storagedriver/overlayfs-driver/

Docker engine architecture



※ 참고 : https://betterprogramming.pub/docker-for-front-end-developers-c758a44e622f

Container Network Model (CNM)



▶ Sandbox

- A Sandbox contains the configuration of a container's network stack.
- This includes management of the container's interfaces, routing table and DNS settings.
- An implementation of a Sandbox could be a Linux Network Namespace, a FreeBSD Jail or other similar concept.

▶ Endpoint

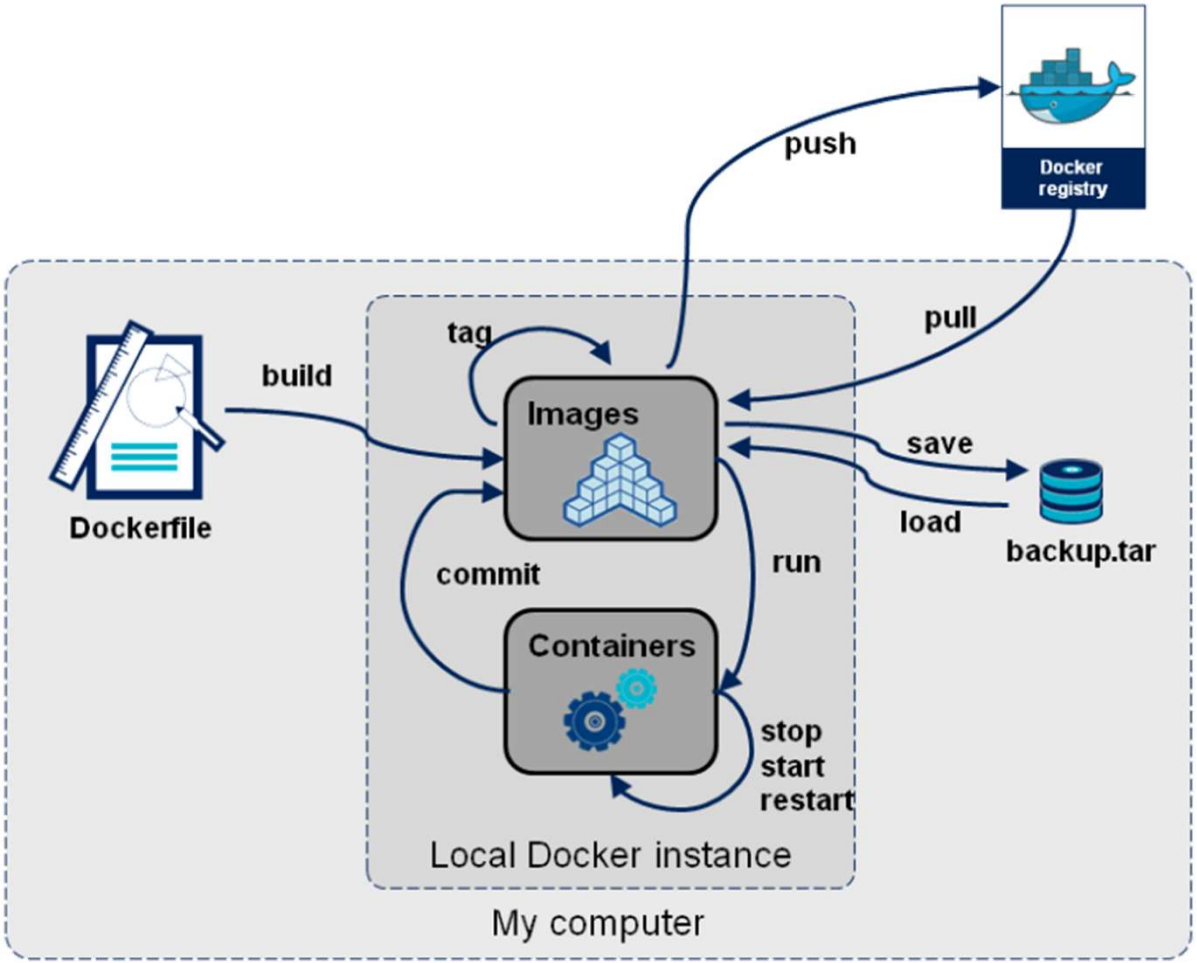
- An Endpoint joins a Sandbox to a Network.
- An implementation of an Endpoint could be a veth pair, an Open vSwitch internal port or similar

▶ Network

- A Network is a group of Endpoints that are able to communicate with each-other directly.
- An implementation of a Network could be a VXLAN Segment, a Linux bridge, a VLAN, etc.

※ 참고 : https://www.slideshare.net/OpenNetworkingSummit/container-networking-deep-dive

Dockerfile

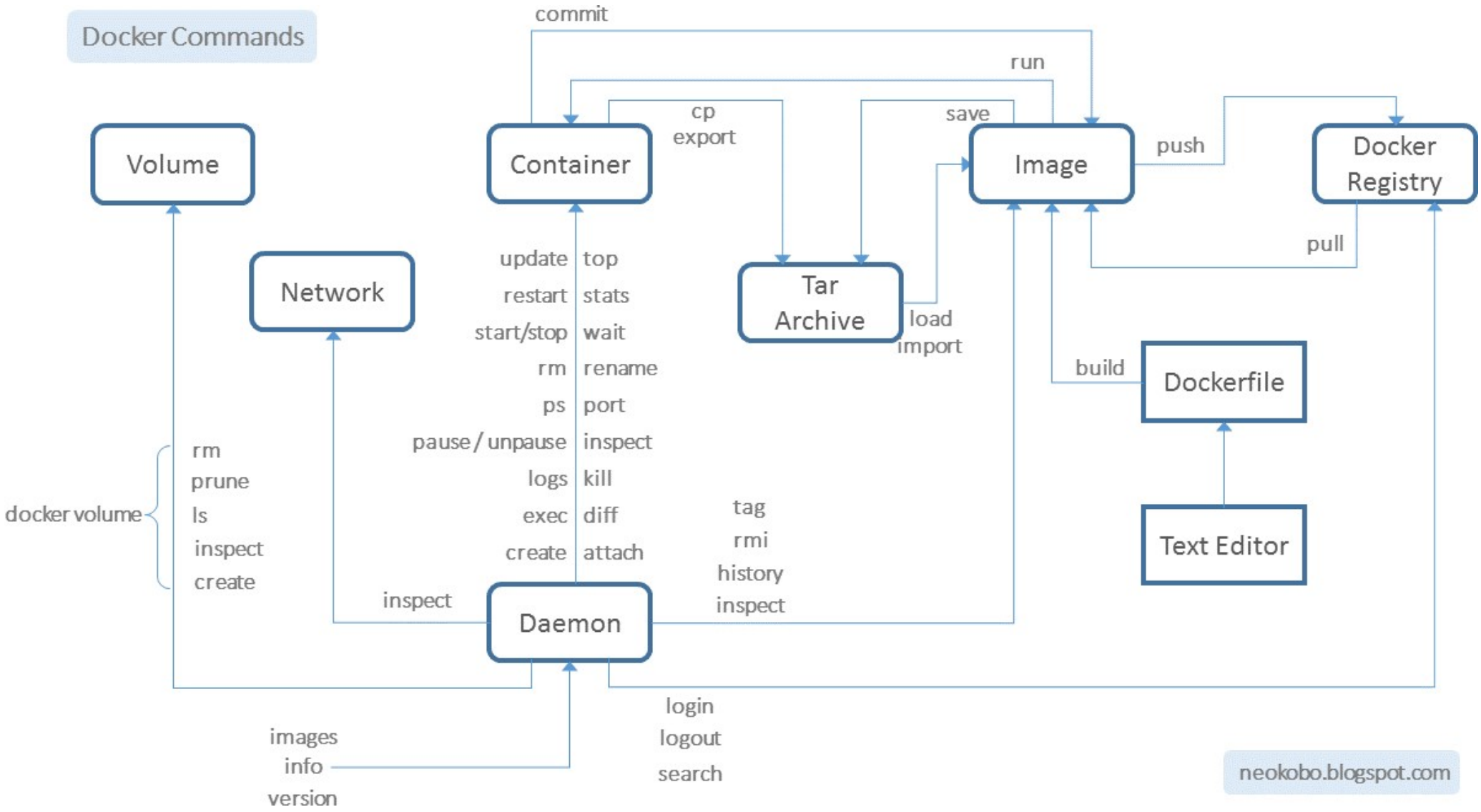


※ 참고 : https://blog.wonizz.tk/2019/07/31/docker-dockerfile/

Dockerfile - sample

```
# fetch node v4 LTS codename argon
FROM node:argon

# Request samplename build argument
ARG samplename

# Create app directory
RUN mkdir -p /usr/src/spfx-samples
WORKDIR /usr/src/spfx-samples

#Install app dependencies
RUN git clone https://github.com/SharePoint/sp-dev-fx-webparts.git .
WORKDIR /usr/src/spfx-samples/samples/$samplename

# install gulp on a global scope
RUN npm install gulp -g

# RUN ["npm", "install", "gulp"]
RUN npm install
RUN npm cache clean

# Expose required ports
EXPOSE 4321 35729 5432

# Run sample
CMD ["gulp", "serve"]
```

※ 참고 : https://n8d.at/how-to-run-sharepoint-pattern-and-practices-samples-through-docker/

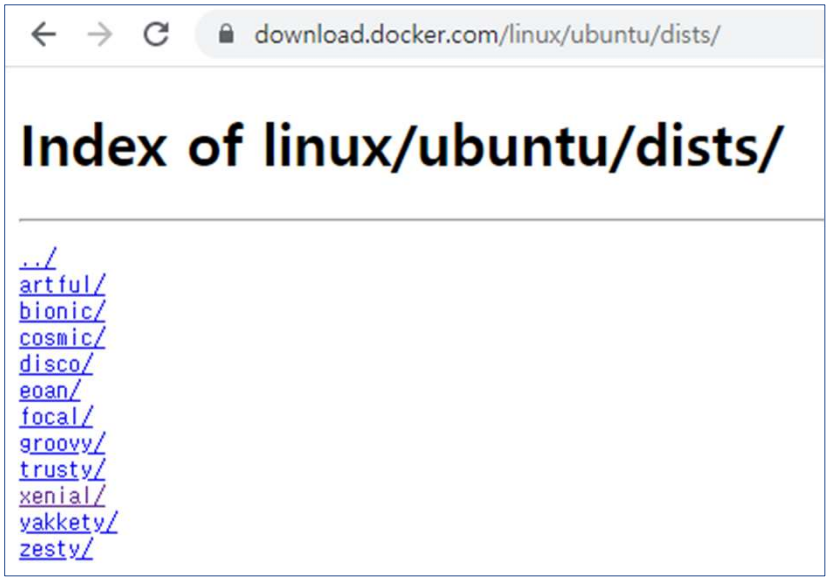


※ 참고 : http://neokobo.blogspot.com/2017/12/docker-command-flowchart.html

Docker
실습

Install

- Download : https://download.docker.com/linux/ubuntu/dists/



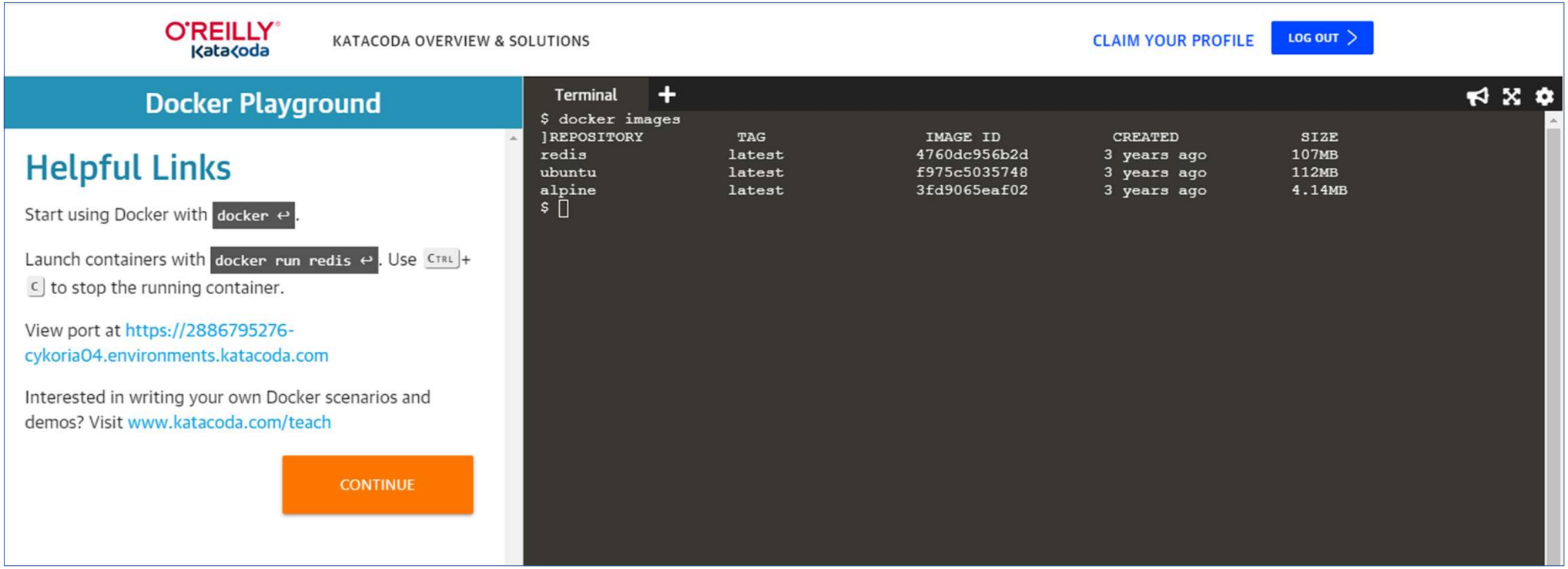

```
$ wget https://download.docker.com/linux/ubuntu/dists/focal/pool/stable/amd64/containerd.io_1.4.3-1_amd64.deb
$ wget https://download.docker.com/linux/ubuntu/dists/focal/pool/stable/amd64/docker-ce-cli_20.10.1~3-0~ubuntu-focal_amd64.deb
$ wget https://download.docker.com/linux/ubuntu/dists/focal/pool/stable/amd64/docker-ce_20.10.1~3-0~ubuntu-focal_amd64.deb
```

```
$ sudo dpkg --install ./containerd.io_1.4.3-1_amd64.deb
$ sudo dpkg --install ./docker-ce-cli_20.10.1~3-0~ubuntu-focal_amd64.deb
$ sudo dpkg --install ./docker-ce_20.10.1~3-0~ubuntu-focal_amd64.deb
```

```
$ sudo usermod -aG docker $USER
```

Katacoda

https://www.katacoda.com/courses/docker/playground



Nginx – 1/2

index.html

```
<!doctype html>
<html lang="en">
<head>
  <meta charset="utf-8">
  <title>Docker Nginx</title>
</head>
<body>
  <h2>Hello from Nginx container</h2>
</body>
</html>
```

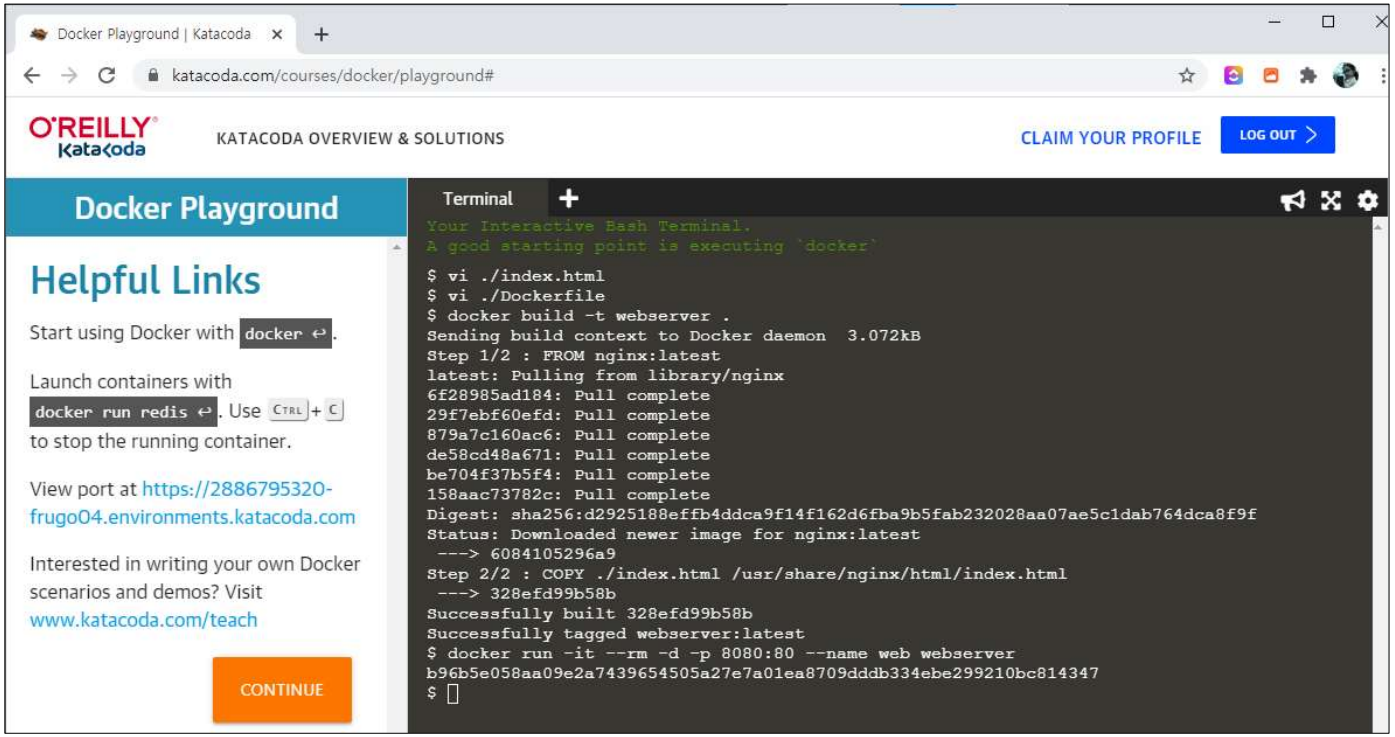
Dockerfile

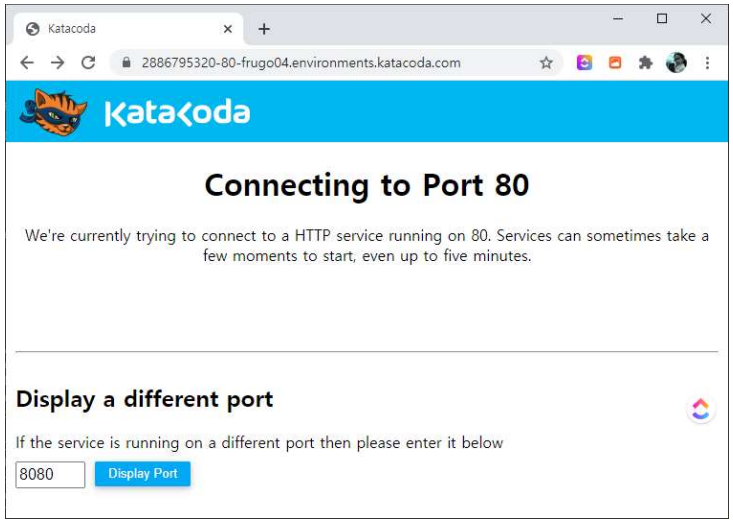
```
FROM nginx:latest
COPY ./index.html /usr/share/nginx/html/index.html
```

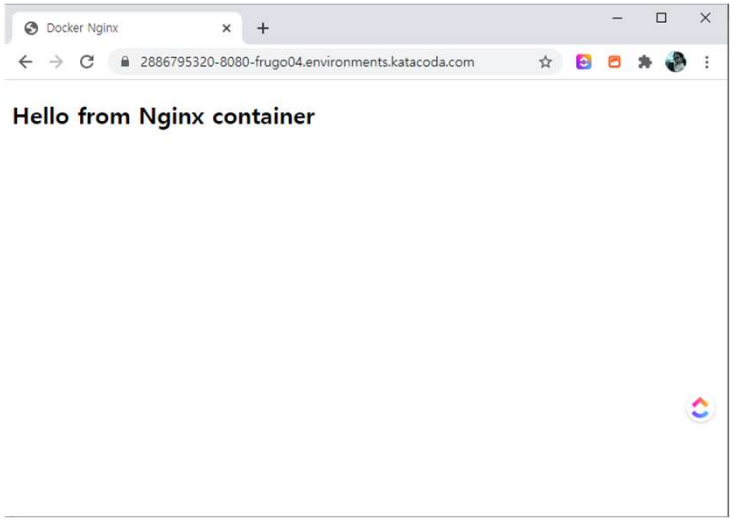
```
> docker build -t webserver .
> docker run -it --rm -d -p 8080:80 --name web webserver
```

※ 참고 : https://www.docker.com/blog/how-to-use-the-official-nginx-docker-image/

Nginx – 2/2







※ 참고 : https://www.docker.com/blog/how-to-use-the-official-nginx-docker-image/

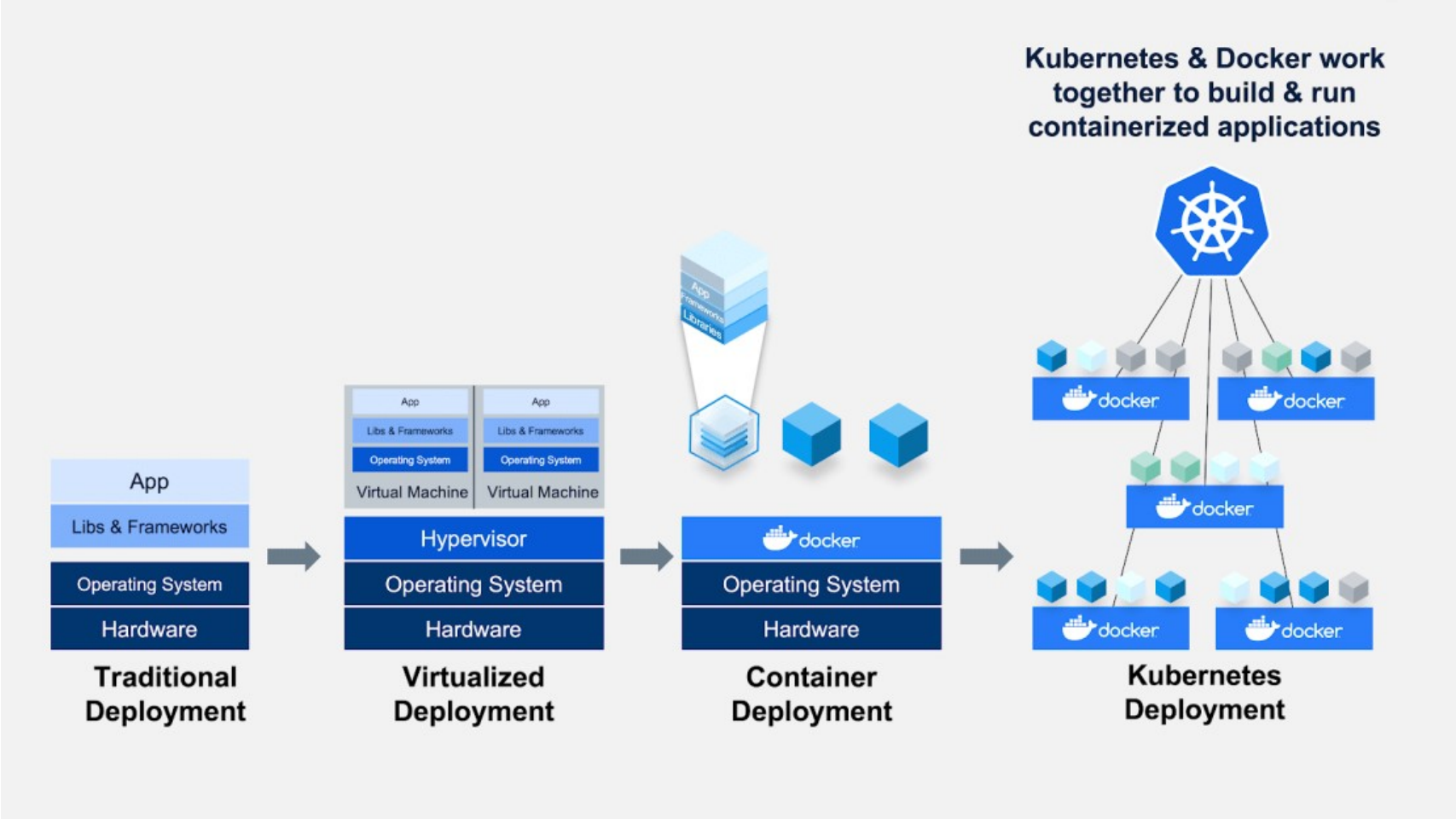
Kubernetes - Overview

Kubernetes is ...

Kubernetes, also known as K8s,
is an open-source system for
automating deployment, scaling, and
management of containerized applications.

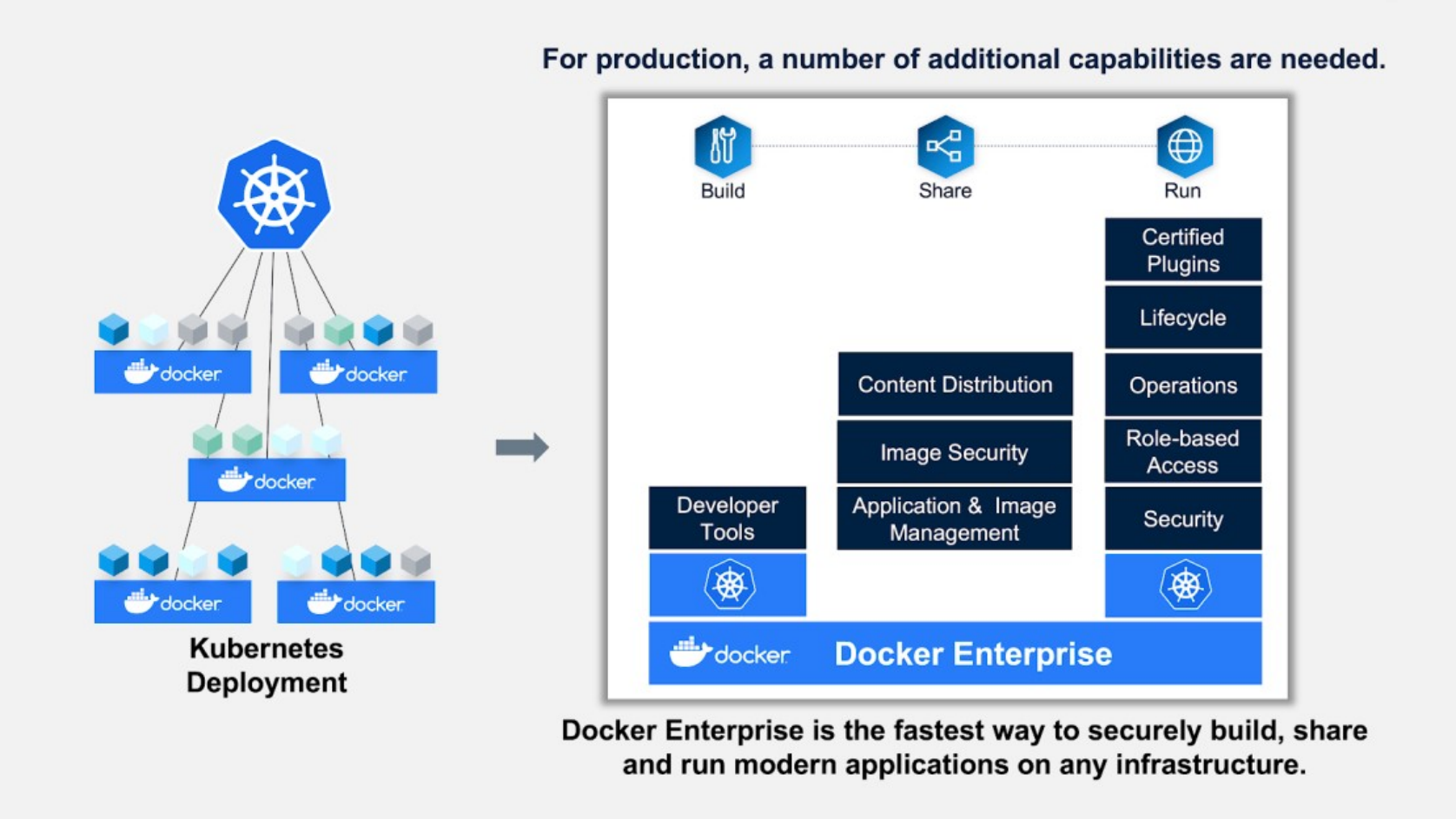
※ 참고 : https://kubernetes.io/

Docker & Kubernetes



※ 참고 : https://www.docker.com/blog/top-questions-docker-kubernetes-competitors-or-together/

Docker & Kubernetes

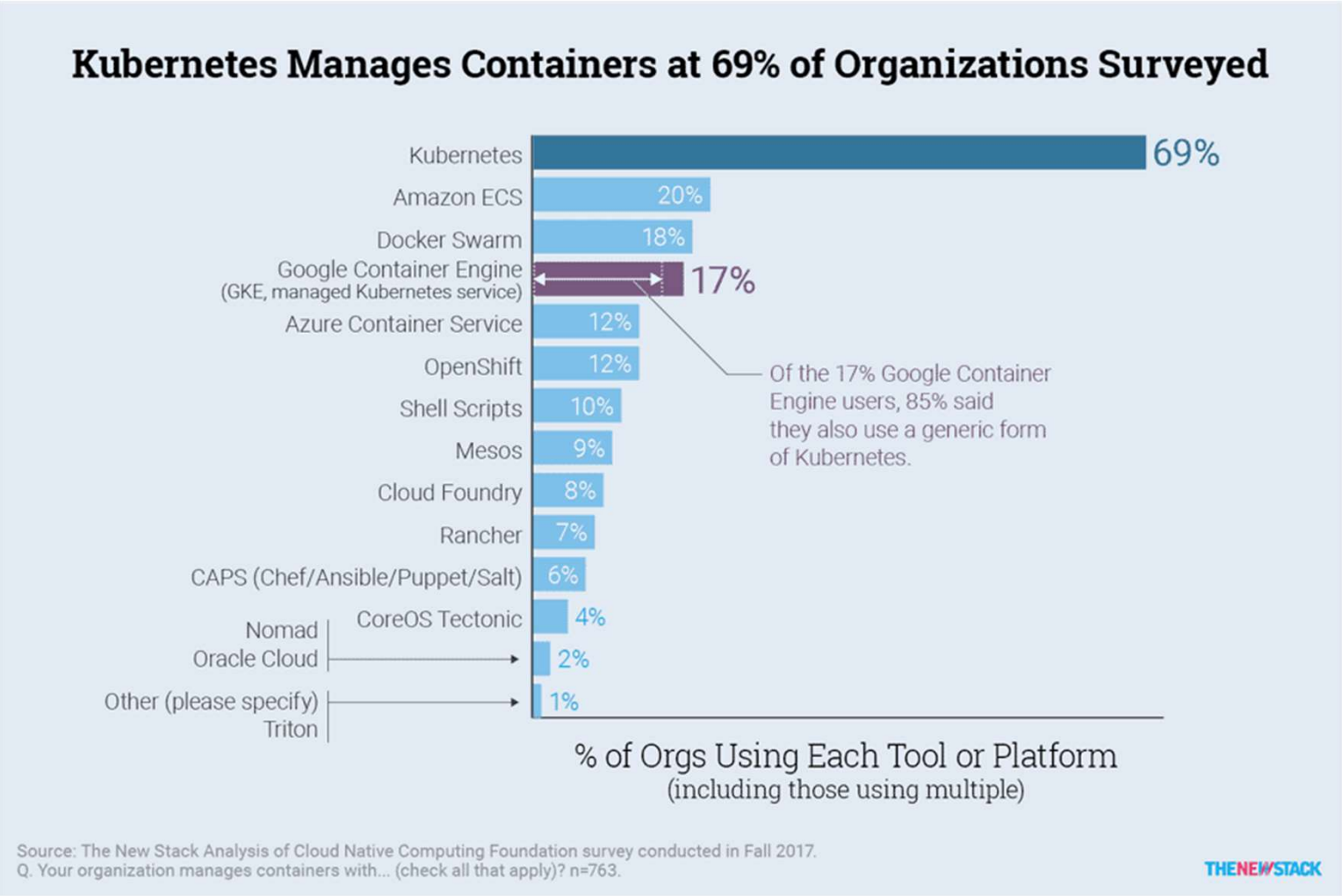


※ 참고 : https://www.docker.com/blog/top-questions-docker-kubernetes-competitors-or-together/

Features of Kubernetes

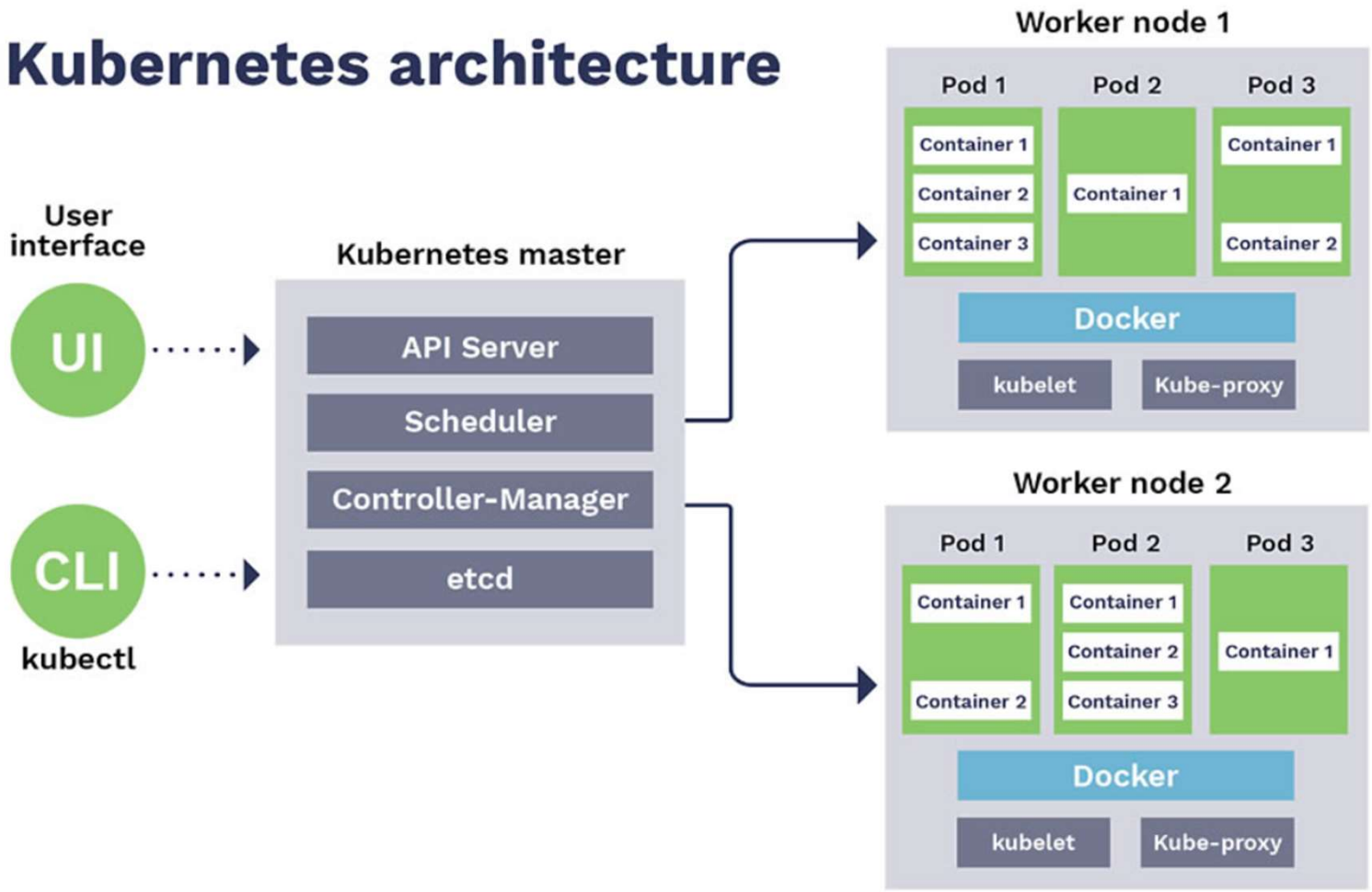
※ 참고 : https://www.xenonstack.com/blog/debug-application-running-in-kubernetes/

Kubernetes M/S



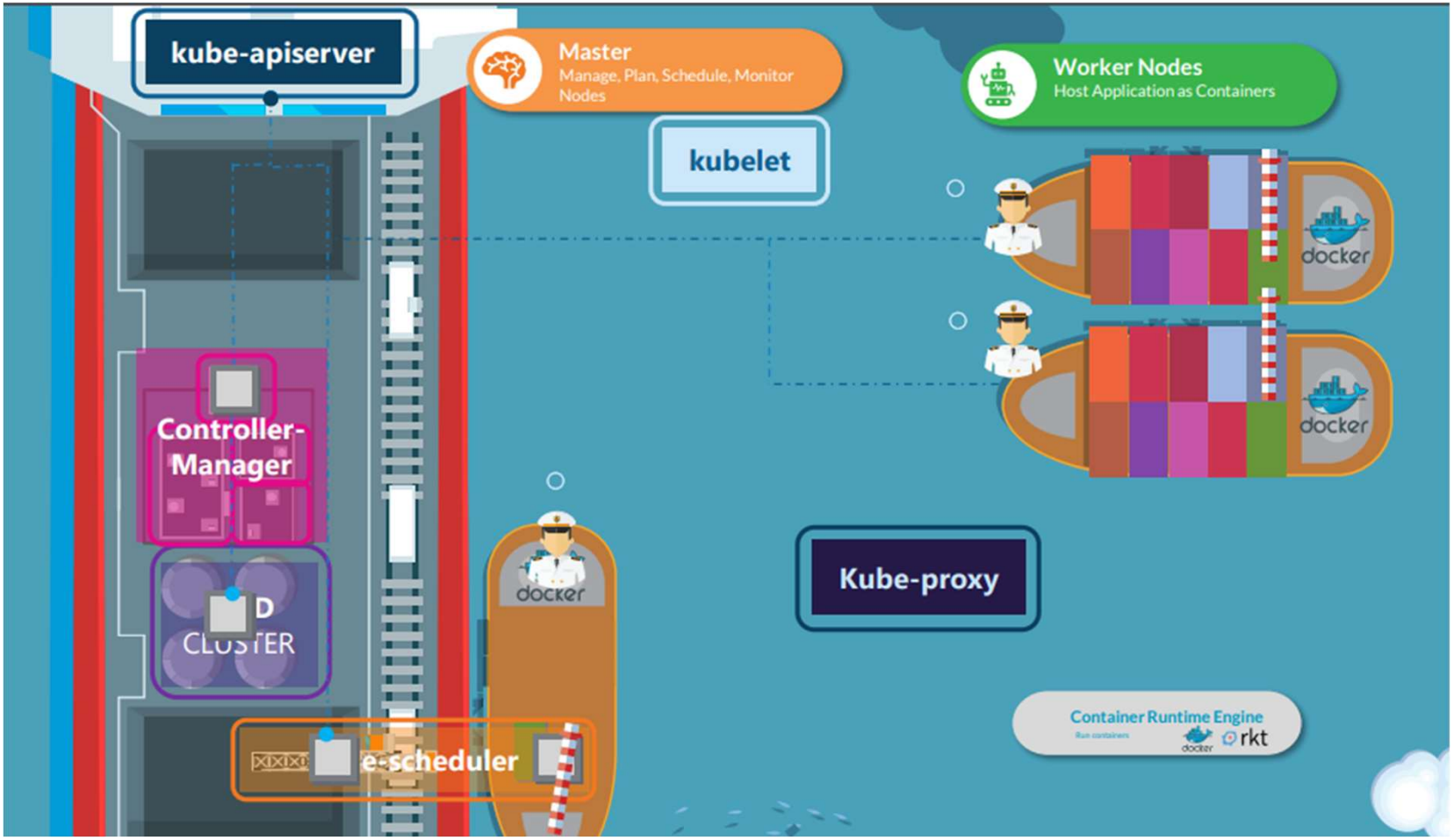
※ 참고 : https://www.cncf.io/blog/2018/03/07/cncf-sponsors-new-free-kubernetes-deployment-and-security-patterns-ebook-from-the-new-stack/

Kubernetes Architecture



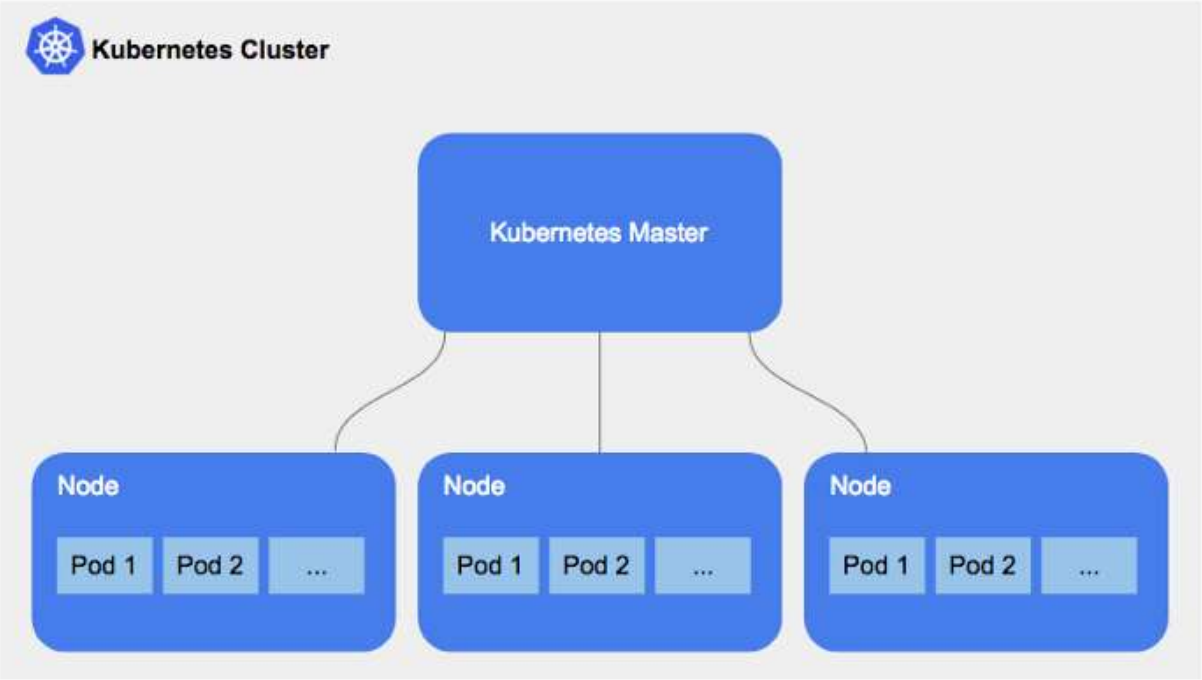
※ 참고 : https://keetmalin.wixsite.com/keetmalin/post/understanding-container-orchestration-with-kubernetes

Cluster



※ 참고 : https://github.com/kodekloudhub/certified-kubernetes-administrator-course/blob/master/docs/02-Core-Concepts/02-Cluster-Architecture.md

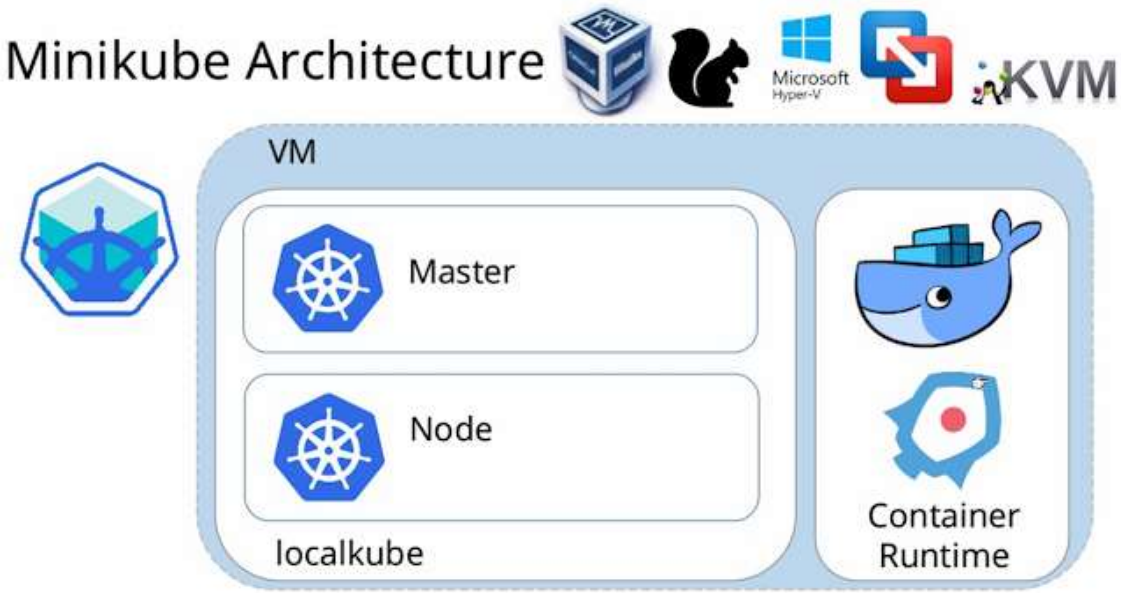
Cluster



※ 참고 : https://medium.com/@tomerf/so-you-want-to-configure-the-perfect-db-cluster-inside-a-kubernetes-cluster-a4d2c26aca7a

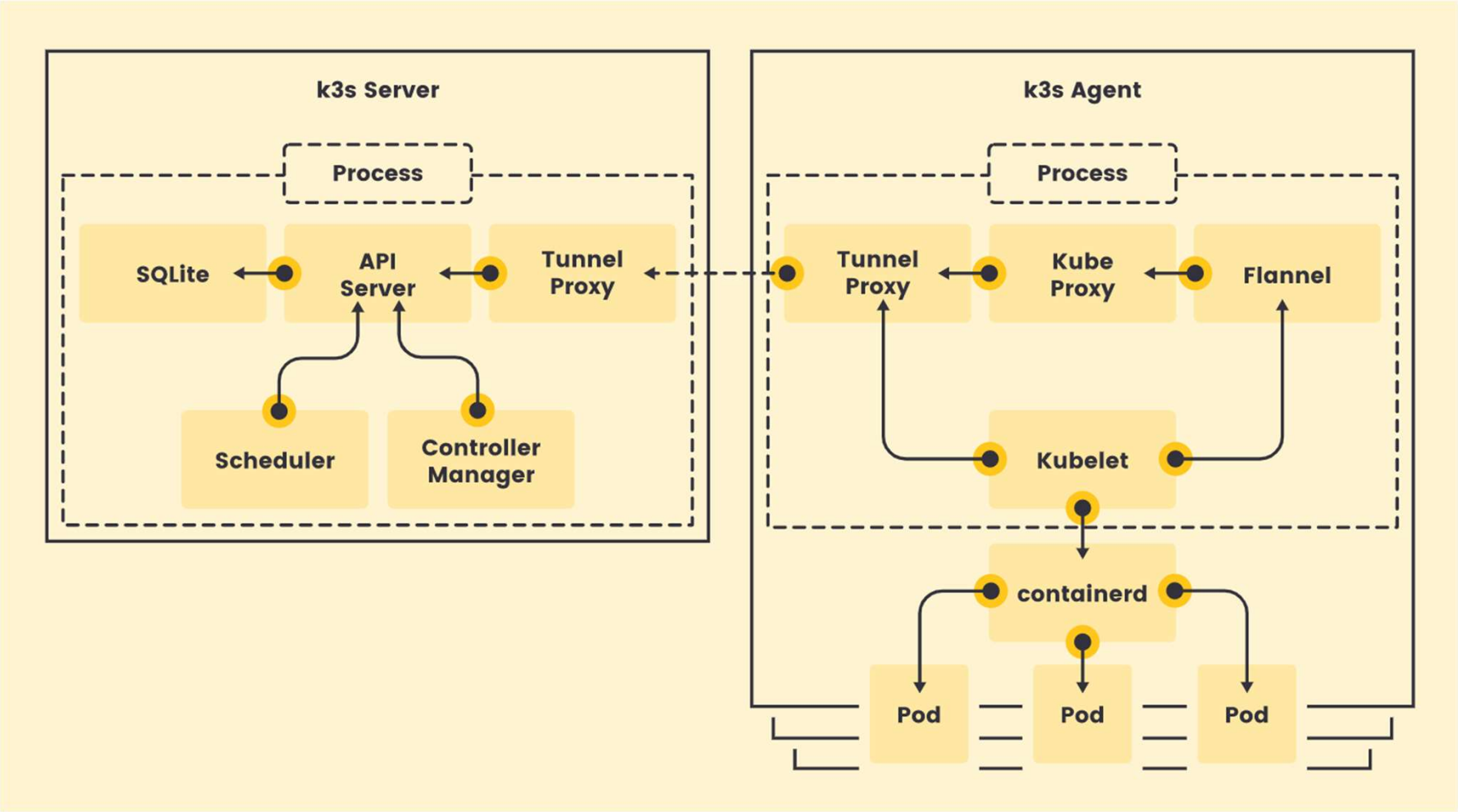
Kubernetes - Overview
실습

Minikube



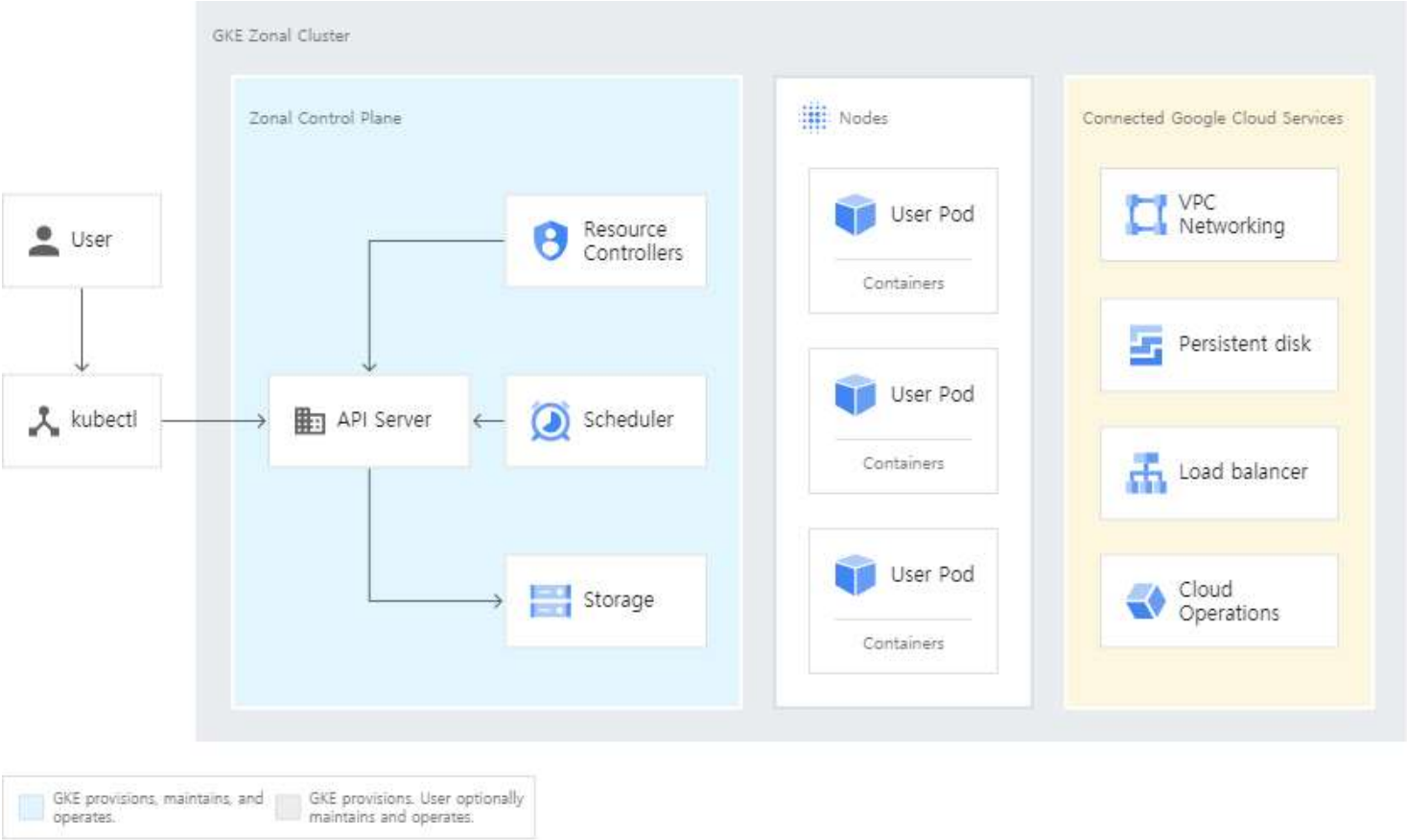
※ 참고 : https://blog.codonomics.com/2019/02/loadbalancer-support-with-minikube-for-k8s.html

k3s



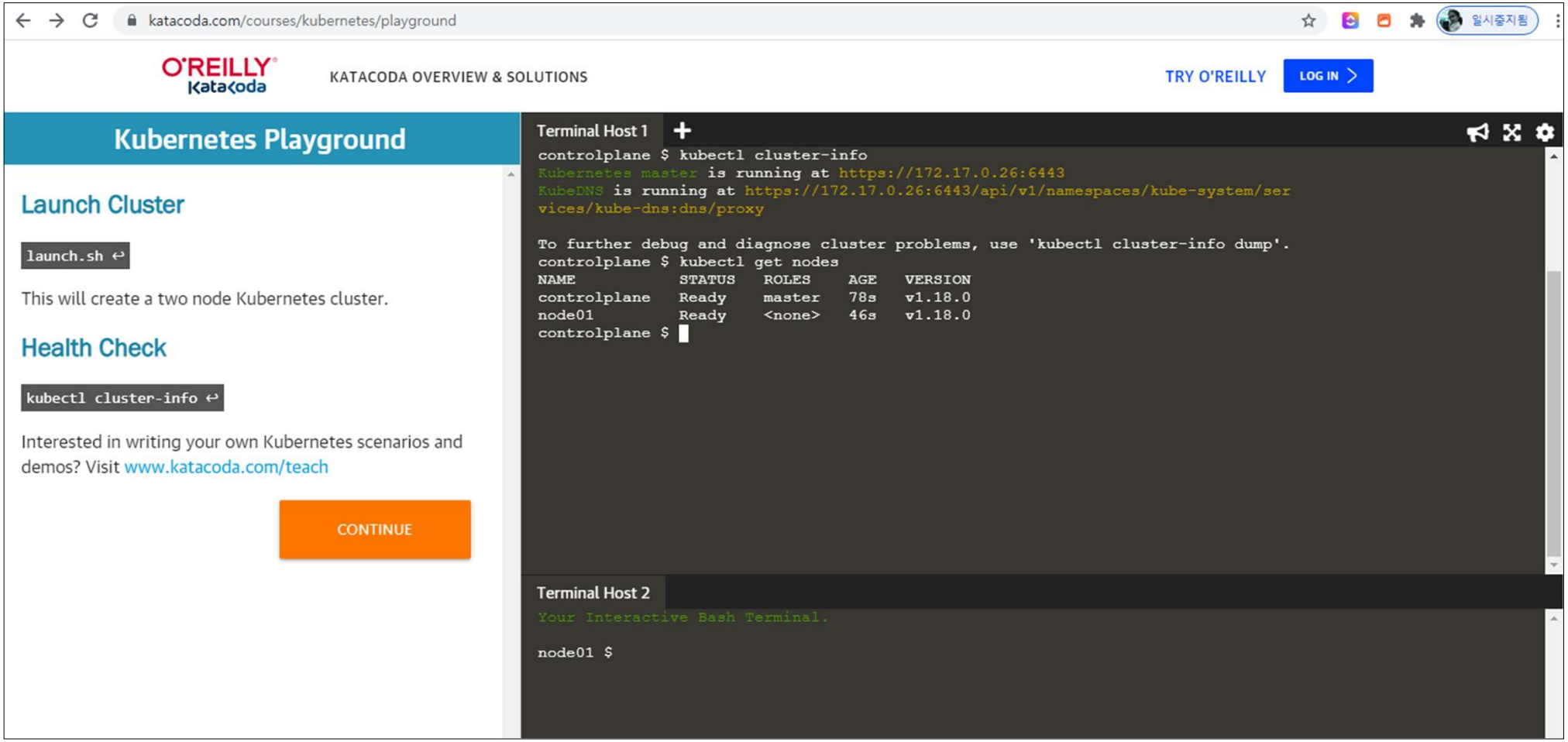
※ 참고 : https://k3s.io/

GKE



※ 참고 : https://cloud.google.com/kubernetes-engine/docs/concepts/cluster-architecture?hl=ko

katacoda



※ 참고 : https://www.katacoda.com/courses/kubernetes/playground

https://kahoot.it/