

SAY HI TO VIRTUALIZATION

---

# DOCKER SWARM

Wang Xuechen

2019/09/10

## AGENDA

- ▶ Docker Swarm
  - ▶ Architecture
  - ▶ Ingress network
  - ▶ Image/Container/Service/Stack/Swarm
  - ▶ How-to
    - ▶ compose-file
    - ▶ config / volumes / network / logging
    - ▶ Monitoring / Swarmpit
  - ▶ Microservice

## DOCKER SWARM

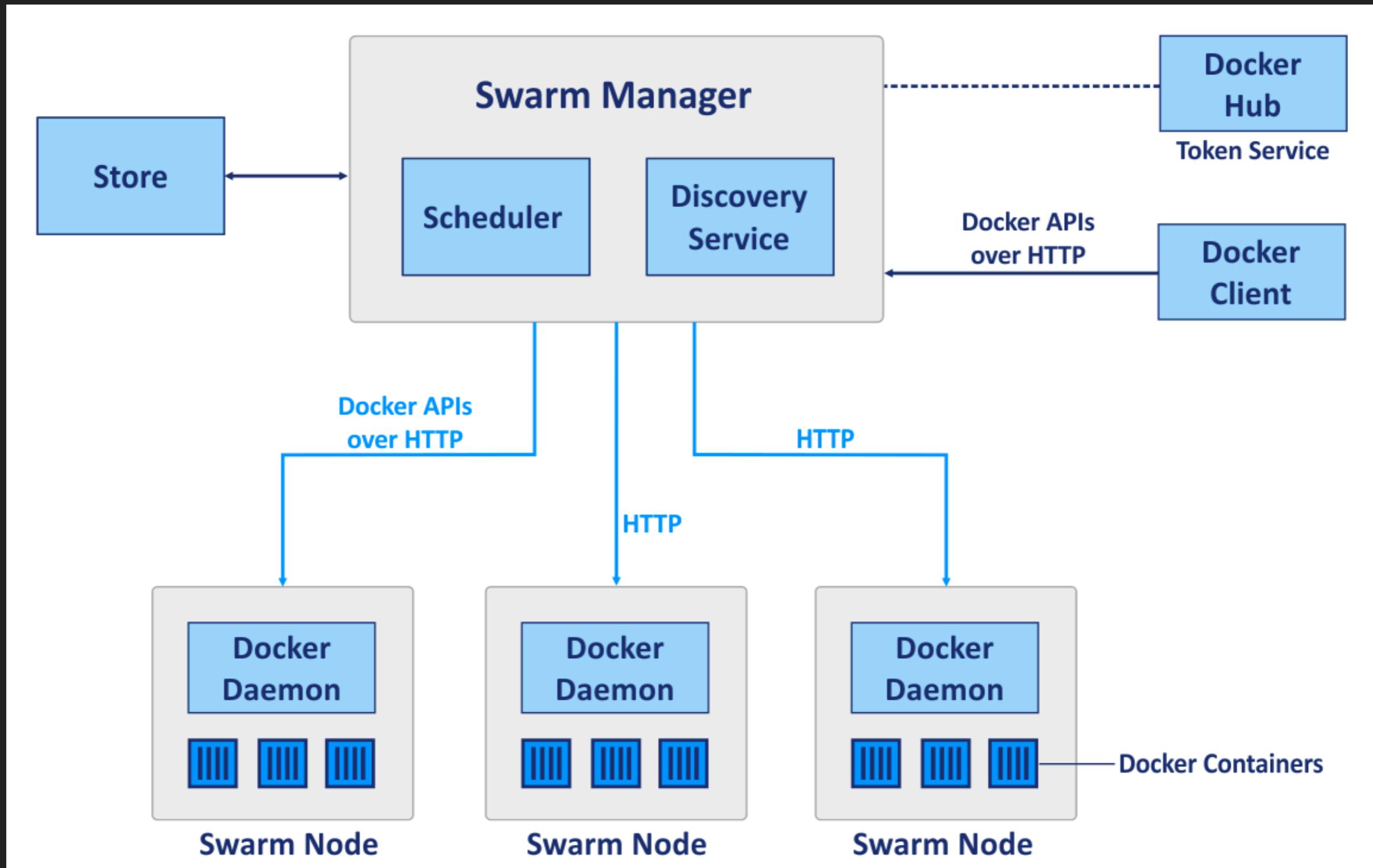


MESOS

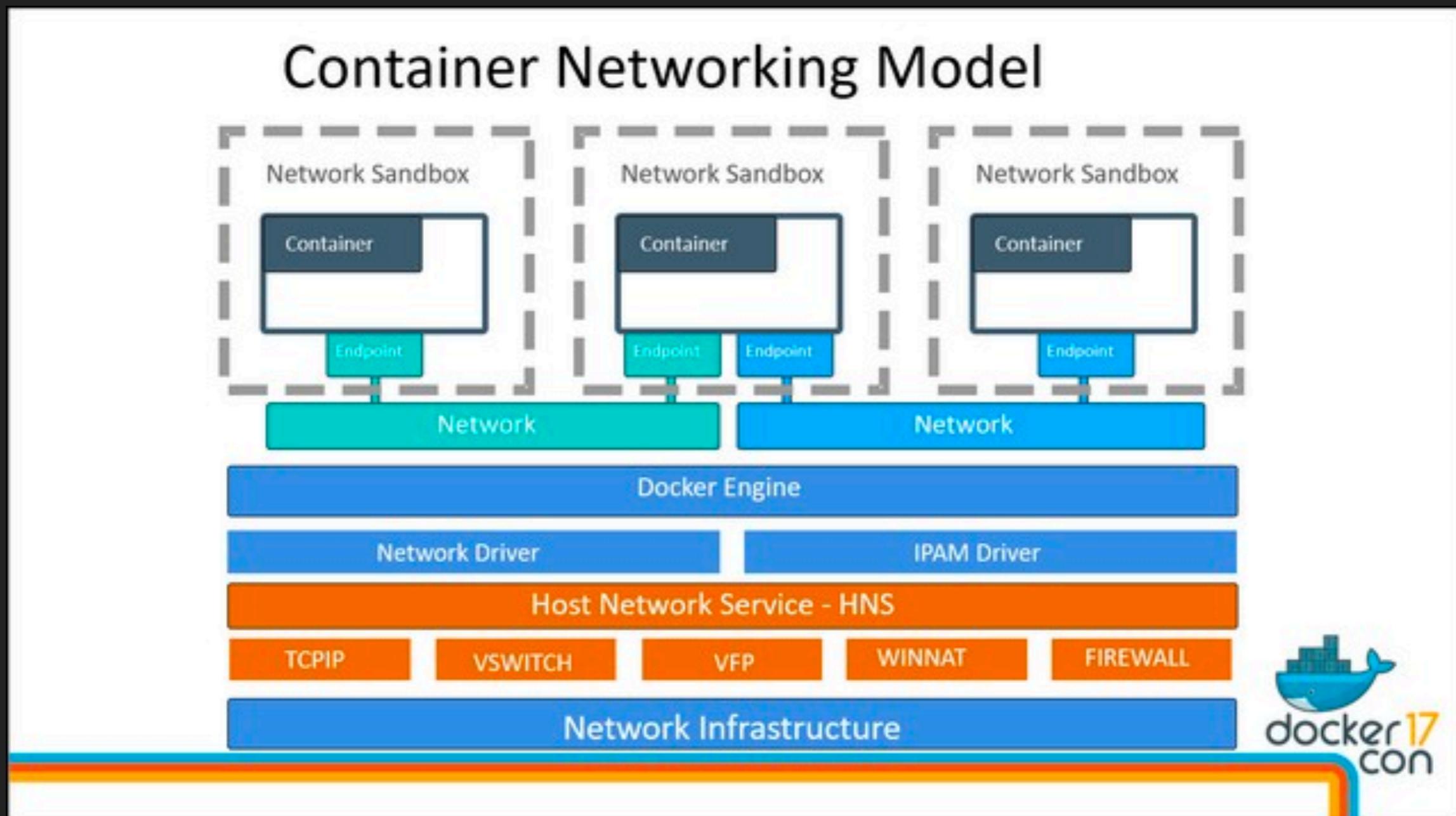
## DOCKER SWARM

- ▶ <https://docs.docker.com/engine/swarm/>
  - ▶ Cluster management integrated with Docker Engine
  - ▶ Decentralized design
  - ▶ Declarative service model
  - ▶ Scaling
  - ▶ Desired state reconciliation
  - ▶ Multi-host networking
  - ▶ Service discovery
  - ▶ Load balancing
  - ▶ Secure by default
  - ▶ Rolling updates

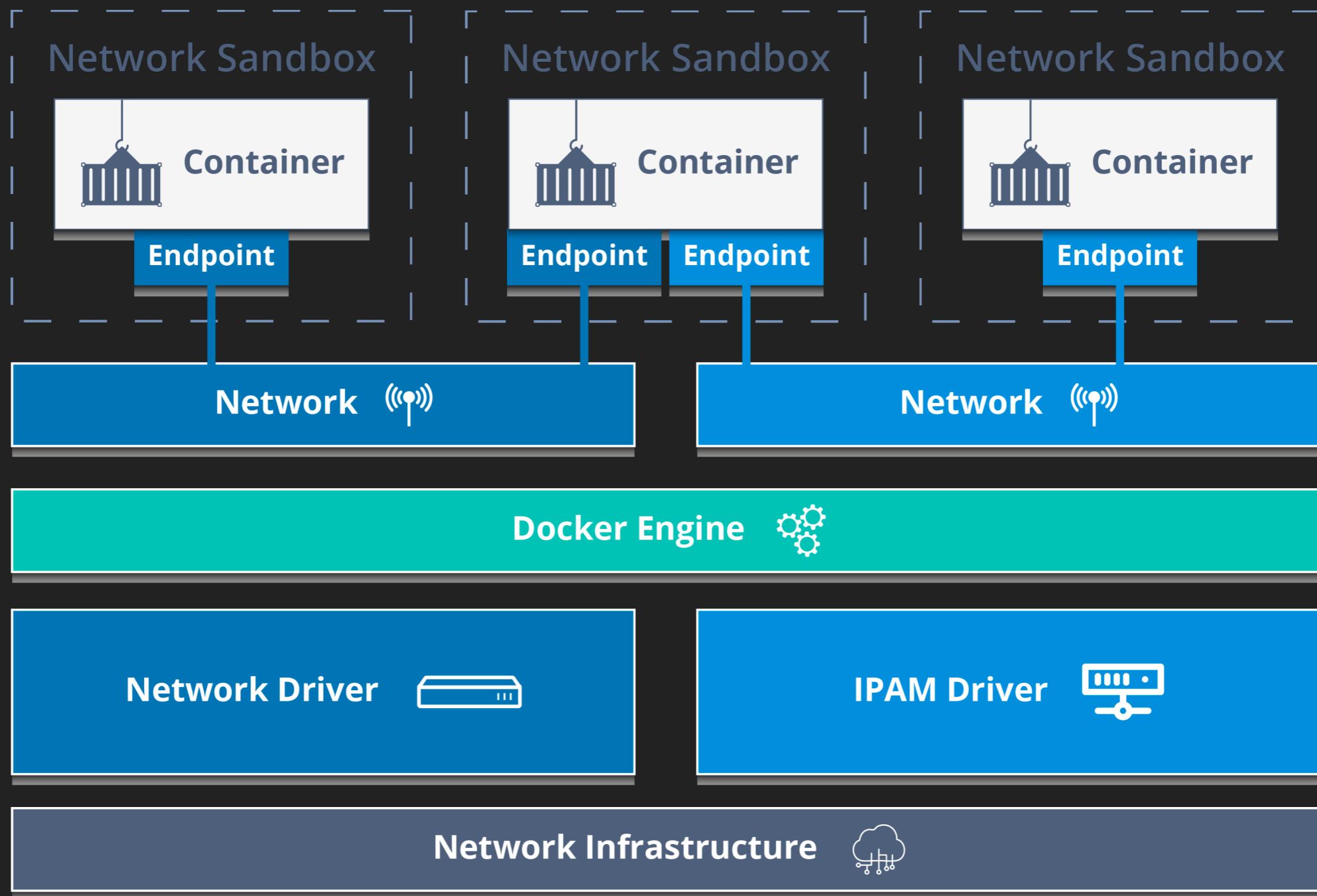
# DOCKER SWARM



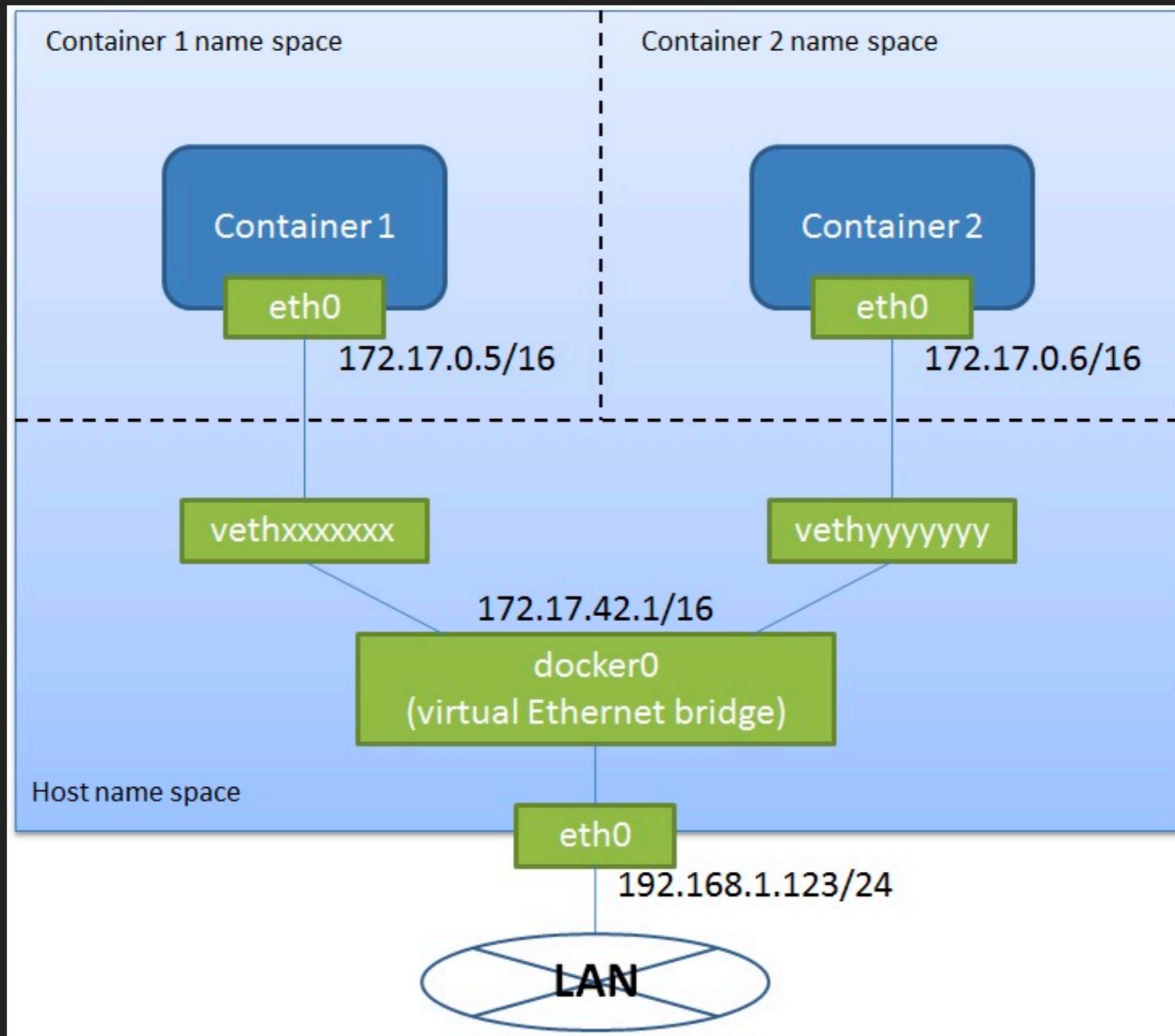
# DOCKER NETWORKING



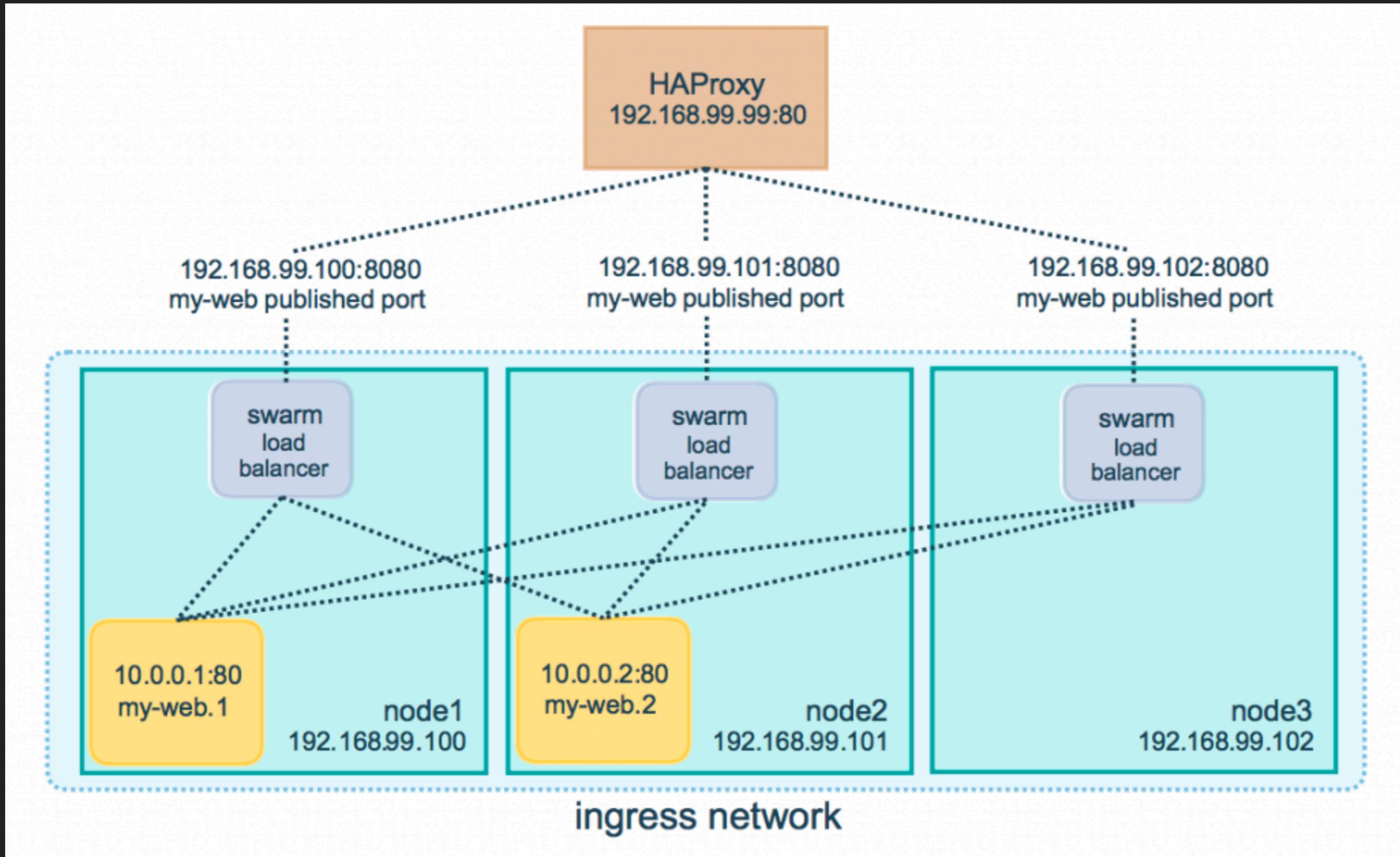
# DOCKER NETWORKING



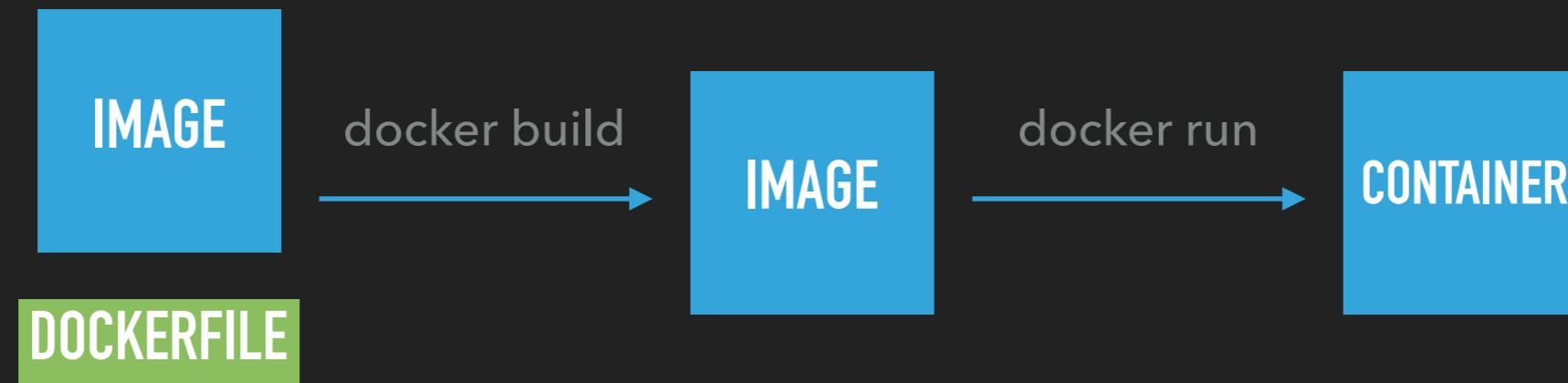
# DOCKER NETWORKING



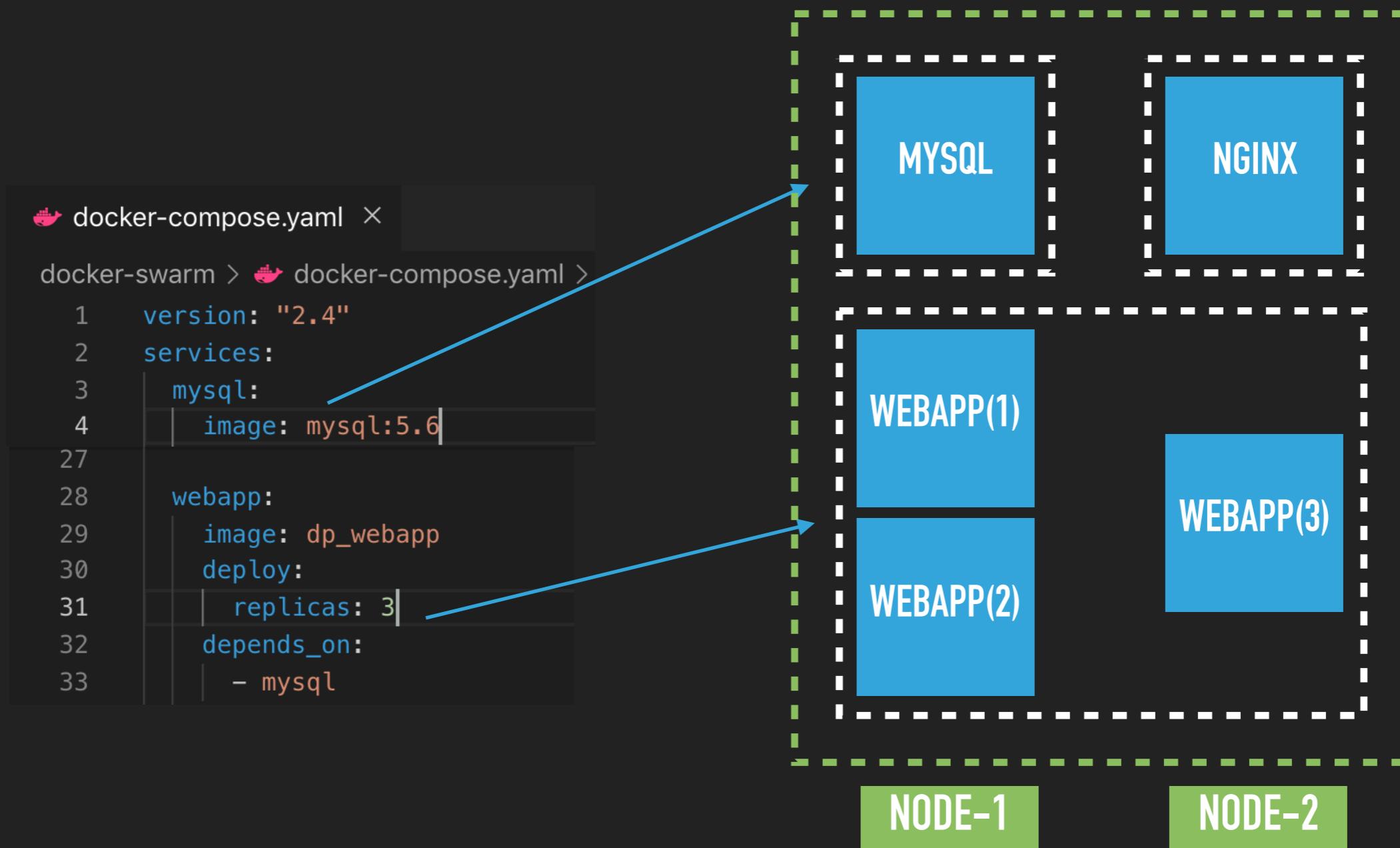
# DOCKER SWARM



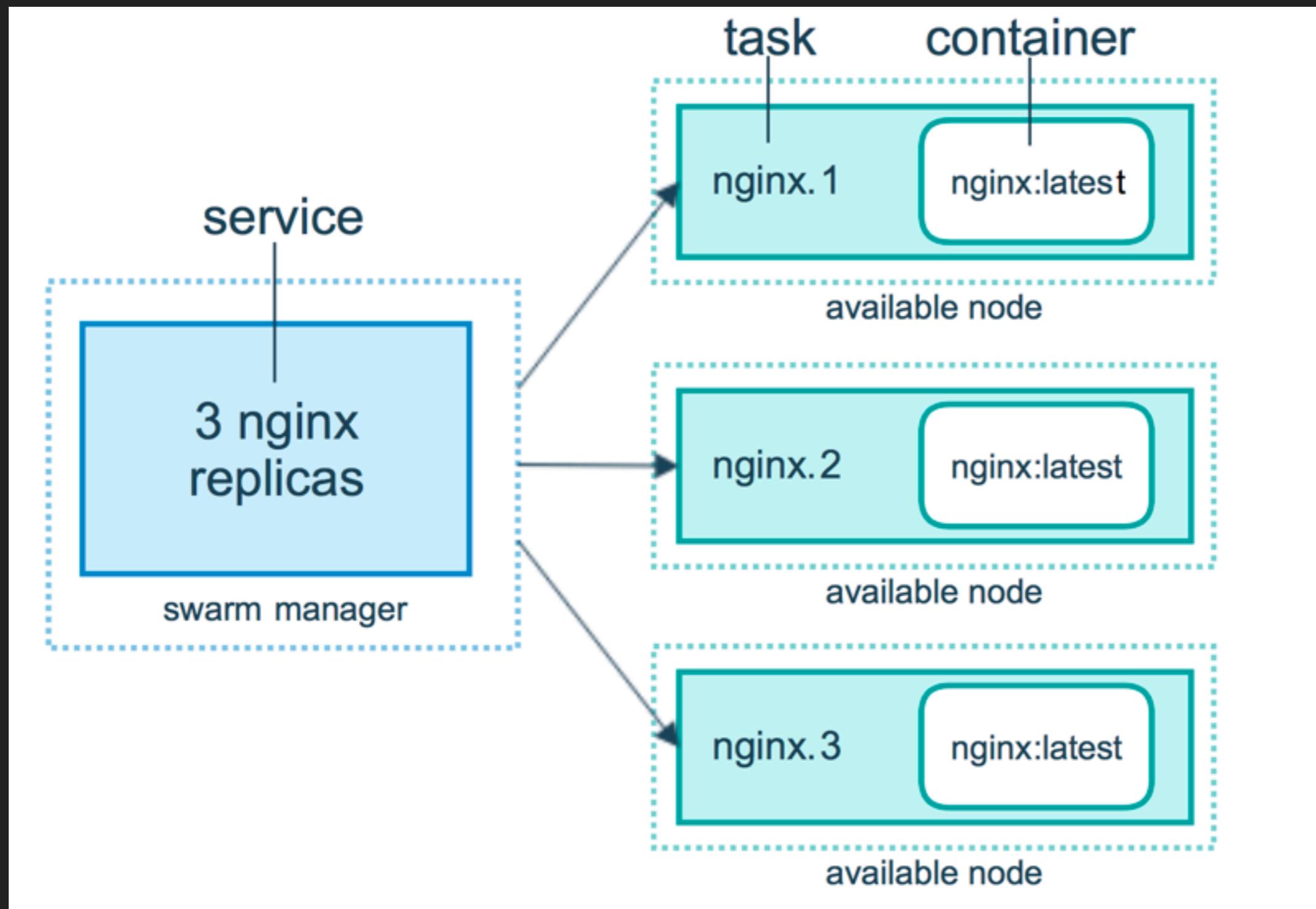
## IMAGE/CONTAINER



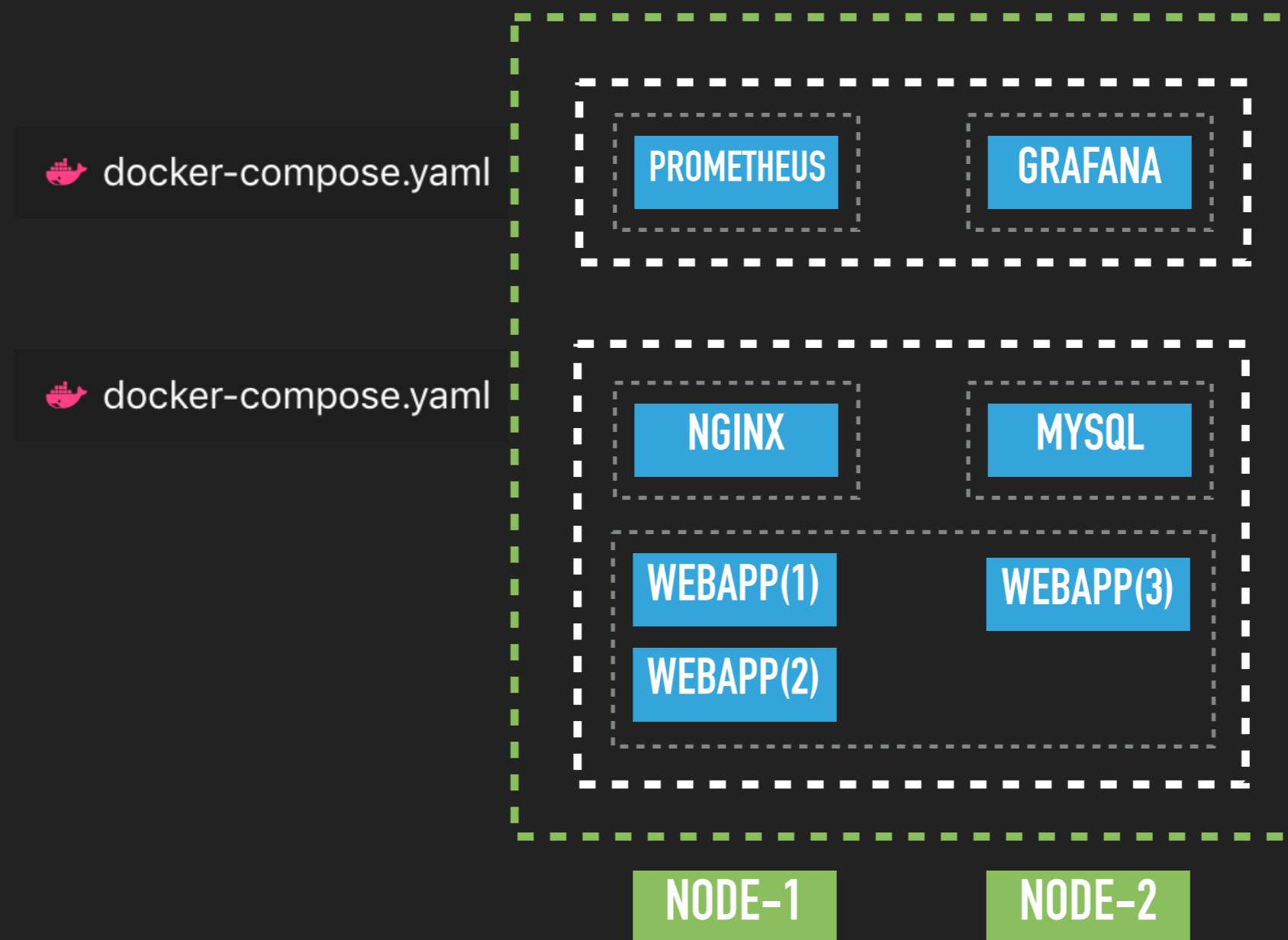
# SWARM - SERVICE



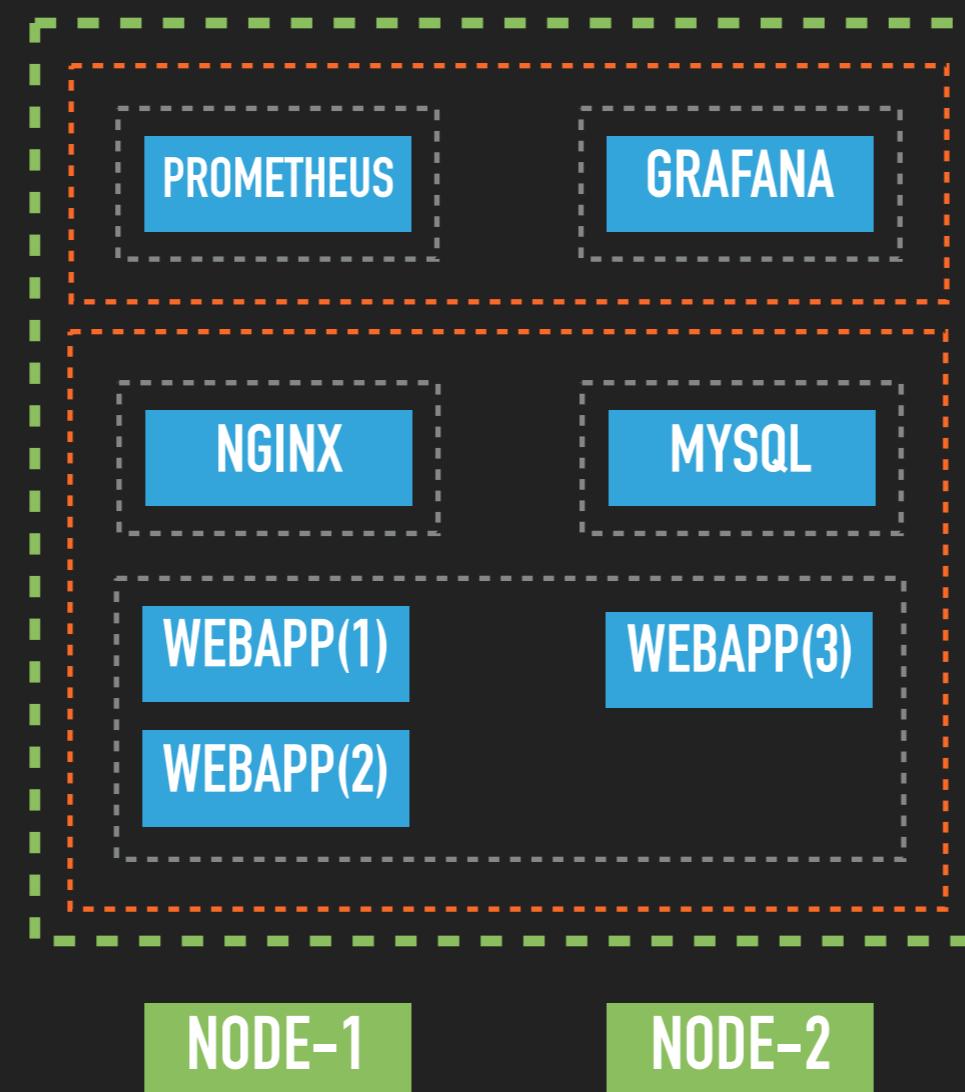
# SWARM - SERVICE



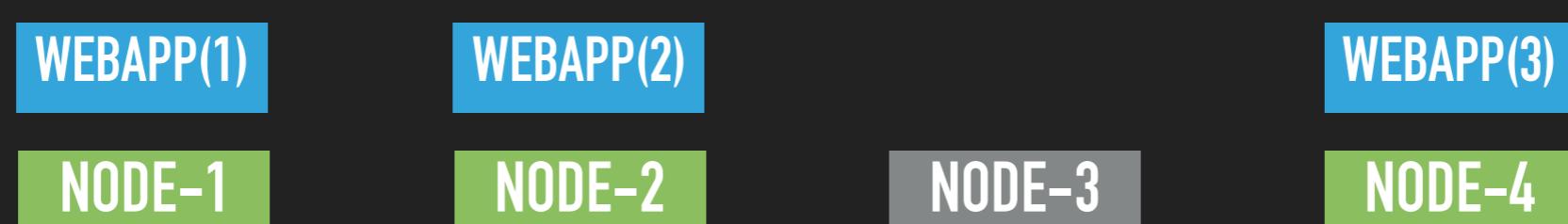
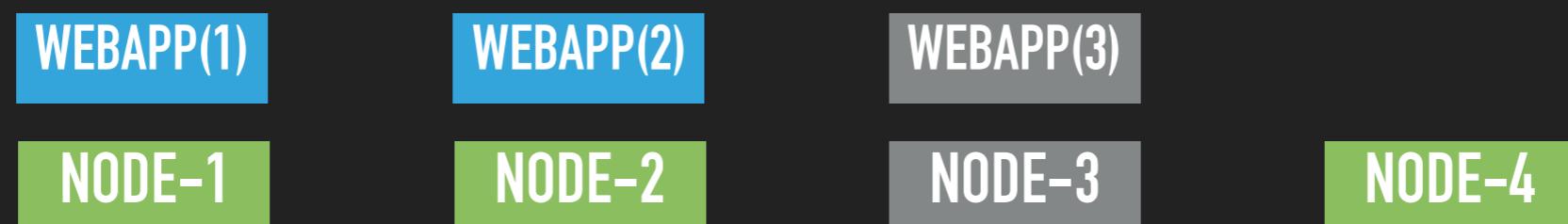
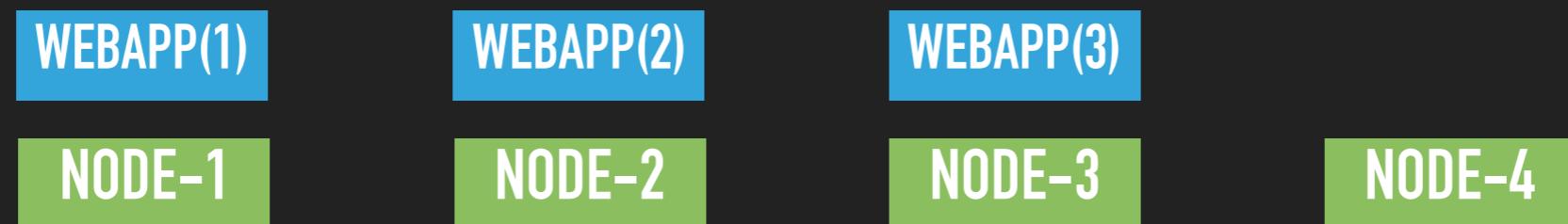
# SWARM - STACK



# SWARM



## SWARM



# COMPOSE FILE



[https://github.com/zenanswer/docker\\_practice/blob/master/docker-swarm/docker-compose.yaml](https://github.com/zenanswer/docker_practice/blob/master/docker-swarm/docker-compose.yaml)

## COMPOSE FILE

```
👉 docker-compose.yaml ×  
docker-swarm > 🚀 docker-compose.yaml > {} networks > {} app_network > abc driver  
...  
74   configs:  
75     healthcheck_js:  
76       file: ./docker/healthcheck.js  
77     nginx_conf:  
78       file: ./docker/nginx.conf  
79     # one_external_config:  
80     #   external: true  
81  
82   # secrets:  
83   #   one_external_secret:  
84   #     external: true  
85  
86   volumes:  
87     app-img-data:  
88  
89   networks:  
90     app_network:  
91       driver: overlay You, 21 hours ago • Add compose file for do  
92       attachable: true  
93
```

docker &gt; dock docker-compose.yaml &gt; abc version

```
1+version: "3.7"
2-
3 services:
4   mysql:
5     image: mysql:5.6
6     deploy:
7       restart_policy:
8         condition: on-failure
9       placement:
10      constraints: [node.role == manager]
11
12 volumes:
13   - type: bind
14     source: ./data/mysql
15     target: /var/lib/mysql
16   - type: bind
17     source: ../webapp/node-mysql-crud-app/create_table.sh
18     target: /docker-entrypoint-initdb.d/create_table.sh
19   - type: bind
20     source: ./docker/checkiftableexists.sh
21     target: /checkiftableexists.sh
22 environment:
23   - MYSQL_ROOT_PASSWORD=root
24   - MYSQL_USER=dpuser
25   - MYSQL_PASSWORD=dppassed
26   - MYSQL_DATABASE=dp
27 healthcheck:
28   test: ["CMD", "bash", "/checkiftableexists.sh"]
29   start_period: 30s
30   interval: 5s
31   timeout: 3s
32   retries: 4
33
34 networks:
35   - app_network
```

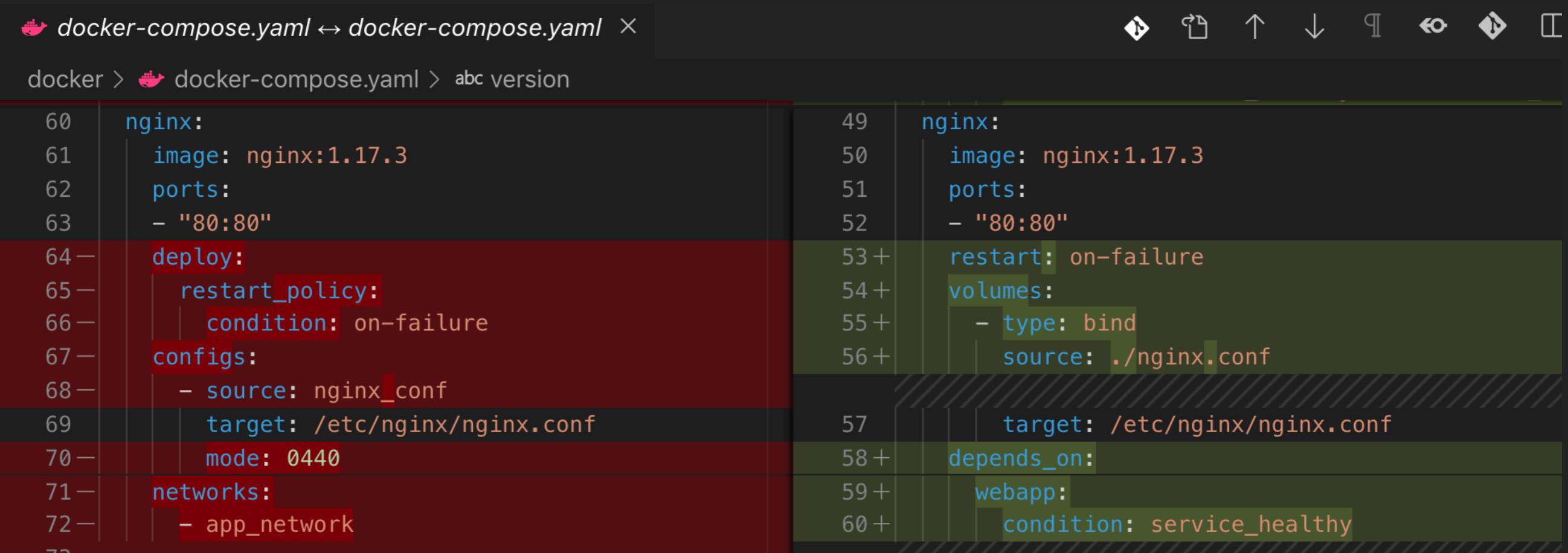
```
1+version: "2.4"          You, 7 days ago • Add HEALTH_C...
2 services:
3   mysql:
4     image: mysql:5.6
5     restart: on-failure
6
7 volumes:
8   - type: bind
9     source: ./data/mysql
10    target: /var/lib/mysql
11   - type: bind
12     source: ../webapp/node-mysql-crud-app/create_table.sh
13     target: /docker-entrypoint-initdb.d/create_table.sh
14   - type: bind
15     source: ./checkiftableexists.sh
16     target: /checkiftableexists.sh
17 environment:
18   - MYSQL_ROOT_PASSWORD=root
19   - MYSQL_USER=dpuser
20   - MYSQL_PASSWORD=dppassed
21   - MYSQL_DATABASE=dp
22 healthcheck:
23   test: ["CMD", "bash", "/checkiftableexists.sh"]
24   start_period: 30s
25   interval: 5s
26   timeout: 3s
27   retries: 4
```

# DOCKER - HOW-TO

```
docker > docker-compose.yaml > abc version
```

35 webapp:	27 webapp:
36   image: dp_webapp	28   image: dp_webapp
37 - deploy:	29 + restart: on-failure
38 -   replicas: 3	
39 -   restart_policy:	
40 -     condition: on-failure	
41   volumes:	30   volumes:
42 -     - type: volume	31 +     - type: bind
43 -       source: app-img-data	32 +       source: ./data/webapp
44       target: /node-mysql-crud-app/public/assets/i	33       target: /node-mysql-crud-app/public/assets/i
45 - configs:	34 +     - type: bind
46 -   - source: healthcheck_js	35 +       source: ./healthcheck.js
47       target: /healthcheck.js	36       target: /healthcheck.js
48 -   mode: 0755	
49 environment:	37 environment:
50   - DB_URL=mysql://dpuser:dppassed@mysql/dp	38   - DB_URL=mysql://dpuser:dppassed@mysql/dp
51 healthcheck:	39 healthcheck:
52   test: ["CMD", "node", "/healthcheck.js"]	40 +   # test: ["CMD", "curl", "http://localhost/"]
53   start_period: 10s	41   test: ["CMD", "node", "/healthcheck.js"]
54   interval: 2s	42   start_period: 10s
55   timeout: 3s	43   interval: 2s
56   retries: 4	44   timeout: 3s
57 - networks:	45   retries: 4
58 -   - app_network	46 + depends_on:
59 -	47 +   mysql:
	48 +     condition: service_healthy # or service_star

# COMPOSE FILE



```
docker > docker-compose.yaml > abc version
```

Line	File 1 (version 1)	File 2 (version 2)
60	nginx:	nginx:
61	image: nginx:1.17.3	image: nginx:1.17.3
62	ports:	ports:
63	- "80:80"	- "80:80"
64	- deploy:	+ restart: on-failure
65	restart_policy:	+ volumes:
66	condition: on-failure	- type: bind
67	configs:	source: ./nginx.conf
68	- source: nginx_conf	target: /etc/nginx/nginx.conf
69	target: /etc/nginx/nginx.conf	+ depends_on:
70	mode: 0440	+ webapp:
71	networks:	condition: service_healthy
72	- app_network	

# SWARM - INIT & JOIN

## ► docker swarm/node status

```
[xcwang@alidev project]$ docker info | grep -i swarm
```

**Swarm:** inactive

```
[xcwang@alidev project]$
```

Run "docker swarm init" or "docker swarm join" to connect this node to swarm and try again.

```
[xcwang@tag01 ~]$ docker info | grep -i swarm
```

**Swarm:** inactive

```
[xcwang@tag01 ~]$
```

```
[xcwang@alidev project]$ docker node ls
```

Error response from daemon: This node is not a swarm manager. Use "docker swarm init" or "docker swarm join" to connect this node to swarm and try again.

```
[xcwang@alidev project]$
```

```
[xcwang@tag01 ~]$ docker node ls
```

Error response from daemon: This node is not a swarm manager. Use "docker swarm init" or "docker swarm join" to connect this node to swarm and try again.

```
[xcwang@tag01 ~]$
```

# SWARM - INIT & JOIN

## ► docker swarm init & node join

```
[xcwang@alidev project]$ docker swarm init
Swarm initialized: current node (1uytgicfqnl4hhmht0r8a62dk) is now a manager.
```

To add a worker to this swarm, run the following command:

```
docker swarm join --token SWMTKN-1-210sfq0pfyrrnq59azzdxvgdapb7fmedzxvz1f270nym6yxdim4-aowmtg7y1eva2ljq0uwewgkft 10.10.11.5:2377
```

To add a manager to this swarm, run 'docker swarm join-token manager' and follow the instructions.

```
[xcwang@alidev project]$
```

```
[xcwang@tag01 ~]$ docker swarm join --token SWMTKN-1-210sfq0pfyrrnq59azzdxvgdapb7fmedzxvz1f270nym6yxdim4-aowmtg7y1eva2ljq0uwewgkft 10.10.11.5:2377
This node joined a swarm as a worker.
[xcwang@tag01 ~]$
```

# SWARM - INIT & JOIN

## ► docker swarm/node status

```
[xcwang@alidev project]$ docker info | grep -i swarm
```

**Swarm:** active

```
[xcwang@alidev project]$ █
```

```
[xcwang@tag01 ~]$
```

```
[xcwang@tag01 ~]$ docker info | grep -i swarm
```

**Swarm:** active

```
[xcwang@tag01 ~]$ █
```

```
[xcwang@alidev project]$ docker node ls
```

ID	HOSTNAME	STATUS	AVAILABILITY	MANAGE
R STATUS	ENGINE VERSION			
1uytgicfqnl4hhmht0r8a62dk *	alidev	Ready	Active	Leader
	19.03.1			
1qq5shhn0ywb8enhfbfioid6c	tag01	Ready	Active	
	19.03.1			

```
[xcwang@alidev project]$
```

```
[xcwang@alidev project]$
```

```
[xcwang@alidev project]$ █
```

```
[xcwang@tag01 ~]$ docker node ls
```

Error response from daemon: This node is not a swarm manager. Worker nodes can't be used to view or modify cluster state. Please run this command on a manager node or promote the current node to a manager.

```
[xcwang@tag01 ~]$ █
```

# SWARM - INIT & JOIN

## ► docker swarm/node status

```
Log: awslogs fluentd gcplogs gelf journald json-file syslog
Swarm: active
NodeID: 1uytgicfqnl4hhmht0r8a62dk
Is Manager: true
ClusterID: gng25wv9or8uw2lie2lxwc5bx
Managers: 1
Nodes: 2
Default Address Pool: 10.0.0.0/8
SubnetSize: 24
Data Path Port: 4789
Orchestration:
  Task History Retention Limit: 5
Raft:
```

```
Log: awslogs fluentd gcplogs gelf journald json-file syslog
Network: bridge host ipvlan macvlan null overlay
Swarm: active
NodeID: lqq5shhn0ywb8enhfbfioid6c
Is Manager: false
Node Address: 10.10.11.6
Manager Addresses:
  10.10.11.5:2377
Runtimes: runc
Default Runtime: runc
Init Binary: docker-init
```

## SWARM - CUSTOM IMAGE

- ▶ dp\_webapp image
- ▶ [https://github.com/zenanswer/docker\\_practice/tree/  
master/webapp](https://github.com/zenanswer/docker_practice/tree/master/webapp)
- ▶ Make sure that every node in this swarm has this image.

# SWARM - STACK

## ► docker stack deploy

```
[xcwang@alidev docker-swarm]$ docker stack deploy --compose-file ./docker-compose.yaml dptest
Creating network dptest_app_network
Creating config dptest_nginx_conf
Creating config dptest_healthcheck_js
Creating service dptest_nginx
Creating service dptest_mysql
Creating service dptest_webapp
```

```
[xcwang@alidev docker-swarm]$ docker stack ls
NAME          SERVICES          ORCHESTRATOR
dptest        3                Swarm
```

## SWARM - STACK

- ▶ docker stack deploy [error]

ID	NAME	IMAGE	NODE	DESIRED STATE
CURRENT STATE		ERROR		PORTS
t6kwn7qi2b8j	dptest_webapp.1	dp_webapp:latest	tag01	Ready
	Preparing 3 seconds ago			
zn8um69cyw0a	\_ dptest_webapp.1	dp_webapp:latest	tag01	Shutdown
	Rejected 4 seconds ago	"No such image: dp_webapp:late..."		
x35lna6abbvf	dptest_mysql.1	mysql:5.6	alidev	Running
	Preparing 48 seconds ago			
qns4rrzfnprg	dptest_nginx.1	nginx:1.17.3	tag01	Running
	Preparing about a minute ago			
2ex849jq9l0t	dptest_webapp.2	dp_webapp:latest	alidev	Running
	Preparing 25 seconds ago			
xut588z2pphd	dptest_webapp.3	dp_webapp:latest	alidev	Running
	Starting 3 seconds ago			

# SWARM - STACK

## ► docker stack deploy [error]

ID	NAME	IMAGE	NODE	DESIRED STATE	CURRENT STATE
ERROR			PORTS		
p9qg7aeklwu9tst1tcnqwpaxr	dptest_mysql.1	mysql:5.6@sha256:e2388e706b4e90b2f558126f98eda			
5b38fc36c9d220468a10535778e28707e2f	alidev			Running	Running 33 seconds ago
sxo51gb8r0c2vvo1kdi3yn8kf	dptest_webapp.1	dp_webapp:latest	alidev	Running	Running 29 seconds ago
bh7s4ucnptjklva0taijemilp	dptest_nginx.1	nginx:1.17.3@sha256:53ddb41e46de3d63376579acf4			
6f9a41a8d7de33645db47a486de9769201fec9	tag01			Running	Preparing about a minute ago
id1er3a4776xx2u289dd5ibxv	dptest_webapp.1	dp_webapp:latest	alidev	Shutdown	Failed 53 seconds ago
	"task: non-zero exit (1)"				
kdyfg27eu6xaa5xjzhjb6fxpa	dptest_webapp.2	dp_webapp:latest	alidev	Running	Preparing 11 seconds ago
2juefrfv3dc3olkz9jvq7354p	\_ dptest_webapp.2	dp_webapp:latest	tag01	Shutdown	Rejected 11 seconds ago
	"No command specified"				

## SWARM - STACK

- ▶ docker stack deploy [error]

```
[xcwang@alidev docker-swarm]$ docker config ls
ID                      NAME          CREATED        UPDATED
pyvzx16zzpzjrvtsitys4949h  dptest_healthcheck_js  7 minutes ago  7 minutes ago
1mpiz88yt0ssxivi2g695op1m   dptest_nginx_conf      7 minutes ago  7 minutes ago
[xcwang@alidev docker-swarm]$ docker network ls
NETWORK ID          NAME          DRIVER        SCOPE
z01za4duf9eu        app_app_network  overlay       swarm
92f1c65415a2        bridge         bridge       local
e44a5472c671        docker_gwbridge  bridge       local
o04jg124lggs        dptest_app_network  overlay       swarm
b22905a890f0        host           host        local
pjptwirwsgb0        ingress        overlay       swarm
897e26a66be2        none          null        local
```

# SWARM - STACK

## ► docker stack deploy [error]

```
[xcwang@alidev docker-swarm]$ docker config inspect dptest_healthcheck_js
[{"id": "pyvzx16zzpzjrvtsitys4949h", "version": {"index": 2099}, "createdAt": "2019-09-09T06:55:35.947197047Z", "updatedAt": "2019-09-09T06:55:35.947197047Z", "spec": {"name": "dptest_healthcheck_js", "labels": {"com.docker.stack.namespace": "dptest"}, "data": "Y29uc3QgaHR0cCA9IHJlcXVpcmUoJ2h0dHAnKTsKCnZhciBwb3J0ID1BPUIQ7Cn0KCmNvbnN0IG9wdGlvbnMgPSB7CiAgICBob3N00iAnMTI3LjAuMC4xJywKICAgIHBydWVzdChvcHRpb25zLCocmVzKSA9PiB7CiAgICBjb25zb2x1LmxvZyhgSEVBTFRIQ0hFQ0sgU1wogICAgICAgIHByb2Nlc3MuZXhpdcgwKTsKICAgIH0KICAgIGVsc2UgewogICAgICAgIHByb2NyKSB7CiAgICBjb25zb2x1LmVycm9yKCdFU1JPUicp0wogICAgchJvY2Vzcy5leGl0KDEp0wp9KT"}]}
```

# SWARM - STACK

## ► docker stack deploy

```
[xcwang@alidev docker-swarm]$ docker stack deploy -c docker-compose.yaml dptest
Creating network dptest_app_network
Creating config dptest_healthcheck_js
Creating config dptest_nginx_conf
Creating service dptest_mysql
Creating service dptest_webapp
Creating service dptest_nginx
[xcwang@alidev docker-swarm]$ █
```

[xcwang@alidev docker-swarm]\$ docker stack ps dptest				
ID	DESIRED STATE	NAME	IMAGE	NODE
		CURRENT STATE	ERROR	PORTS
otrdmblqlqhd	Running	dptest_nginx.1	nginx:1.17.3	tag01
gag235xiy1m7	Running	dptest_webapp.1	dp_webapp:latest	tag01
tuyp4ed7cud9	Running	dptest_mysql.1	mysql:5.6	alidev
du7abbnmk1e7	Running	dptest_webapp.2	dp_webapp:latest	tag01
gkkypaw9ityh	Running	dptest_webapp.3	dp_webapp:latest	alidev

```
[xcwang@alidev docker-swarm]$ █
```

# SWARM - STACK

## ► docker stack deploy

```
[xcwang@alidev docker-swarm]$ docker ps
```

CONTAINER ID	IMAGE	COMMAND	CREATED
STATUS	PORTS	NAMES	
95a7d53256e1	dp_webapp:latest	"node app.js"	2 minutes ago
Up 2 minutes (healthy)	80/tcp	dptest_webapp.3.gkkypaw9ityhvc98	

CONTAINER ID	IMAGE	COMMAND	CREATED
STATUS	PORTS	NAMES	
99352bdfb713	mysql:5.6	"docker-entrypoint.s..."	3 minutes ago
Up 3 minutes (healthy)	3306/tcp	dptest_mysql.1.tuyp4ed7cud9cwa6r	

CONTAINER ID	IMAGE	COMMAND	CREATED
STATUS	PORTS	NAMES	
1g761kv14			

```
[xcwang@alidev docker-swarm]$ █
```

```
[xcwang@tag01 ~]$
```

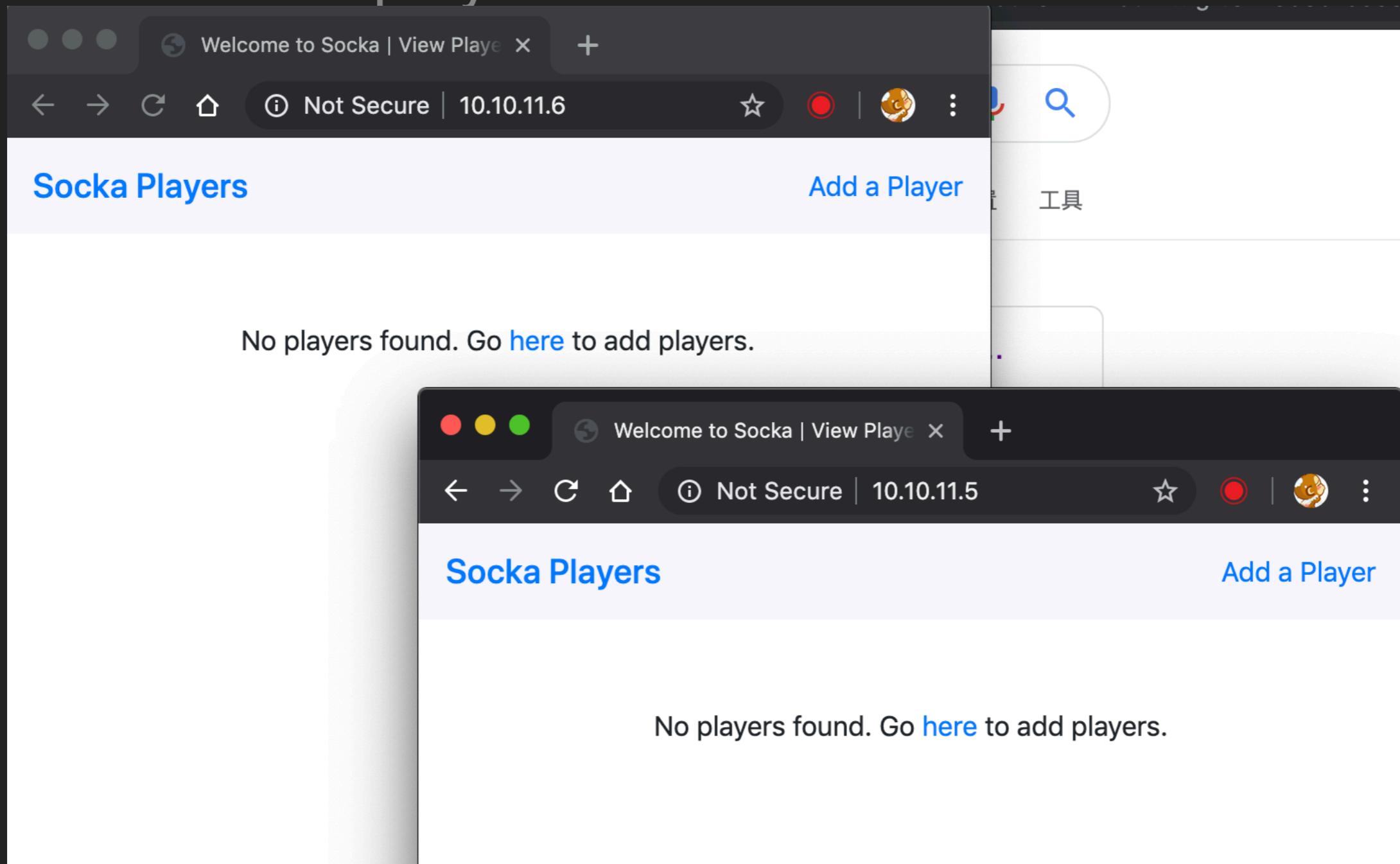
```
[xcwang@tag01 ~]$ docker ps
```

CONTAINER ID	IMAGE	COMMAND	CREATED	STA
STATUS	PORTS	NAMES		
TUS				
b77c4ee98f29	nginx:1.17.3	"nginx -g 'daemon of..."	2 minutes ago	Up
2 minutes	80/tcp	dptest_nginx.1.otrdmbiplqhd4s6h540v2esxg		
1682ff1e2297	dp_webapp:latest	"node app.js"	3 minutes ago	Up
3 minutes (healthy)	80/tcp	dptest_webapp.1.gag235xiy1m7t6x7a5p1vzv99		
7711f5d09b43	dp_webapp:latest	"node app.js"	3 minutes ago	Up
3 minutes (healthy)	80/tcp	dptest_webapp.2.du7abbnmk1e7lcx9w4ljjz9z38		

```
[xcwang@tag01 ~]$ █
```

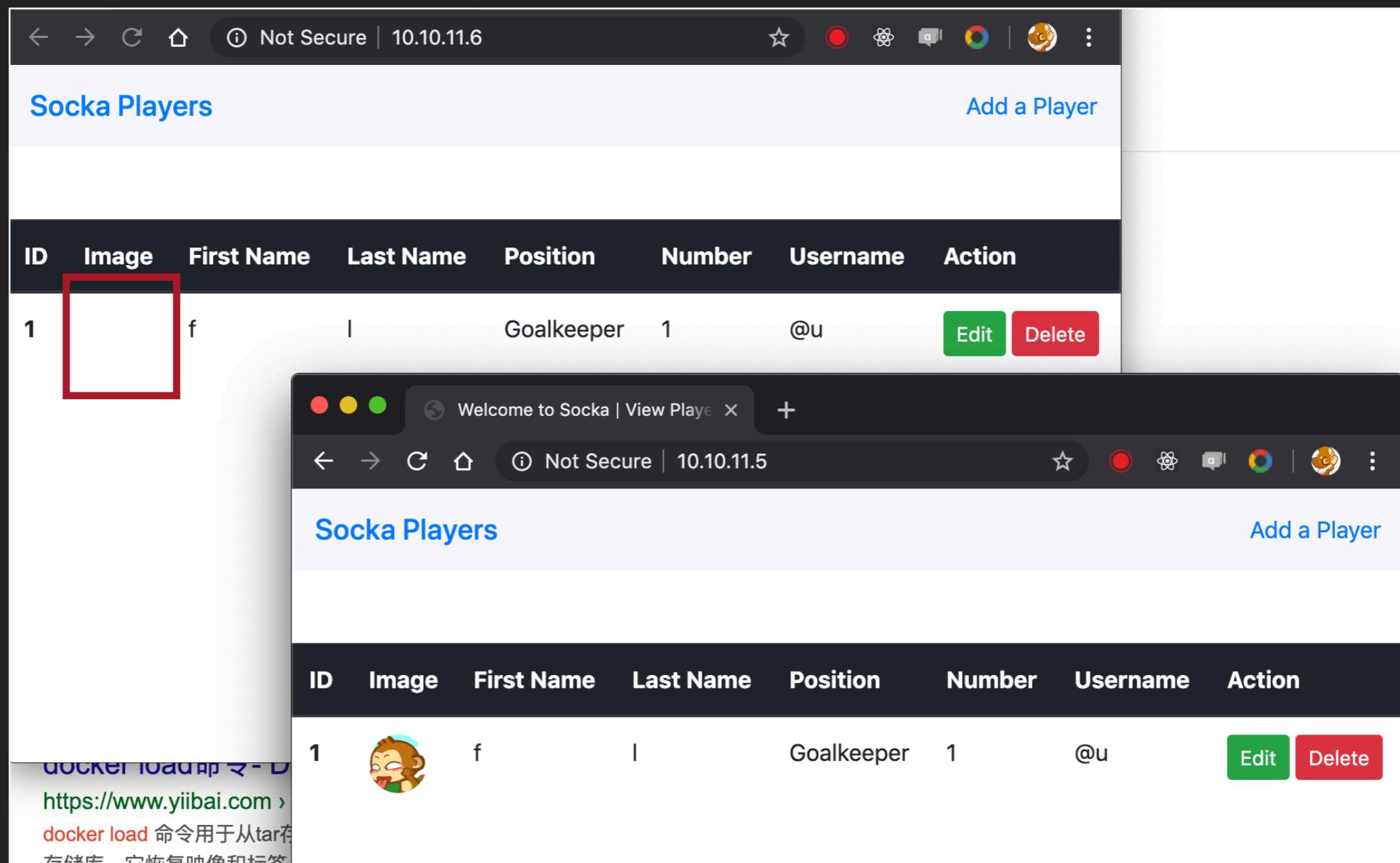
# SWARM - STACK

## ► docker stack deploy



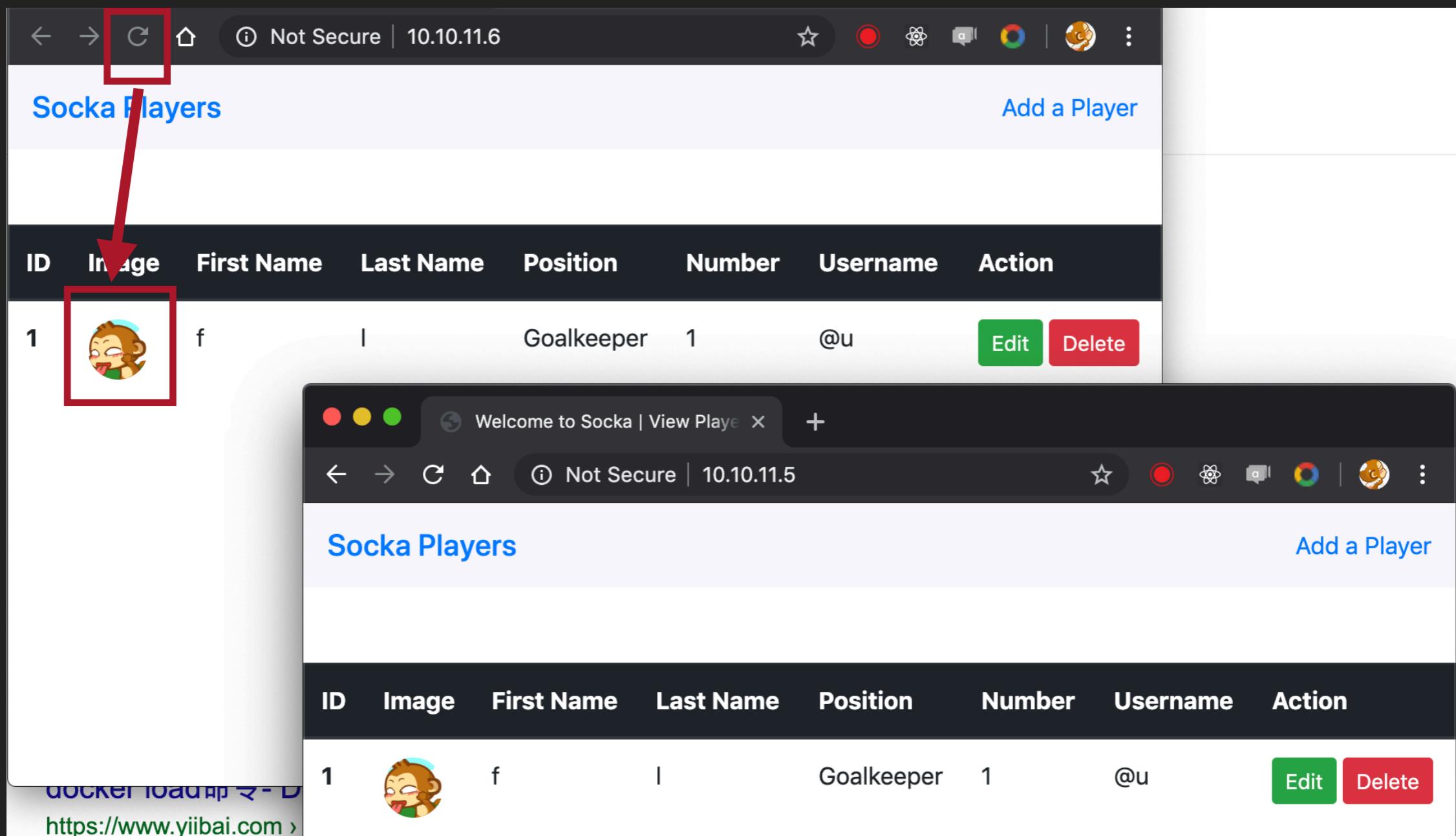
## SWARM - STACK

### ► docker stack deploy



# SWARM - STACK

## ▶ docker stack deploy



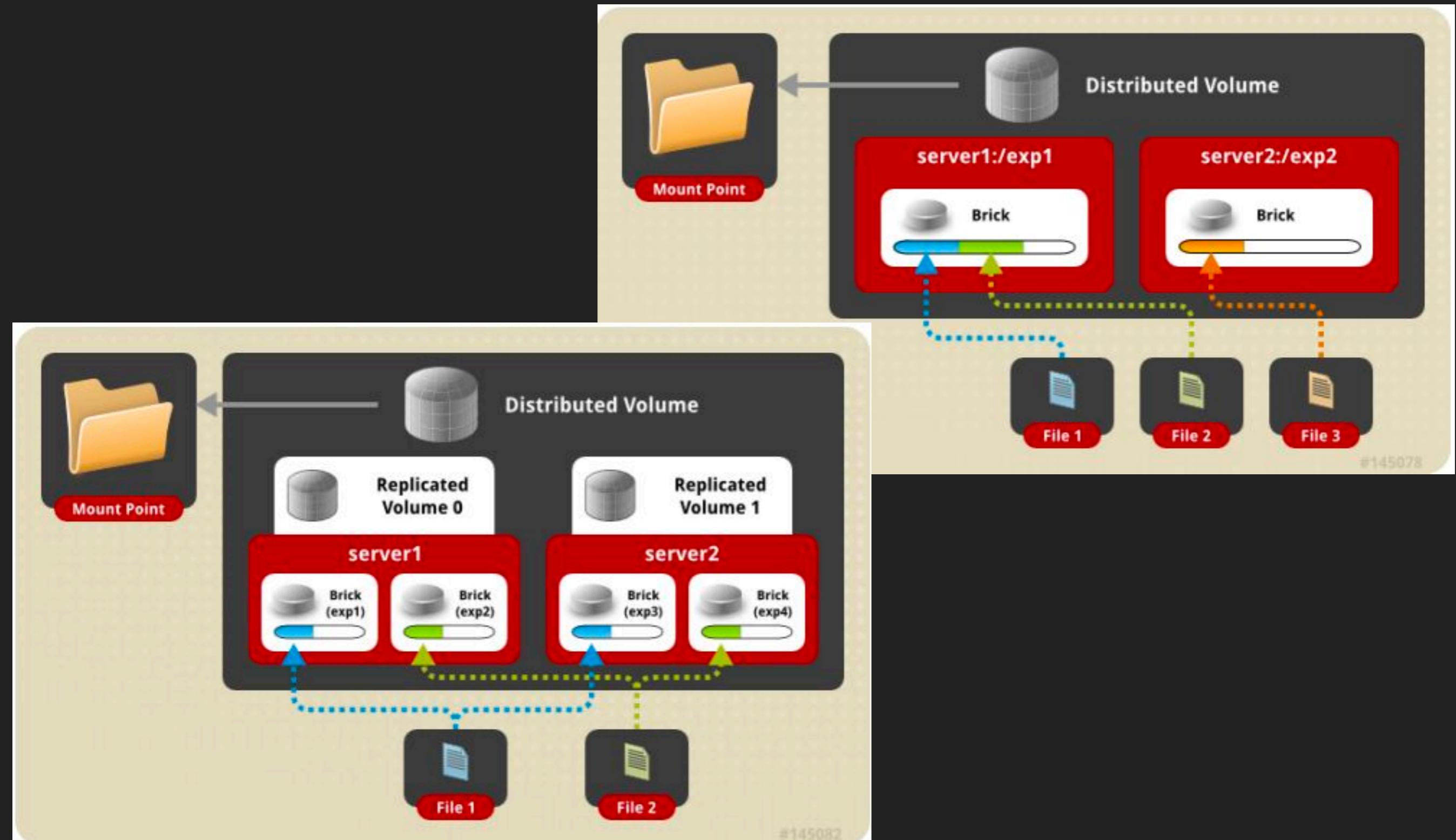
## VOLUME

```
[xcwang@alidev docker-swarm]$ docker volume inspect dptest_app-img-data
[
  {
    "CreatedAt": "2019-09-09T16:17:40+08:00",
    "Driver": "local",
    "Labels": {
      "com.docker.stack.namespace": "dptest"
    },
    "Mountpoint": "/home/dockerstore/volumes/dptest_app-img-data/_data",
    "Name": "dptest_app-img-data",
    "Options": null,
    "Scope": "local"
  }
]
```

```
[root@alidev ~]# ls -lth /home/dockerstore/volumes/dptest_app-img-data/_data
total 0
[root@alidev ~]# █
```

```
[root@tag01 ~]# ls -lth /home/dockerstore/volumes/dptest_app-img-data/_data
total 20K
-rw-r--r--. 1 root root 17K Sep  9 16:24 u.png
[root@tag01 ~]# █
```

# DISTRIBUTED FILE SYSTEM



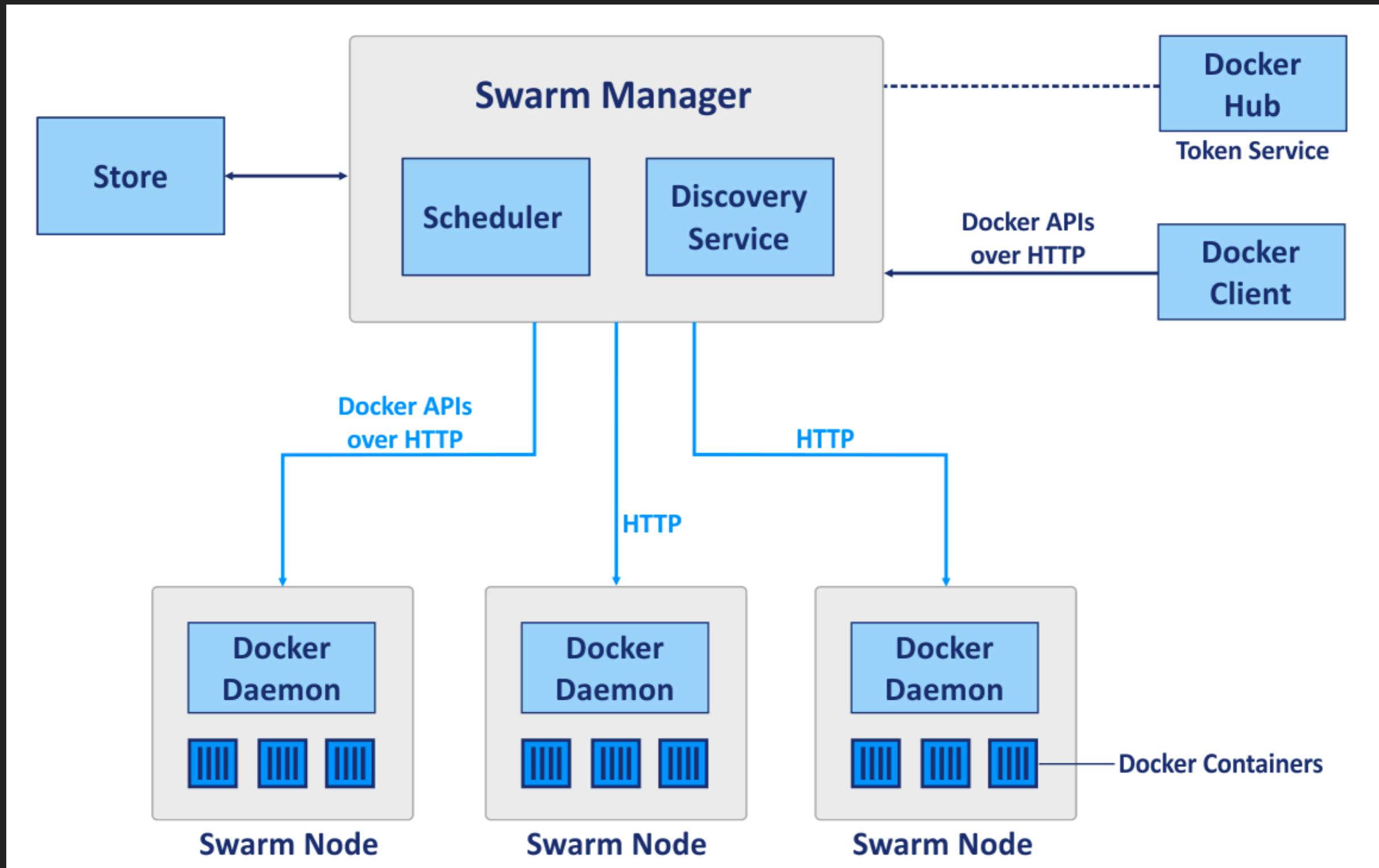
## DISTRIBUTED FILE SYSTEM

- ▶ NFS
  - ▶ Network File System
  - ▶ <https://www.ibm.com/developerworks/cn/linux/network-filesystems/index.html>
- ▶ HDFS
  - ▶ Hadoop Distributed File System
  - ▶ <https://www.ibm.com/developerworks/cn/web/introhdfs/index.html>

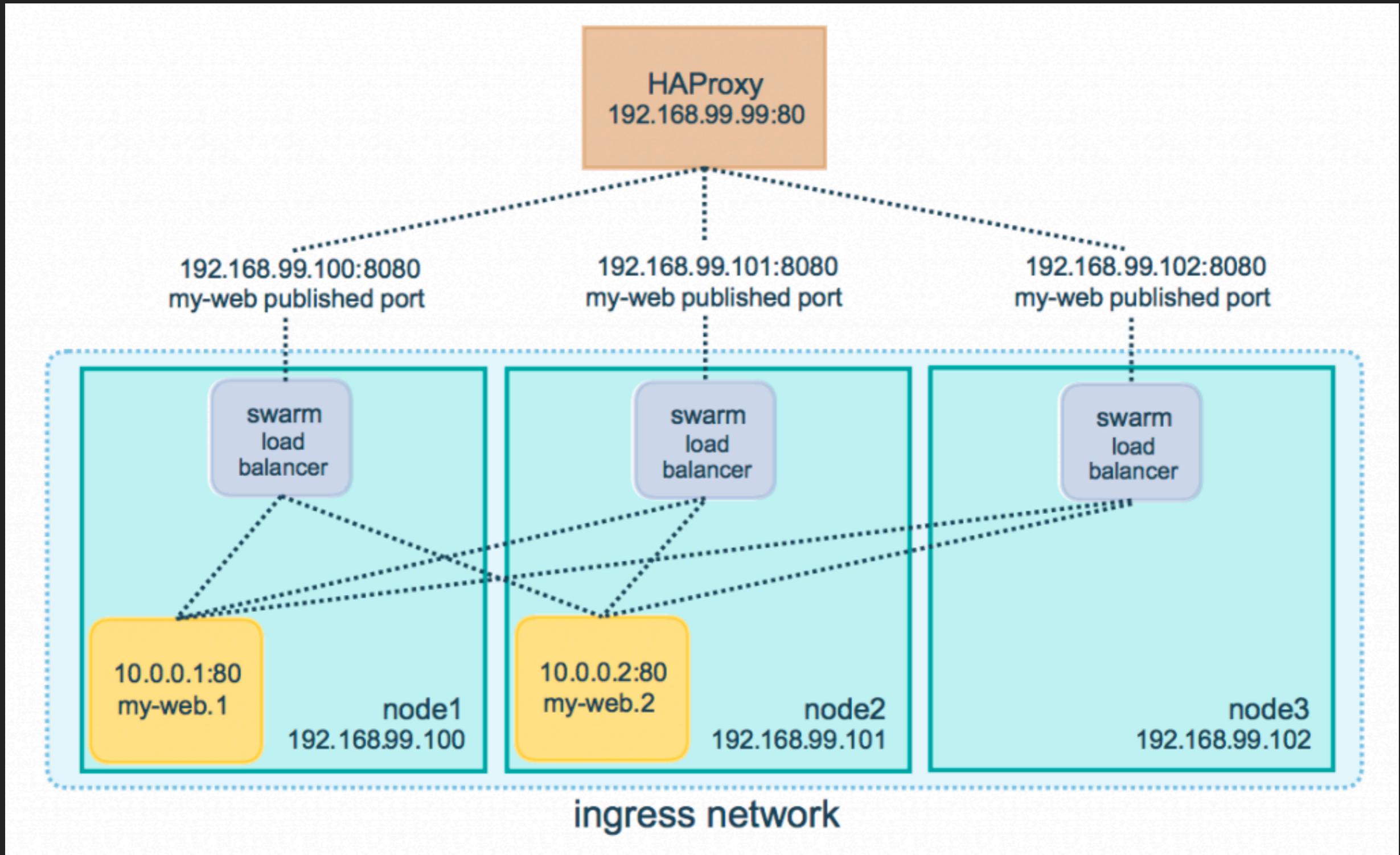
## DISTRIBUTED FILE SYSTEM

- ▶ Ceph
  - ▶ OBJECT STORE / BLOCK DEVICE / FILE SYSTEM(CephFS)
  - ▶ <https://ceph.io/>
  - ▶ <https://www.ibm.com/developerworks/cn/linux/l-ceph/index.html>
- ▶ GlusterFS
  - ▶ <https://www.gluster.org/>
  - ▶ <https://www.ibm.com/developerworks/cn/opensource/os-cn-glusterfs-docker-volume/index.html>

# DOCKER SWARM



# DOCKER SWARM



# DOCKER ENGINE PLUGINS

► [https://docs.docker.com/engine/extend/legacy\\_plugins/](https://docs.docker.com/engine/extend/legacy_plugins/)

## Network plugins

Plugin	Description
Contiv Networking	An open source network plugin to provide infrastructure and security policies for a multi-tenant micro services deployment, while providing an integration to physical network for non-container workload. Contiv Networking implements the remote driver and IPAM APIs available in Docker 1.9 onwards.
Kuryr Network Plugin	A network plugin is developed as part of the OpenStack Kuryr project and implements the Docker networking (libnetwork) remote driver API by utilizing Neutron, the OpenStack networking service. It includes an IPAM driver as well.
Weave Network Plugin	A network plugin that creates a virtual network that connects your Docker containers - across multiple hosts or clouds and enables automatic discovery of applications. Weave networks are resilient, partition tolerant, secure and work in partially connected networks, and other adverse environments - all configured with delightful simplicity.

# DOCKER ENGINE PLUGINS

## Volume plugins

Plugin	Description
Azure File Storage plugin	Lets you mount Microsoft Azure File Storage shares to Docker containers as volumes using the SMB 3.0 protocol. <a href="#">Learn more.</a>
BeeGFS Volume Plugin	An open source volume plugin to create persistent volumes in a BeeGFS parallel file system.
Blockbridge plugin	A volume plugin that provides access to an extensible set of container-based persistent storage options. It supports single and multi-host Docker environments with features that include tenant isolation, automated provisioning, encryption, secure deletion, snapshots and QoS.
Contiv Volume Plugin	An open source volume plugin that provides multi-tenant, persistent, distributed storage with intent based consumption. It has support for Ceph and NFS.
Convoy plugin	A volume plugin for a variety of storage back-ends including device mapper and NFS. It's a simple standalone executable written in Go and provides the framework to support vendor-specific extensions such as snapshots, backups and restore.

# NETWORK

## ▶ Attach a network

```
[xcwang@tag01 ~]$ docker run -it --rm --entrypoint sh --network dptest_app_network raese  
ne/alpine-nettools
```

## NETWORK

### ▶ Attach a network

```
[xcwang@alidev docker-swarm]$ docker stack deploy -c docker-compose-nettools.yaml tool
Creating service tool_nettools
```

! docker-compose-nettools.yaml ×

```
docker-swarm > ! docker-compose-nettools.yaml > ...
1   version: "3.7"
2
3   services:
4     nettools:
5       image: raesene/alpine-nettools
6       networks:
7         - app_network
8
9   networks:
10    app_network:
11      name: dptest_app_network
12      external: true
13
```

```
[xcwang@alidev docker-swarm]$ docker stack ps tool
ID          NAME          IMAGE          NODE
DESIRED STATE  CURRENT STATE  ERROR          PORTS
wcxtsbcqj5k2  tool_nettools.1  raesene/alpine-nettools:latest  alidev
        Running          Preparing 19 seconds ago
[xcwang@alidev docker-swarm]$ docker ps
CONTAINER ID  IMAGE          COMMAND          CREATED
STATUS          PORTS          NAMES
ea825b856b07  raesene/alpine-nettools:latest  "/entrypoint.sh"  7 seconds ago
          o          Up 5 seconds
bb
95a7d53256e1  dp_webapp:latest  "node app.js"  2 hours ago
          bb          Up 2 hours (healthy)  80/tcp
          14
14
99352bdfb713  mysql:5.6      "docker-entrypoint.s..."  2 hours ago
          14          Up 2 hours (healthy)  3306/tcp
          l
```

## NETWORK

### ► DNS

```
[xcwang@alidev docker-swarm]$ docker exec -it ea825b856b07 sh  
/ # dig webapp  
  
; <>> DiG 9.10.8-P1 <>> webapp  
;; global options: +cmd  
;; Got answer:  
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 22330  
;; flags: qr rd ra; QUERY: 1, ANSWER: 1, AUTHORITY: 0, ADDITIONAL: 0  
  
;; QUESTION SECTION:  
;webapp.                      IN      A  
  
;; ANSWER SECTION:  
webapp.          600      IN      A      10.0.5.5  
  
;; Query time: 0 msec  
;; SERVER: 127.0.0.1#53(127.0.0.11)  
;; WHEN: Mon Sep 09 09:54:09 UTC 2019  
;; MSG SIZE  rcvd: 46
```

# NETWORK

## ► DNS

```
/ # dig tasks.webapp

; <>> DiG 9.10.8-P1 <>> tasks.webapp
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 62662
;; flags: qr rd ra; QUERY: 1, ANSWER: 3, AUTHORITY: 0, ADDITIONAL: 0

;; QUESTION SECTION:
;tasks.webapp.           IN      A

;; ANSWER SECTION:
tasks.webapp.        600    IN      A      10.0.5.7
tasks.webapp.        600    IN      A      10.0.5.6
tasks.webapp.        600    IN      A      10.0.5.8

;; Query time: 0 msec
;; SERVER: 127.0.0.11#53(127.0.0.11)
;; WHEN: Mon Sep 09 09:54:16 UTC 2019
;; MSG SIZE  rcvd: 114

/ # █
```

## CONFIGS

- ▶ <https://docs.docker.com/engine/swarm/configs/>
- ▶ <https://docs.docker.com/engine/swarm/configs/#example-rotate-a-config>
- ▶ Issue
  - ▶ <https://blog.sunekeller.dk/2019/01/docker-stack-deploy-update-configs/>
  - ▶ <https://github.com/moby/moby/issues/35048>

# DEPENDS\_ON

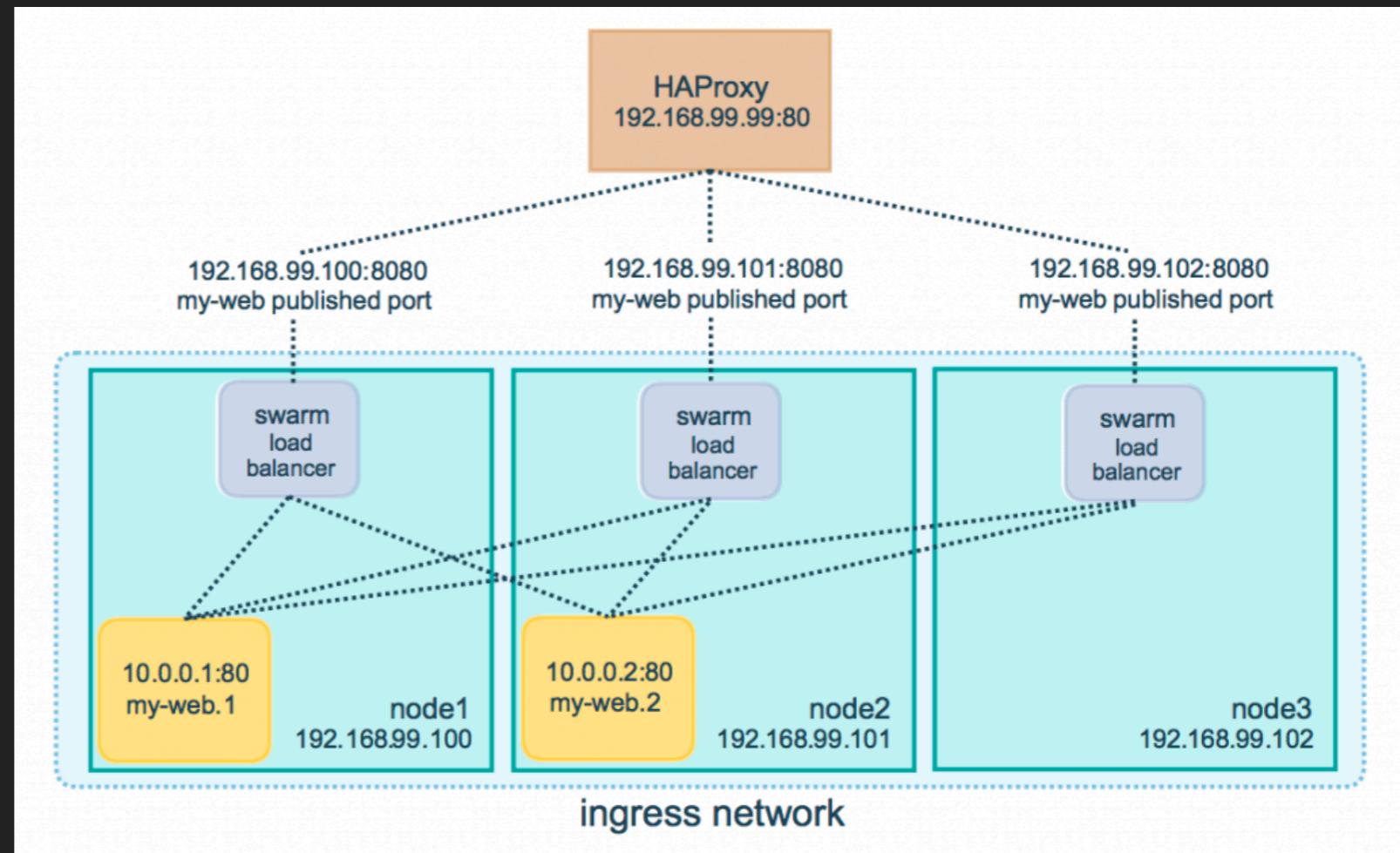
- ▶ <https://github.com/moby/moby/issues/31333>
- ▶ [https://docs.docker.com/compose/compose-file/  
#depends\\_on](https://docs.docker.com/compose/compose-file/#depends_on)

✓ There are several things to be aware of when using `depends_on` :

- `depends_on` does not wait for `db` and `redis` to be “ready” before starting `web` - only until they have been started. If you need to wait for a service to be ready, see [Controlling startup order](#) for more on this problem and strategies for solving it.
- Version 3 no longer supports the `condition` form of `depends_on`.
- The `depends_on` option is ignored when deploying a stack in swarm mode with a version 3 Compose file.

# LOGGING

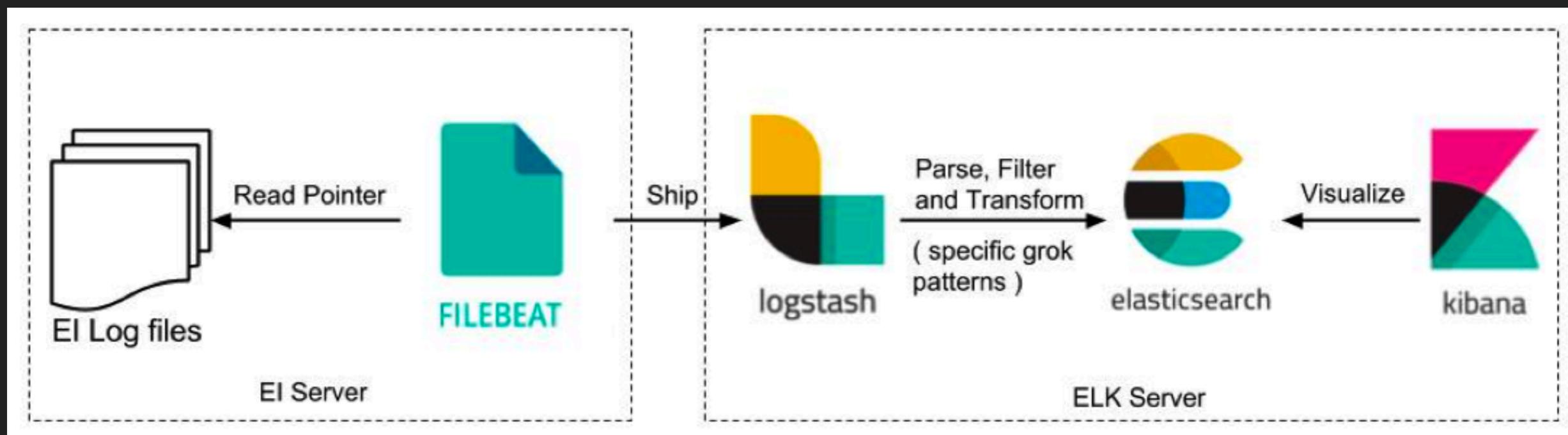
## ▶ Issues



```
[root@dck01 docker_practice]# docker service ps dptest_webapp
ID          NAME      IMAGE           NODE      PORTS
DESIRED STATE CURRENT STATE          ERROR
zjvmfj230ch8  dptest_webapp.1  dp_webapp:latest  dck02
Running      Running  41 minutes ago
xpyftrng8dal  dptest_webapp.2  dp_webapp:latest  dck01
Running      Running  40 minutes ago
bm4yfxqol9vq  dptest_webapp.3  dp_webapp:latest  dck02
Running      Running  40 minutes ago
[root@dck01 docker_practice]#
```

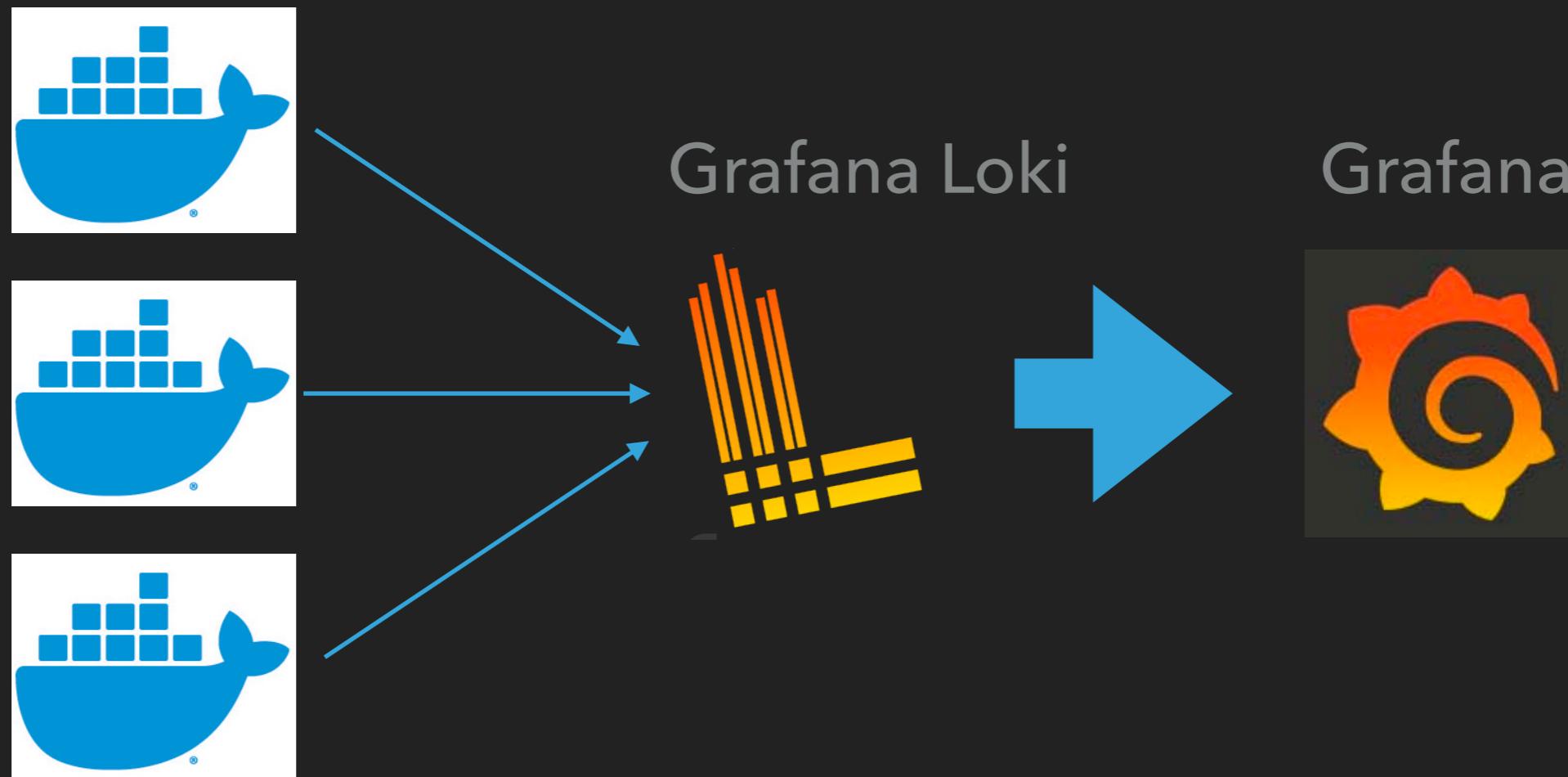
## LOGGING

### Solution



# LOGGING

## ► Solution



## LOGGING

- ▶ <https://docs.docker.com/config/containers/logging/configure/>
- ▶ <https://docs.docker.com/compose/compose-file/#logging>
- ▶ dockerd
  - ▶ daemon.json
- ▶ container
  - ▶ docker run --log-driver \*\*\* --log-opt \*\*\*
  - ▶ Logging configuration for the service in compose file

# DOCKER - HOW-TO

## LOGGING

! docker-compose-log.yaml ×

docker-swarm > ! docker-compose-log.yaml > {} services > {} grafana

zenanswer, 33 minutes ago | 2 authors (You and others)

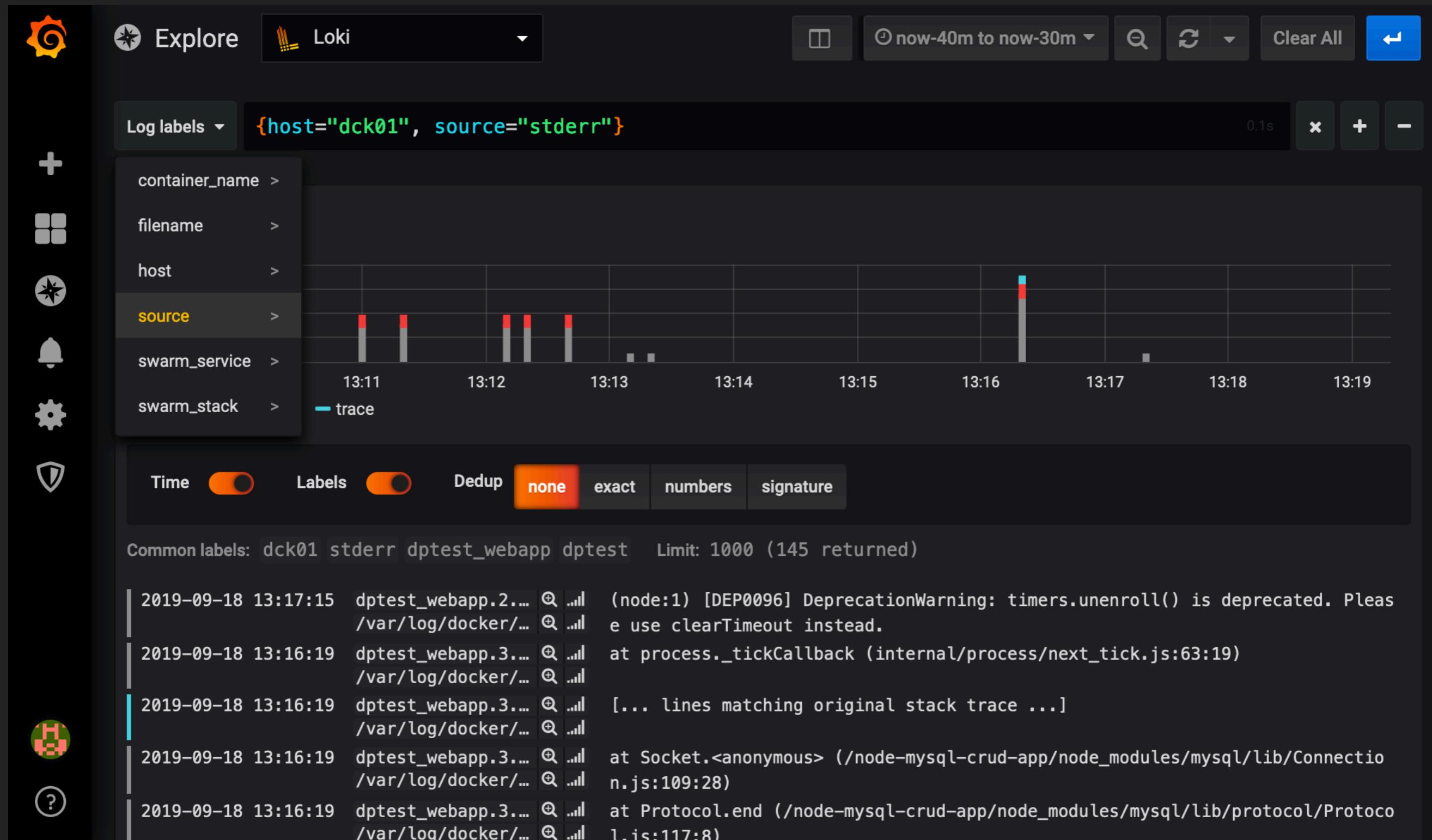
```
1 version: "3.7"
2
3 networks:
4   loki_network:
5     driver: overlay
6     attachable: true
7
8 services:
9   loki:
10    image: grafana/loki:latest
11    ports:
12      - "3100:3100"
13    command: -config.file=/etc/loki/local-config.yaml
14    networks:
15      - loki_network
16
17   grafana:
18    image: grafana/grafana:6.3.5
19    ports:
20      - "3000:3000"
21    networks:
22      - loki_network
23
```

! docker-compose.yaml × run.sh ! docker-compose-log.yaml

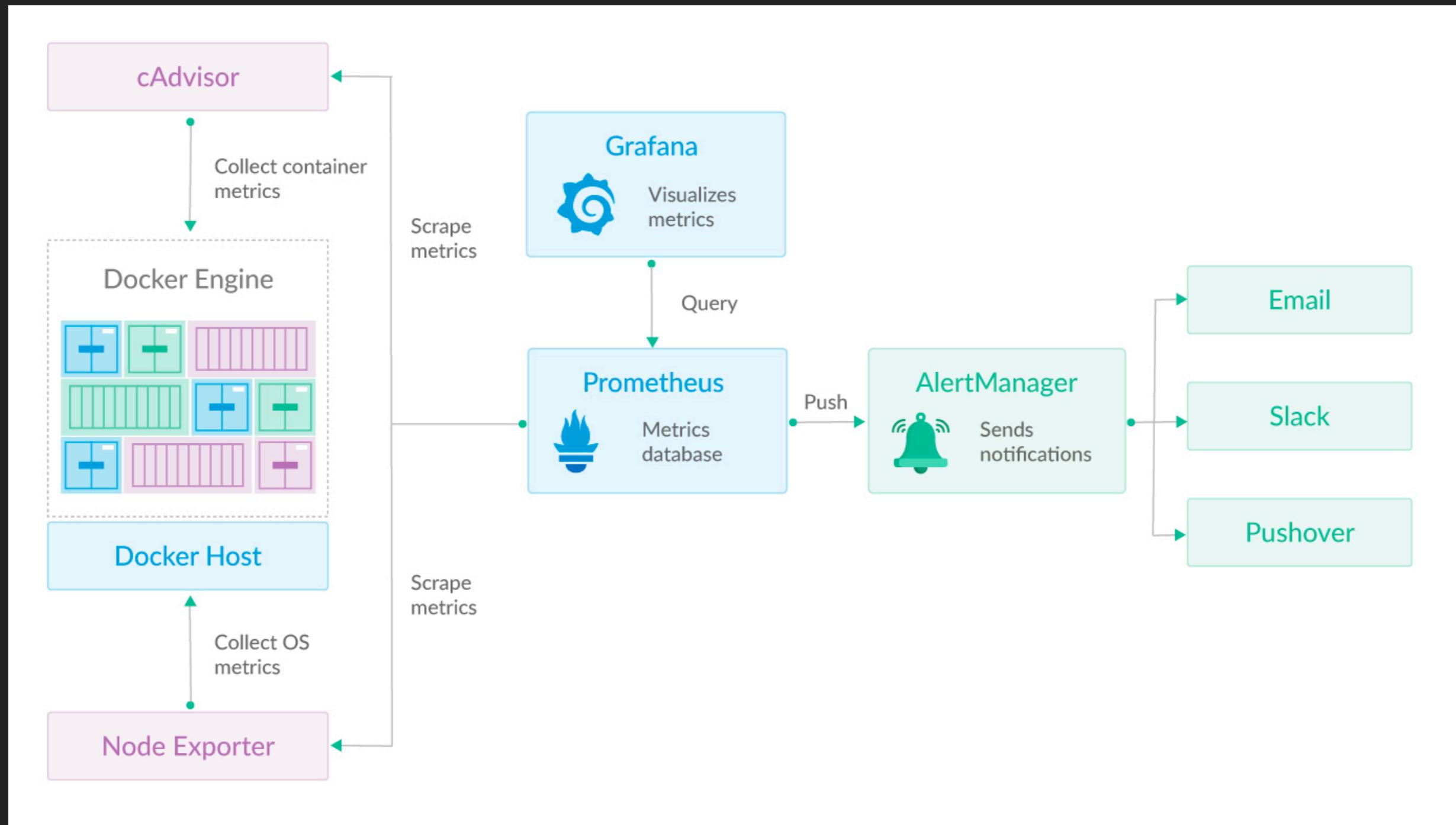
docker-swarm > docker-compose.yaml > {} services > {} webapp > {} log

```
34
35   webapp:
36     image: dp_webapp
37     deploy:
38       replicas: 3
39       restart_policy:
40         condition: on-failure
41     volumes:
42       - type: volume
43         source: app-img-data
44         target: /node-mysql-crud-app/public/assets/img
45     configs:
46       - source: healthcheck_js
47         target: /healthcheck.js
48         mode: 0755
49     environment:
50       - DB_URL=mysql://dpuser:dppassed@mysql/dp
51     healthcheck:
52       test: ["CMD", "node", "/healthcheck.js"]
53       start_period: 10s
54       interval: 2s
55       timeout: 3s
56       retries: 4
57     networks:
58       - app_network
59     logging:
60       driver: loki
61       options:
62         loki-url: "http://10.10.11.9:3100/api/prom/push"
```

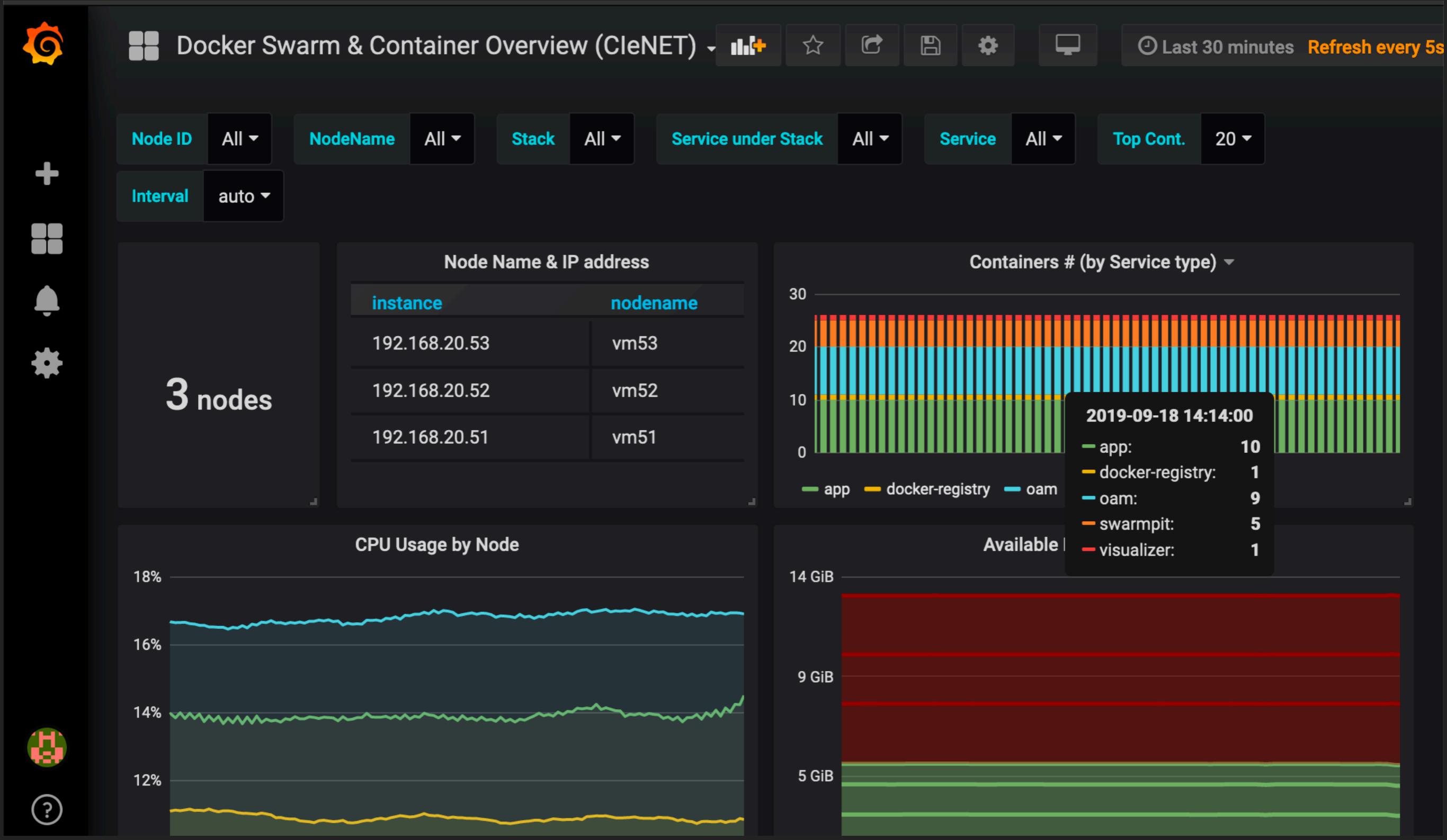
# LOGGING



# MONITORING



# MONITORING



## MONITORING



# SWARMPIT

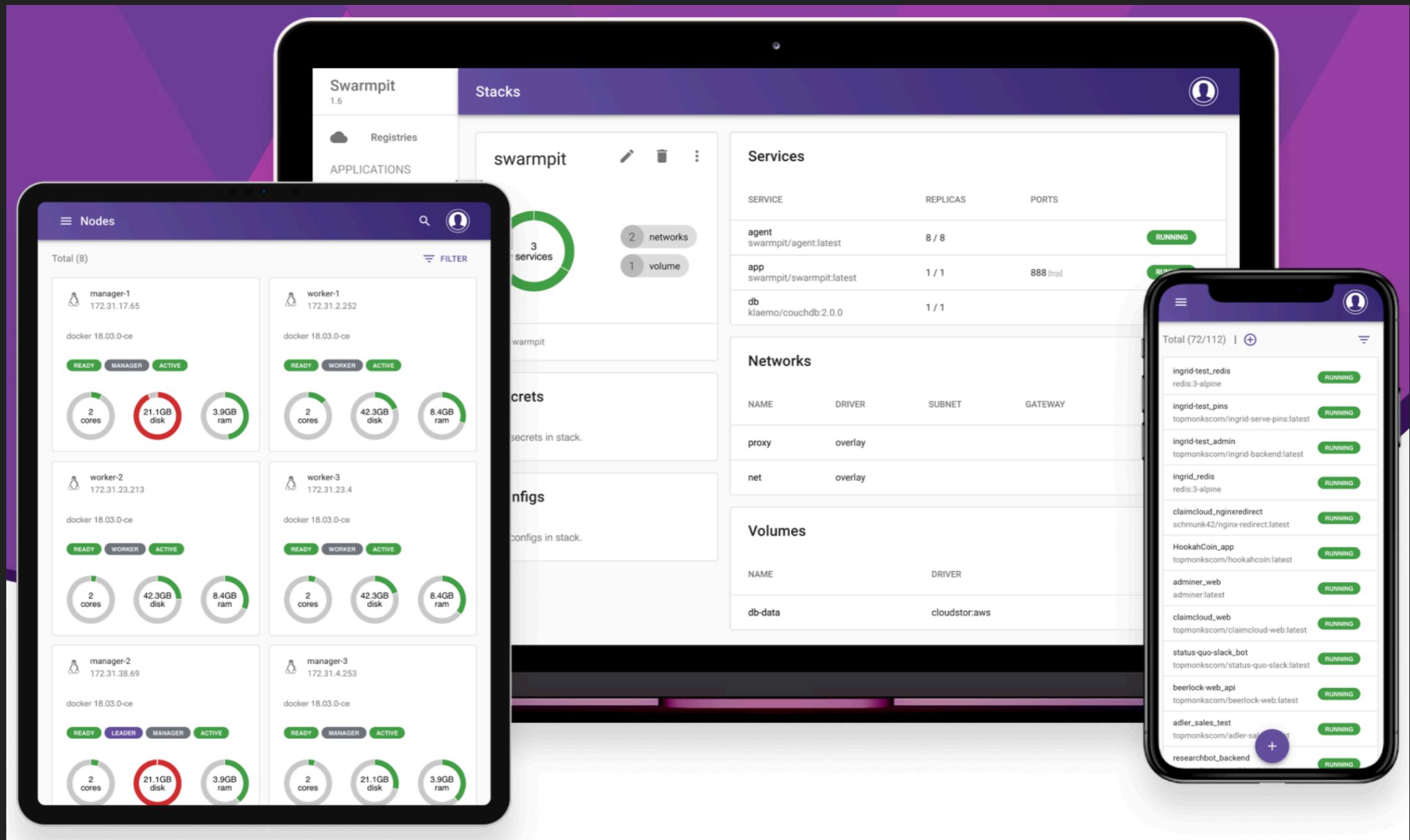
- ▶ <https://swarmpit.io/>
- ▶ <https://github.com/swarmpit/swarmpit>

### Manual installation

Simply deploy Swarmpit by using a compose file from our git repo.

```
git clone https://github.com/swarmpit/swarmpit
docker stack deploy -c swarmpit/docker-compose.yml swarmpit
```

## SWARMPIT



# SWARMPIT

swarmpit 1.6-2a0a14b

## Nodes

admin ▾

APPLICATIONS

- Stacks
- Services
- Tasks

INFRASTRUCTURE

- Networks
- Nodes

DATA

- Volumes
- Secrets

Configs

Search nodes

Node	Docker Version	IP Address	Status	Type	Role
tag03	docker 18.09.1	192.168.20.63	ready	worker	active
vm51	docker 18.09.1	192.168.20.51	ready	leader	manager active
vm52	docker 18.09.1	192.168.20.52	ready	worker	active
vm53	docker 18.09.1	192.168.20.53	ready	worker	active

CPU      DISK      MEMORY

4 cores    1.0TB    12.4GB  
1.65%    8.09%    27.84%

1 core    32.2GB    6.1GB  
14.22%   44.75%   44.53%

1 core    32.2GB    4.0GB  
10.65%   14.56%   52.58%

1 core    32.2GB    4.0GB  
16.51%   22.90%   67.20%

# SWARMPIT

swarmpit 1.6-2a0a14b

## Stacks

admin ▾

APPLICATIONS

Search stacks

NEW STACK

Name	Services	Networks	Volumes	Configs	Secrets
app	6	1	0	0	0
docker-registry	1	1	0	0	2
elk	7	1	0	0	0
oam	5	1	0	0	0
swarmpit	3	1	1	0	0
test	2	1	0	0	0
visualizer	1	1	0	0	0

INFRASTRUCTURE

DATA

Stacks

Services

Tasks

Networks

Nodes

Volumes

Secrets

Configs

# SWARMPIT

swarmpit 1.6-2a0a14b

## Stacks

ACTIONS ▾

APPLICATIONS	Services	Name	Image	Replicas	Ports	Status
Stacks	demo-app	demo-app	192.168.20.51:5001/demo-app:0.0.1	3 / 3	8080 [tcp]	running
Services	kafka	kafka	192.168.20.51:5001/kafka_jmx:2.12-2.1.0	3 / 3	9094 [tcp]	running
INFRASTRUCTURE	mysql	mysql	mysql:latest	1 / 1		running
Networks	zoo1	zoo1	192.168.20.51:5001/zookeeper_jmx:3.4.13	1 / 1		running
Nodes	zoo2	zoo2	192.168.20.51:5001/zookeeper_jmx:3.4.13	1 / 1		running
	zoo3	zoo3	192.168.20.51:5001/zookeeper_jmx:3.4.13	1 / 1		running

## DATA

### Networks

Volumes	Name	Driver	Subnet	Gateway	
Volumes	app_net	overlay	10.0.3.0/24	10.0.3.1	external
Secrets					
Configs					

# SWARMPIT

swarmpit 1.6-2a0a14b

## Services

app\_demo-app running 3 / 3

LOGS ACTIONS

General settings	
ID	y8spkqli4hb63wsi1321dax98
STACK	<a href="#">app</a>
NAME	demo-app
CREATED	7 months ago
LAST UPDATE	2 months ago
IMAGE	192.168.20.51:5001/demo-app:0.0.1
MODE	global

## Ports

Container port	Protocol	Mode	Host port
8080	tcp	ingress	8080

Volumes

Secrets

Configs

# SWARMPIT

## Services



## Tasks

Name	Image	Node	CPU Usage	Memory Usage	Memory	Status
app_demo-app.ovyjh337luz7n7v8yewfps5yg	192.168.20.51:5001/demo-app:0.0.1	vm51	-	-	-	failed
app_demo-app.ovyjh337luz7n7v8yewfps5yg	192.168.20.51:5001/demo-app:0.0.1	vm51	-	-	-	failed
app_demo-app.ovyjh337luz7n7v8yewfps5yg	192.168.20.51:5001/demo-app:0.0.1	vm51	-	-	-	failed
app_demo-app.mghpmp6f36ddqqaop145009f5	192.168.20.51:5001/demo-app:0.0.1	vm53	0.37%	10.79%	428.8MB	running
app_demo-app.s6dsbdkhiqzodmittoxufzuki	192.168.20.51:5001/demo-app:0.0.1	vm52	-	-	-	failed
app_demo-app.s6dsbdkhiqzodmittoxufzuki	192.168.20.51:5001/demo-app:0.0.1	vm52	-	-	-	failed
app_demo-app.mghpmp6f36ddqqaop145009f5	192.168.20.51:5001/demo-app:0.0.1	vm53	-	-	-	failed
app_demo-app.ovyjh337luz7n7v8yewfps5yg	192.168.20.51:5001/demo-app:0.0.1	vm51	0.37%	7.14%	434.9MB	running
app_demo-app.s6dsbdkhiqzodmittoxufzuki	192.168.20.51:5001/demo-app:0.0.1	vm52	-	-	-	failed
app_demo-app.ovyjh337luz7n7v8yewfps5yg	192.168.20.51:5001/demo-app:0.0.1	vm51	-	-	-	failed
app_demo-app.s6dsbdkhiqzodmittoxufzuki	192.168.20.51:5001/demo-app:0.0.1	vm52	0.39%	11.02%	438.1MB	running
app_demo-app.mghpmp6f36ddqqaop145009f5	192.168.20.51:5001/demo-app:0.0.1	vm53	-	-	-	failed
app_demo-app.s6dsbdkhiqzodmittoxufzuki	192.168.20.51:5001/demo-app:0.0.1	vm52	-	-	-	failed
app_demo-app.mghpmp6f36ddqqaop145009f5	192.168.20.51:5001/demo-app:0.0.1	vm53	-	-	-	failed

# SWARMPIT

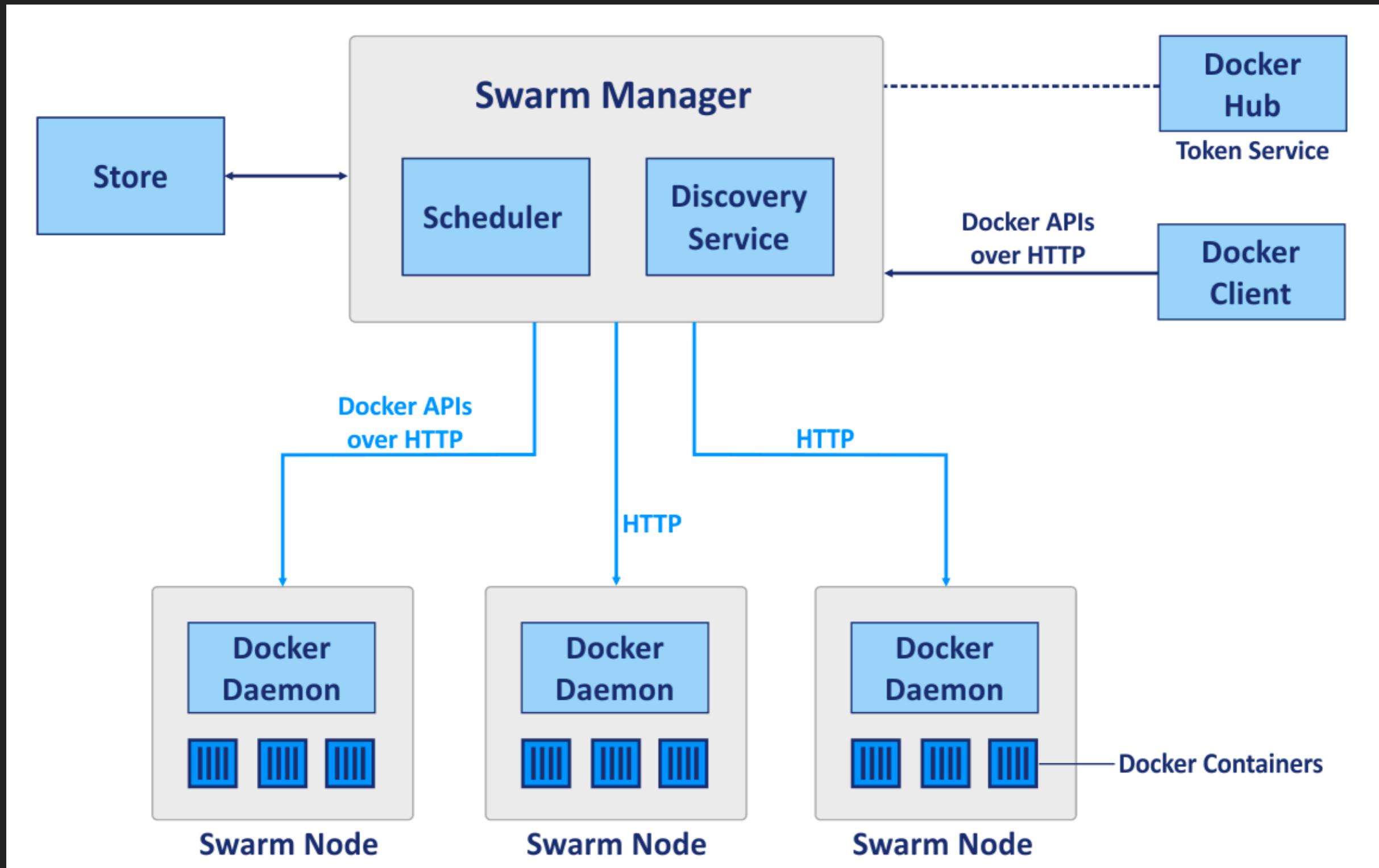
swarmpit  
1.6-2a0a14b

## Tasks

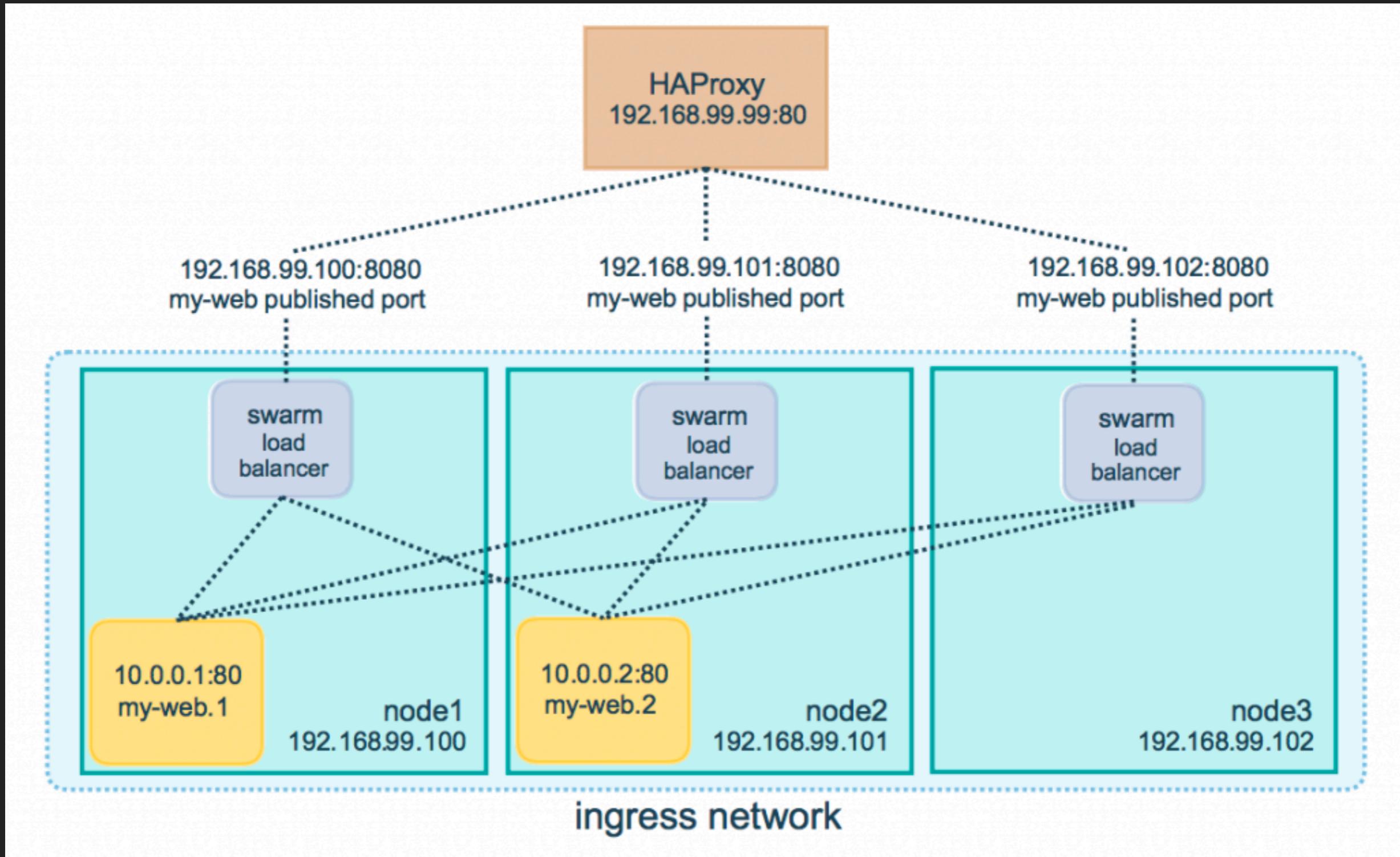
admin ▾

APPLICATIONS	app_demo-app.mghpmp6f36ddqoap14...	
Stacks	General settings	running
Services	ID	atqz7yh3smw1c1norwsjnwk7
Tasks	SERVICE	<a href="#">app_demo-app</a>
INFRASTRUCTURE	NAME	app_demo-app.mghpmp6f36ddqoap145009f5
Networks	CREATED	2 months ago
Nodes	LAST UPDATE	2 months ago
DATA	IMAGE	192.168.20.51:5001/demo-app:0.0.1
Volumes	NODE	<a href="#">vm53</a>
Secrets	Status	
Configs	STATE	running
	DESIRED STATE	running

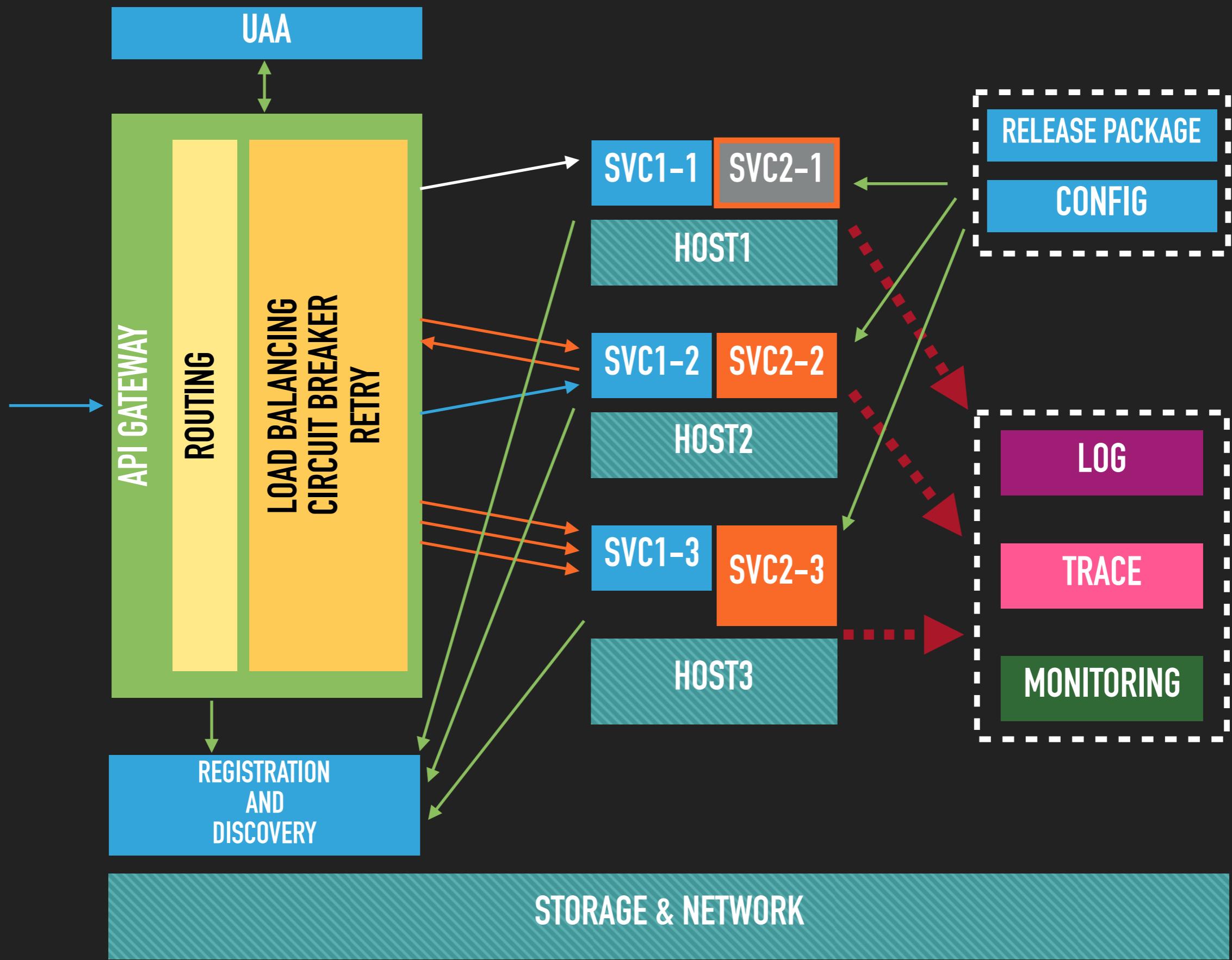
# DOCKER SWARM



# DOCKER SWARM



# DOCKER - MICROSERVICE





kubernetes