



Docker Swarm en production

Le retour du slip et de la poule

BDX.IO 2017

Nous

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@Im_flog



#java #microservices #kafka
#zipkin #docker

Jeremie MONSINJON

@jmonsinjon



#java #microservices
#elastic #docker

IPPON EN QUELQUES MOTS



15 ans
2002 - 2017



300
collaborateurs



24M€
CA 2016



30M€
prévisionnel 2017



4
continents

Attention

Ce film est sous titré en anglais
pour l'exportation en Chine et/ou autre...

Il fait suite à un premier épisode
“découverte” des outils Docker



BORDEAUX JUG
Java User Group

Jérémie Monsinjon & Florian Garcia

Enseirb - Matmeca - Amphi A

jeudi 15 Déc. 19H

Vous ne pouvez pas être passés à côté de la "tendance" des "microservices". Sur le papier, rien à dire, mais concrètement, beaucoup de mystères planent encore au dessus de ce concept. Comment les services communiquent-ils ?

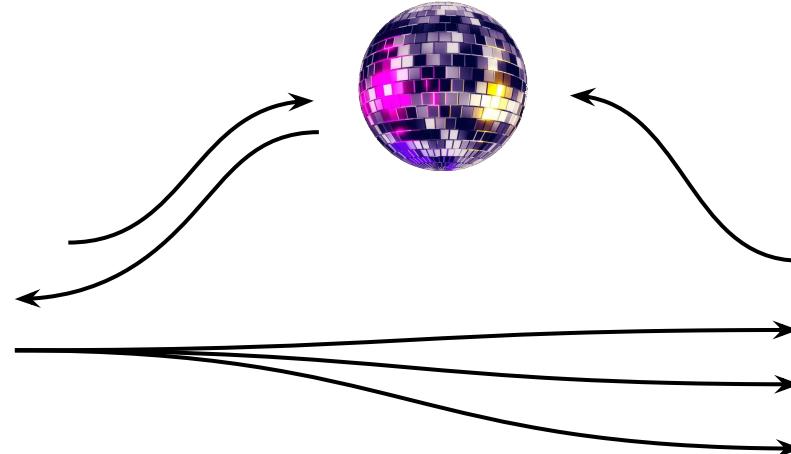
Le "discovery", kézako ? Et si on "scale", ça casse tout ? J'ai entendu parler de Docker, ça me sert à quoi dans mon architecture ?

Students friendly

Previously on swarm...

Discovery ...

Poule ...



Slips ...



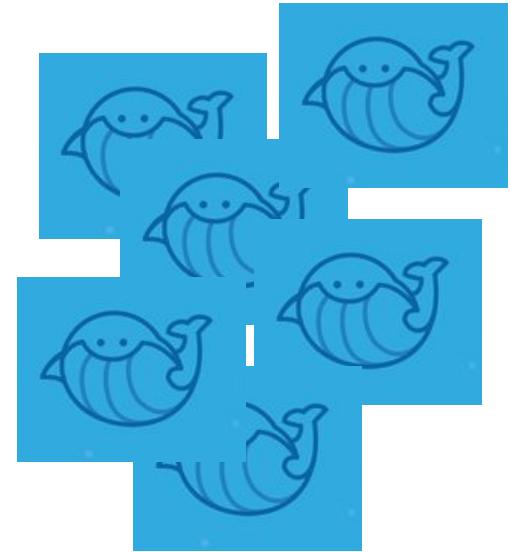
Previously on swarm...

2 services wanted to communicate in a free but vast world



Previously on swarm...

Then a whale saved us!



A long road to production !



Docker **Swarm**

Orchestration Components



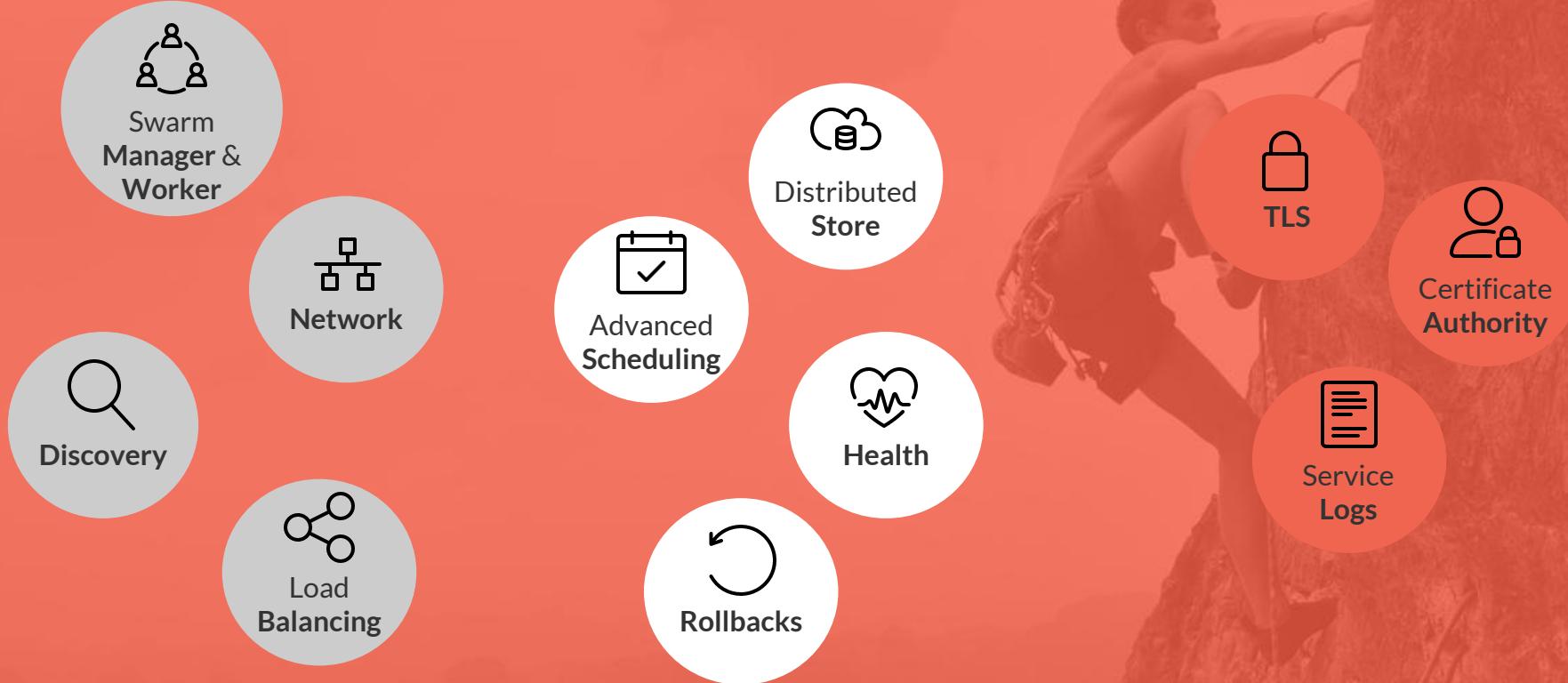
Docker **Swarm**

Orchestration Components



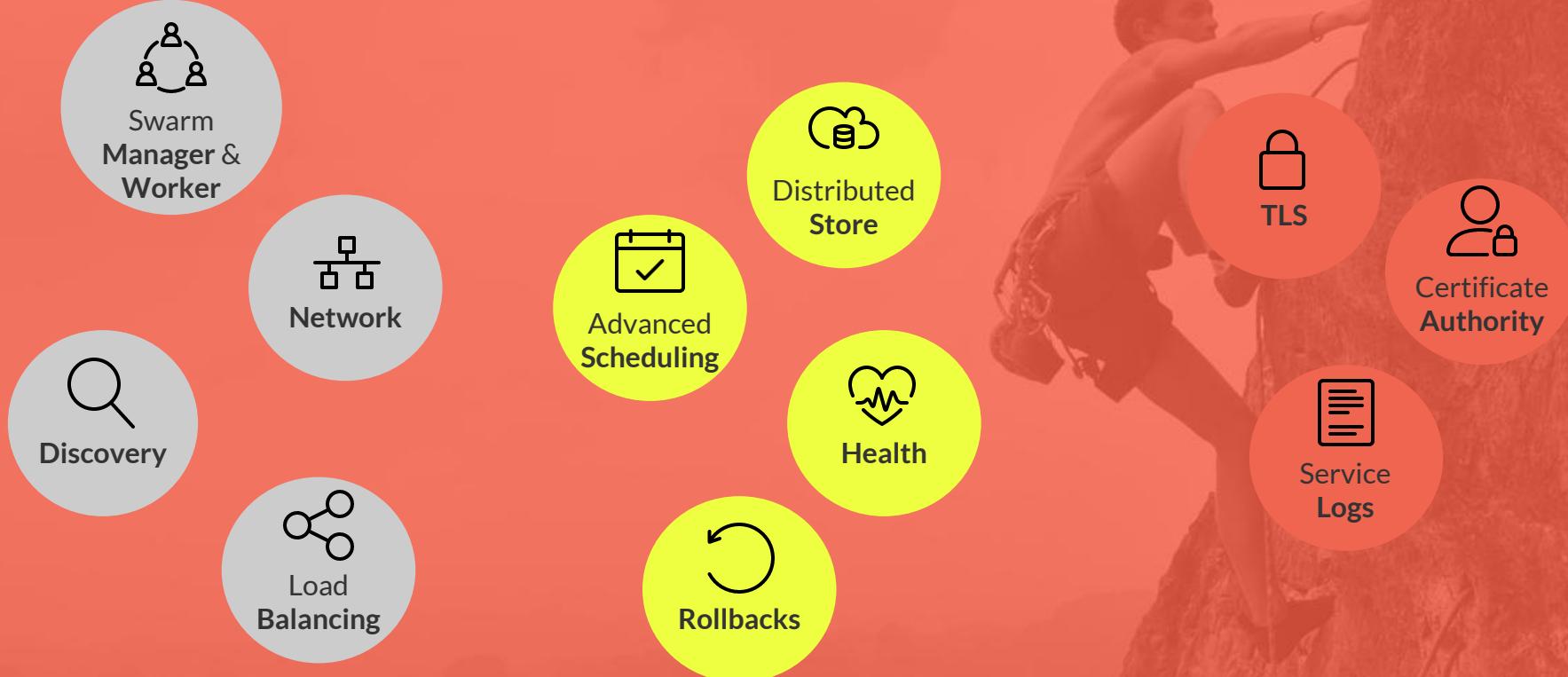
Docker **Swarm**

Orchestration Components



Docker Swarm

Orchestration Components





ADVANCED SCHEDULING

Cluster configuration

- **Node types**
 - Master
 - Worker
 - Both
- **Node availability**
 - Active
 - Pause
 - Drain
- **Node labels**
 - Key only
 - Key value pairs
 - `docker node update --label-add <key>`
 - `docker node update --label-add <key>=<value>`



Resources management

- **Scheduling rules**
 - `Spread (--placement-pref 'spread=node.labels.datacenter' \)`
 - `Constraint (--constraint region!=east \)`
- **Allocation mémoire / CPU :**
 - `--limit-{memory|cpu}`
 - `--reserve-{memory|cpu}`
 - $\text{reserve} \geq \text{limit}$





Every 2.0s: docker service ps slip

Wed Nov 8 20:54:41 2017

ID	NAME	IMAGE	NODE	DESIRED	STATE	CURRENT STAT
E	ERROR	PORTS				
qep68hhz2yyx	slip.1	ippontain/slip:v1.0.0	ip-172-31-19-248	Running	Running	5 mi
nutes ago						
vj15rf3sjvi6	slip.2	ippontain/slip:v1.0.0	ip-172-31-31-25	Running	Running	abou
t a minute ago						
hrbbgicdb1kb	slip.3	ippontain/slip:v1.0.0	ip-172-31-19-172	Running	Running	abou
t a minute ago						

docker@ip-172-31-31-25:~\$ docker node update --availability pause ip-172-31-31-25
ip-172-31-31-25

docker@ip-172-31-31-25:~\$ █

Every 2.0s: docker service ps slip

ID	NAME	IMAGE	NODE	DESIRED	STATE	CURRENT	STAT
E rror	Ports						
qep68hhz2yyx nutes ago	slip.1	ipponttrain/slip:v1.0.0	ip-172-31-19-248	Running	Running	6	mi
vj15rf3sjvi6 nutes ago	slip.2	ipponttrain/slip:v1.0.0	ip-172-31-31-25	Running	Running	2	mi
hrbbgicdb1kb nutes ago	slip.3	ipponttrain/slip:v1.0.0	ip-172-31-19-172	Running	Running	2	mi
uc7wdyz4cu8q econds ago	slip.4	ipponttrain/slip:v1.0.0	ip-172-31-19-172	Running	Running	11	s
wjbvjwjwq4ze1 econds ago	slip.5	ipponttrain/slip:v1.0.0	ip-172-31-19-248	Running	Running	11	s
tgbhj7zxkdlg econds ago	slip.6	ipponttrain/slip:v1.0.0	ip-172-31-19-248	Running	Running	10	s

docker@ip-172-31-31-25:~\$

docker@ip-172-31-31-25:~\$ docker service scale slip=6

slip scaled to 6

Since --detach=false was not specified, tasks will be scaled in the background.

In a future release, --detach=false will become the default.

docker@ip-172-31-31-25:~\$

Every 2.0s: docker service ps slip

Wed Nov 8 20:56:45 2017

ID	NAME	IMAGE	NODE	DESIRED	STATE	CURRENT STAT
ERROR	PORTS					
qep68hhz2yyx nutes ago	slip.1	ipponttrain/slip:v1.0.0	ip-172-31-19-248	Running	Running	7 mi
jjayh13wwkio conds ago	slip.2	ipponttrain/slip:v1.0.0	ip-172-31-19-172	Running	Running	7 se
vj15rf3sjvi6 seconds ago	_ slip.2	ipponttrain/slip:v1.0.0	ip-172-31-31-25	Shutdown	Shutdown	7 s
hrbbgicdb1kb nutes ago	slip.3	ipponttrain/slip:v1.0.0	ip-172-31-19-172	Running	Running	3 mi
uc7wdyz4cu8q t a minute ago	slip.4	ipponttrain/slip:v1.0.0	ip-172-31-19-172	Running	Running	abou
wjbvjjwq4ze1 t a minute ago	slip.5	ipponttrain/slip:v1.0.0	ip-172-31-19-248	Running	Running	abou
tgbhj7zxkdlg t a minute ago	slip.6	ipponttrain/slip:v1.0.0	ip-172-31-19-248	Running	Running	abou

```
docker@ip-172-31-31-25:~$ docker node update --availability drain ip-172-31-31-25  
ip-172-31-31-25  
docker@ip-172-31-31-25:~$
```

```
Every 2.0s: docker service ps slip
```

Wed Nov 8 21:06:02 2017

ID	NAME	IMAGE	NODE	DESIRED STATE	CURRENT STAT
Ports					
E oine3qog1lb9 conds ago	slip.1	ipponttrain/slip:v1.0.0	ip-172-31-19-248	Running	Running 4 se
5hotvekx40e6 conds ago	slip.2	ipponttrain/slip:v1.0.0	ip-172-31-19-248	Running	Running 5 se

```
docker@ip-172-31-31-25:~$ docker node update --label-add datacenter=bdxio ip-172-31-19-248  
ip-172-31-19-248
```

```
docker@ip-172-31-31-25:~$ docker service update --constraint-add node.labels.datacenter==bdxio --detach=true slip  
slip
```

```
docker@ip-172-31-31-25:~$ docker service scale --detach=true slip=2  
slip scaled to 2
```

```
docker@ip-172-31-31-25:~$
```

Every 2.0s: docker service ps slip

Wed Nov 8 21:09:44 2017

ID	NAME	IMAGE	NODE	DESIRED	STATE	CURRENT STAT
E 6vllnd99yq43 econds ago	slip.1	ipponttrain/slip:v1.0.0	ip-172-31-19-248	Running	Running	39 s
jml6nkbeb537 econds ago	slip.2	ipponttrain/slip:v1.0.0	ip-172-31-31-25	Running	Running	23 s
u8gjllfrozvh econds ago	slip.3	ipponttrain/slip:v1.0.0	ip-172-31-19-172	Running	Running	22 s

```
docker@ip-172-31-31-25:~$ docker service create --reserve-memory 3g --replicas 3 --name slip --network disco ipponttrain/slip:v1.0.0
```

Every 2.0s: docker service ps slip

Wed Nov 8 21:10:18 2017

ID	NAME	IMAGE	NODE	DESIRED	STATE	CURRENT	STAT
	ERROR	PORTS					
6vllnd99yq43 t a minute ago	slip.1	ipponttrain/slip:v1.0.0	ip-172-31-19-248	Running	Running	about	
jml6nkbeb537 econds ago	slip.2	ipponttrain/slip:v1.0.0	ip-172-31-31-25	Running	Running	57 s	
u8gjllfrozvh econds ago	slip.3	ipponttrain/slip:v1.0.0	ip-172-31-19-172	Running	Running	57 s	
jhy74i8ti5xq conds ago	slip.4	ipponttrain/slip:v1.0.0		Running	Pending	8 se	
v7vyvkholhh0 conds ago	slip.5	ipponttrain/slip:v1.0.0		Running	Pending	8 se	
axflp8precjg conds ago	slip.6	ipponttrain/slip:v1.0.0		Running	Pending	8 se	

```
docker@ip-172-31-31-25:~$ docker service scale --detach=true slip=6
slip scaled to 6
docker@ip-172-31-31-25:~$
```

Every 2.0s: docker service ps slip

Wed Nov 8 21:13:00 2017

ID	NAME	IMAGE	NODE	DESIRED	STATE	CURRENT	STAT
E	slip.1	ippontain/slip:v1.0.0	ip-172-31-19-248	Running	Running	4 se	Running
6766l2d3f7wy	slip.2	ippontain/slip:v1.0.0	ip-172-31-19-172	Running	Running	3 se	Running
z7dxzjnqfqf	slip.3	ippontain/slip:v1.0.0	ip-172-31-31-25	Running	Running	4 se	Running
nfmu3dbogbx	slip.4	ippontain/slip:v1.0.0	ip-172-31-19-248	Running	Running	4 se	Running
qzwurnyk5lnj	slip.5	ippontain/slip:v1.0.0	ip-172-31-19-172	Running	Running	4 se	Running
iq5i3chhvve	slip.6	ippontain/slip:v1.0.0	ip-172-31-31-25	Running	Running	4 se	Running
yvmdfvaqvmya							
conds ago							
conds ago							
conds ago							
conds ago							

```
docker@ip-172-31-31-25:~$ docker service create --limit-memory 3g --replicas 6 --name slip --network disco --detach=t  
rue ippontain/slip:v1.0.0  
hb8vou63kmuh3gv6mler3ku4x  
docker@ip-172-31-31-25:~$
```

ID	NAME	IMAGE	NODE	DESIRED	STATE	CURRENT	STAT
E 6766l2d3f7wy nutes ago z7dxzjnqfqf nutes ago nfmuc3dbogbx nutes ago qzwurnyk5lnj nutes ago iq5i3chhvve nutes ago yvmdfdfvaqvmya nutes ago	slip.1 slip.2 slip.3 slip.4 slip.5 slip.6	ippontain/slip:v1.0.0 ippontain/slip:v1.0.0 ippontain/slip:v1.0.0 ippontain/slip:v1.0.0 ippontain/slip:v1.0.0 ippontain/slip:v1.0.0	ip-172-31-19-248 ip-172-31-19-172 ip-172-31-31-25 ip-172-31-19-248 ip-172-31-19-172 ip-172-31-31-25	Running Running Running Running Running Running	Running Running Running Running Running Running	2 mi 2 mi 2 mi 2 mi 2 mi 2 mi	

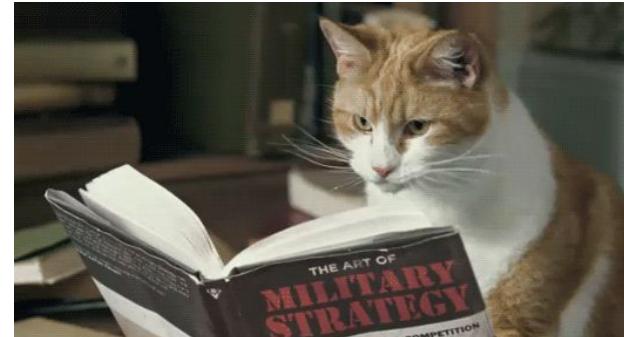

```
docker@ip-172-31-31-25:~$ docker container inspect --format="{{ .HostConfig.Memory }}" f615c3362f9b  
3221225472  
docker@ip-172-31-31-25:~$
```

UPDATE STRATEGIES



Update strategies

- Ensure high availability
- Modify configuration but doesn't re-deploy your services
- `docker service update --update-*`
 - **parallelism:** Maximum number of tasks updated simultaneously
 - **order:** Start or stop first
 - **delay:** Delay between updates



Every 2.0s: docker service ps slip

Wed Nov 8 21:21:48 2017

ID	NAME	IMAGE	NODE	DESIRED	STATE	CURRENT	STAT
E	PORTS						
hn0r6wuqa84j	slip.1	ippontain/slip:v1.0.0	ip-172-31-31-25	Running	Running	9	se
conds ago	slip.2	ippontain/slip:v1.0.0	ip-172-31-19-248	Running	Running	9	se
56ts35cbpu10	slip.3	ippontain/slip:v1.0.0	ip-172-31-19-172	Running	Running	9	se
conds ago							
pq1iwuala9cj							
conds ago							

```
docker@ip-172-31-31-25:~$ docker service create --update-parallelism 1 --update-order start-first --update-delay 5s - -replicas 3 --name slip --network disco --detach=true ippontain/slip:v1.0.0  
w7ounahm9qb7nmfjug9uddj6v  
docker@ip-172-31-31-25:~$
```

Every 2.0s: docker service ps slip

Wed Nov 8 21:22:55 2017

ID	NAME	IMAGE	NODE	DESIRED	STATE	CURRENT STAT
ERROR		PORTS				
4t08zlfib2cx seconds ago hn0r6wuqa84j t a minute ago	slip.1	ipponttrain/slip:v2.0.0	ip-172-31-19-248	Running	Preparing	3
f7ukw9uv2zxp conds ago 56ts35cbpu10 econds ago pq1iwuala9cj t a minute ago	_ slip.1	ipponttrain/slip:v1.0.0	ip-172-31-31-25	Running	Running abou	
	slip.2	ipponttrain/slip:v2.0.0	ip-172-31-31-25	Running	Running	8 se
	_ slip.2	ipponttrain/slip:v1.0.0	ip-172-31-19-248	Shutdown	Shutdown	4 s
	slip.3	ipponttrain/slip:v1.0.0	ip-172-31-19-172	Running	Running	Running abou

```
docker@ip-172-31-31-25:~$ docker service update --image ipponttrain/slip:v2.0.0 slip
```

Since --detach=false was not specified, tasks will be updated in the background.
In a future release, --detach=false will become the default.

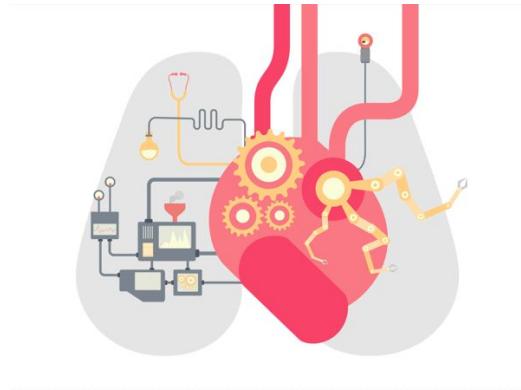
```
docker@ip-172-31-31-25:~$
```

DESIRED STATE **MANAGEMENT**



Health check

- In addition to the normal status
- Used for the desired state (kill if KO)
- **HEALTHCHECK [OPTIONS] CMD command**
 - `--interval=DURATION` (default: 30s)
 - `--timeout=DURATION` (default: 30s)
 - `--retries=N` (default: 3)
 - `--start-period=DURATION` (default: 0s)
- Overridden by service options
- Intelligence carried by the containerized application



Services deep-dive

- Auto actions on update failures
- `docker service update --update-failure-action`
 - pause | continue | rollback
- Rollback → same options as update command
- `docker service update --rollback-*`
 - parallelism: Maximum number of tasks updated simultaneously
 - order: Start or stop first
 - delay: Delay between rollbacks



MAKE GIFS AT GIFSOUP.COM

Services configuration history

```
[{  
    "ID": "ghrj6z9rgexjjhgeb9y1jem26",  
    "Spec": {  
        "Name": "slip",  
        "Labels": {},  
        "TaskTemplate": {  
            "  
        },  
        "PreviousSpec": {  
            "Name": "slip",  
            "Labels": {},  
            "TaskTemplate": {  
                "  
            }  
        }  
    }]  
}
```

Current service configuration

Previous service configuration, used on rollback

Every 2.0s: docker service ps slip

ID	NAME	IMAGE	PORTS	NODE	DESIRED STATE	CURRENT STAT
E vu5j6kg90qdo nutes ago	slip.1	ippontrain/slip:v2.0.0	ip-172-31-31-25	Running	Running	4 mi
W lovvx1hzgwuc inutes ago	slip.2	ippontrain/slip:v3.0.0	ip-172-31-31-25	Shutdown	Shutdown	3 m
i6t11gjfhl1 utes ago	_ slip.2	ippontrain/slip:v3.0.0	ip-172-31-31-25	Shutdown	Failed	3 min
jczz4tv284tk nutes ago	"task: non-zero exit (143): do..."					
y7dwfxizy5u1 nutes ago	_ slip.2	ippontrain/slip:v2.0.0	ip-172-31-19-248	Running	Running	4 mi
	slip.3	ippontrain/slip:v2.0.0	ip-172-31-19-172	Running	Running	4 mi

docker@ip-172-31-31-25:~\$ docker container ls

CONTAINER ID	IMAGE	COMMAND	CREATED	STATUS	PO
RTS 629e99422934	ippontrain/slip:v2.0.0	"java -jar slip-1.jar"	4 minutes ago	Up 4 minutes (healthy)	80
80/tcp	slip.1.vu5j6kg90qdoinhwru2x4nziq				

docker@ip-172-31-31-25:~\$

Every 2.0s: docker service ps slip

Wed Nov 8 21:30:38 2017

ID	NAME	IMAGE	PORTS	NODE	DESIRED STATE	CURRENT STAT
E vu5j6kg90qdo nutes ago lovvx1hzgwuc ut a minute ago i6t11gjfhl1 a minute ago jczz4tv284tk nutes ago y7dwxizi5u1 nutes ago	slip.1	ippontain/slip:v2.0.0	ippontain/slip:v2.0.0	ip-172-31-31-25	Running	Running 2 mi
	slip.2	ippontain/slip:v3.0.0	ippontain/slip:v3.0.0	ip-172-31-31-25	Shutdown	Shutdown abo
	_ slip.2	ippontain/slip:v3.0.0	ippontain/slip:v3.0.0	ip-172-31-31-25	Shutdown	Failed about
	_ slip.2	ippontain/slip:v2.0.0	ippontain/slip:v2.0.0	ip-172-31-19-248	Running	Running 2 mi
	slip.3	ippontain/slip:v2.0.0	ippontain/slip:v2.0.0	ip-172-31-19-172	Running	Running 2 mi

```
docker@ip-172-31-31-25:~$ docker service create --update-failure-action rollback --update-parallelism 1 --update-order start-first --update-delay 5s --replicas 3 --name slip --network disco --detach=true ippontain/slip:v2.0.0 tvmr8pn4slckor8210w7lcw2d
```

```
docker@ip-172-31-31-25:~$ docker service update --image ippontain/slip:v3.0.0 slip
```

Since --detach=false was not specified, tasks will be updated in the background.
In a future release, --detach=false will become the default.

```
docker@ip-172-31-31-25:~$
```

CONFIGURATION MANAGEMENT

Config

- Need to centralize ‘environment’ configuration
- New Docker object “config” since 17.06
- Swarm context only → Accessible from services
- Used for non sensitive data
- Stored in RAFT log
- Mounted in container filesystem (/<config-name>)

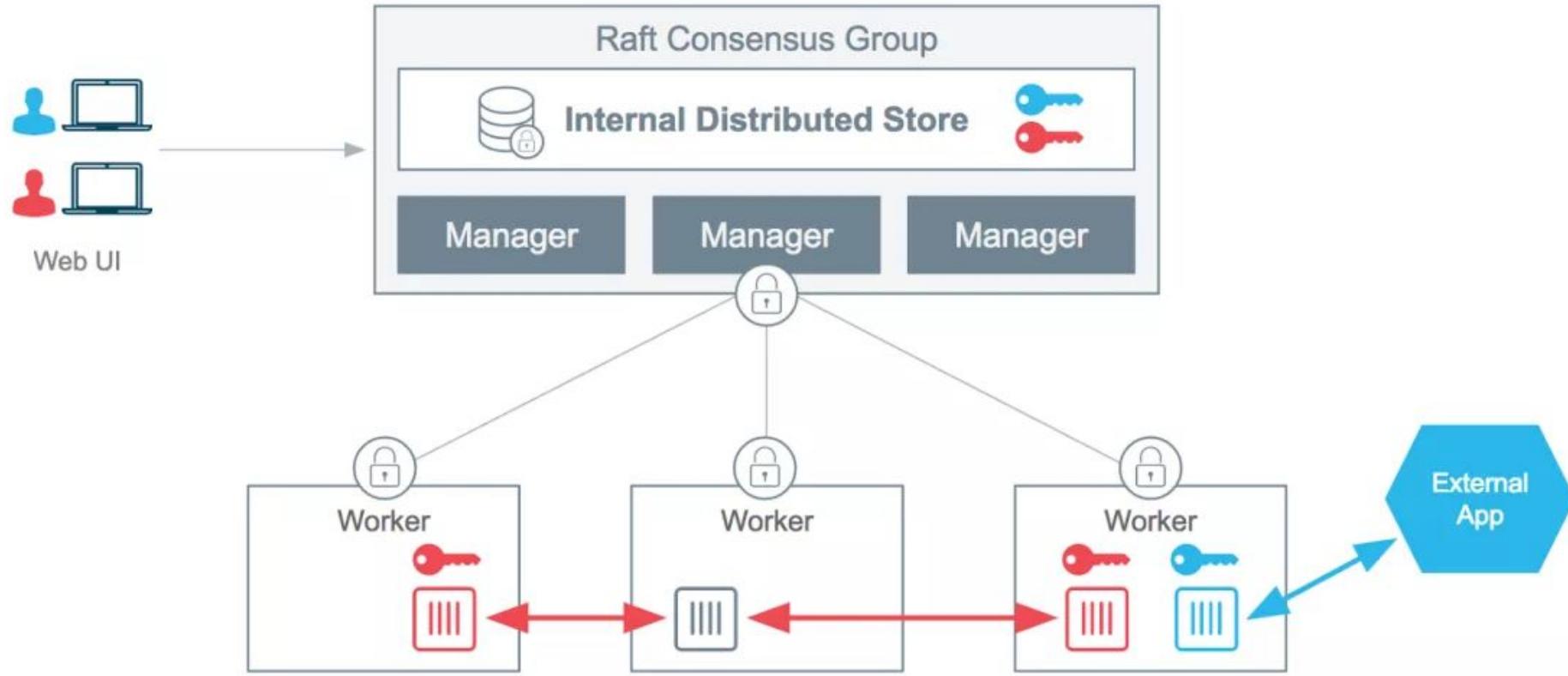


Secrets management

- Just like config but encrypted
- Another new Docker “secret” object
- Mounted an in-memory FS (`/run/secrets/<secret-name>`)
- Use case:
 - Usernames and passwords
 - TLS certificates and keys
 - SSH keys
 - Important data (database or internal server)



Config / Secrets




```
Every 2.0s: docker service ps slip
```

Wed Nov 8 21:35:30 2017

ID	ERROR	NAME	IMAGE	NODE	DESIRED	STATE	CURRENT	STAT
PORTS								
xfloodl4p6sbb econds ago		slip.1	ippontain/slip:v4.0.0	ip-172-31-19-248	Running	Running	21 s	
qgonz2fq8tp6 econds ago		slip.2	ippontain/slip:v4.0.0	ip-172-31-19-172	Running	Running	11 s	
g9qf12ku7lzf econds ago		slip.3	ippontain/slip:v4.0.0	ip-172-31-31-25	Running	Running	21 s	

```
docker@ip-172-31-31-25:~$ docker service create --replicas 3 --name slip --network disco --publish 8081:8080 --detach  
=true ippontain/slip:v4.0.0
```

```
cnf4yvmo2lvciu2nj2dgxmm1y
```

```
docker@ip-172-31-31-25:~$ curl localhost:8081/request
```

```
Hello I'm 656f91b7529c. My little secret is ...
```

UNKNOWN !

```
docker@ip-172-31-31-25:~$
```

```
docker@ip-172-31-31-25:~$ Every 2.0s: docker service ps slip
docker@ip-172-31-31-25:~$ Wed Nov 8 21:39:59 2017


| ID                                                                                                                                                                     | NAME                                                              | IMAGE                                                                                                                     | NODE                                                                                                               | DESIRED STATE                                                     | CURRENT STAT                                                                              |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------|-------------------------------------------------------------------------------------------|
| E                                                                                                                                                                      | ERROR                                                             | PORTS                                                                                                                     |                                                                                                                    |                                                                   |                                                                                           |
| qg9jfcpm7pn6<br>econds ago<br>7n9yrgkhdpv2<br>seconds ago<br>xzlmb706tag5<br>seconds ago<br>wjdmpa7hxndn2<br>seconds ago<br>etxrbdr6z7n7<br>econds ago<br>ya6j5qm45fqt | slip.1<br>\_ slip.1<br>slip.2<br>\_ slip.2<br>slip.3<br>\_ slip.3 | ippontain/slip:v4.0.0<br>ippontain/slip:v4.0.0<br>ippontain/slip:v4.0.0<br>ippontain/slip:v4.0.0<br>ippontain/slip:v4.0.0 | ip-172-31-31-25<br>ip-172-31-31-25<br>ip-172-31-19-248<br>ip-172-31-19-248<br>ip-172-31-19-172<br>ip-172-31-19-172 | Running<br>Shutdown<br>Running<br>Shutdown<br>Running<br>Shutdown | Running 49 s<br>Shutdown 56<br>Running 38 s<br>Shutdown 45<br>Running 21 s<br>Shutdown 34 |



```
docker@ip-172-31-31-25:~$ echo "Bdx.IO 2017" | docker secret create bdx -l11pr3p25x4wlbt1jsg6gpvz2
docker@ip-172-31-31-25:~$ docker service update --secret-add bdx --detach=true slip
slip
docker@ip-172-31-31-25:~$ curl localhost:8081/request
Hello I'm 979d36d35d92. My little secret is ... Bdx.IO 2017
docker@ip-172-31-31-25:~$
```

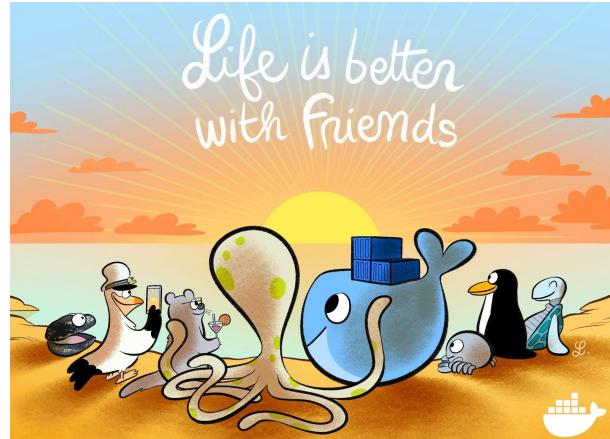

```

CONCLUSION



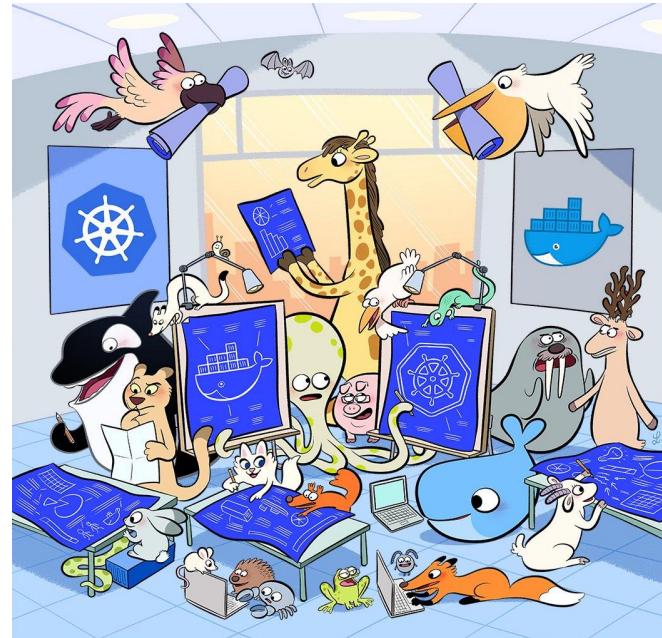
Much love

- Easy peasy
- Lot of “production ready” features out of the box
- Backed by Docker
- Compose / Stacks to simplify usage



BUT

- Kubernetes support announced for Docker CE / EE
- Is it the end of the road for swarm ?



Ressources

- <https://github.com/lmFlog/docker-discovery>
- <https://docs.docker.com/engine/swarm/>
- <https://www.slideshare.net/ajeetraina/deep-dive-into-docker-swarm-mode>
- <https://www.youtube.com/watch?v=HaU5-id2zUo>





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