

Lab 6 – Docker-swarm

Manage cluster of machines

We're going to build a cluster of Docker servers using Docker Swarm. You have 3 Docker servers:

- 1 manager
- 2 workers

Cluster initialization

1. Initialize the swarm cluster from the manager host using its IP from the same range than the 2 workers:

```
vagrant@Manager:~$ docker swarm init --advertise-addr 192.168.205.10
Swarm initialized: current node (tgrnm51domfc5f64gt6tobvak) is now a manager.

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

    docker swarm join --token SWMTKN-1-27y0ngobz8xzty58b0v6nihxqg8ovwp55roajbmiqlrey70a6-byk75lw40y382p2uqes3e31cw 192.168.205.10:2377

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

- What does this command generate?
- Check that the cluster has been created and that the manager is the single member.

```
vagrant@Manager:~$ docker node ls
```

ID	HOSTNAME	STATUS	AVAILABILITY	MANAGER STATUS	ENGINE VERSION
tgrnm51domfc5f64gt6tobvak *	Manager	Ready	Active	Leader	24.0.2

```
vagrant@Manager:~$
```

- What is the token generated by this command used for? Display the 2 tokens.

```
vagrant@Manager:~$ docker swarm join-token manager
To add a manager to this swarm, run the following command:

    docker swarm join --token SWMTKN-1-27y0ngobz8xzty58b0v6nihxqg8ovwp55roajbmiqlrey70a6-emx6fslmbsefb0kj311k8l0b4 192.168.205.10:2377

vagrant@Manager:~$
vagrant@Manager:~$ docker swarm join-token worker
To add a worker to this swarm, run the following command:

    docker swarm join --token SWMTKN-1-27y0ngobz8xzty58b0v6nihxqg8ovwp55roajbmiqlrey70a6-byk75lw40y382p2uqes3e31cw 192.168.205.10:2377

vagrant@Manager:~$
```

2. Join worker1 and worker2 VMs to the cluster (as workers).

```
brahim@Training:~/devops-lab/vagrant-ubuntu20-multiple$ vagrant ssh worker1
Last login: Mon Jun 12 13:00:55 2023 from 10.0.2.2
vagrant@worker1:~$ sudo docker swarm join --token SWMTKN-1-27y0ngobz8xzt58b0v6nihqxdg8ovwp55roajbmiqlrey70a6-byk75lw40y382p2uqes3e31cw 192.16
8.205.10:2377
This node joined a swarm as a worker.
vagrant@worker1:~$
```

```
brahim@Training:~/devops-lab/vagrant-ubuntu20-multiple$ vagrant ssh worker2
Last login: Mon Jun 12 13:05:00 2023 from 10.0.2.2
vagrant@worker2:~$ sudo docker swarm join --token SWMTKN-1-27y0ngobz8xzt58b0v6nihqxdg8ovwp55roajbmiqlrey70a6-byk75lw40y382p2uqes3e31cw 192.16
8.205.10:2377
This node joined a swarm as a worker.
vagrant@worker2:~$
```

- Check that the 2 workers are in the cluster and that they are ready.

```
vagrant@Manager:~$ docker node ls
ID                HOSTNAME        STATUS    AVAILABILITY    MANAGER STATUS    ENGINE VERSION
tgrnm51donfc5f64gt6tobvak * Manager        Ready     Active           Leader             24.0.2
f9fzzgu5dgc6wt3xrmad30br6 worker1         Ready     Active           -                  24.0.2
k8qert553j7o2d6vwm1hgrouu worker2         Ready     Active           -                  24.0.2
vagrant@Manager:~$
```

3. What networks are created following cluster initialization.

```
brahim@Training:~/devops-lab/vagrant-ubuntu20-multiple$ vagrant ssh Manager
Last login: Mon Jun 12 13:12:22 2023 from 10.0.2.2
vagrant@Manager:~$ docker network ls
NETWORK ID        NAME                DRIVER            SCOPE
7938fc3cc0c9      bridge              bridge            local
6285cbd26031      docker_gwbridge     bridge            local
370478b68c6c      dockercoins_default bridge            local
f01d80fd2323      host                host              local
n2svwazx6rj9      ingress             overlay           swarm
9ab24961264f      none                null              local
vagrant@Manager:~$ logout
brahim@Training:~/devops-lab/vagrant-ubuntu20-multiple$ vagrant ssh worker1
Last login: Mon Jun 12 13:17:01 2023 from 10.0.2.2
vagrant@worker1:~$ sudo docker network ls
NETWORK ID        NAME                DRIVER            SCOPE
ac2e8ea9077c      bridge              bridge            local
b9e92603da75      docker_gwbridge     bridge            local
bbae0cde38d4      host                host              local
n2svwazx6rj9      ingress             overlay           swarm
04d7d890dcf4      none                null              local
vagrant@worker1:~$ logout
brahim@Training:~/devops-lab/vagrant-ubuntu20-multiple$ vagrant ssh worker2
Last login: Mon Jun 12 13:12:30 2023 from 10.0.2.2
vagrant@worker2:~$ sudo docker network ls
NETWORK ID        NAME                DRIVER            SCOPE
80d84ab58222      bridge              bridge            local
b0dea255c1a9      docker_gwbridge     bridge            local
89cdafd89a6e      host                host              local
n2svwazx6rj9      ingress             overlay           swarm
c8b9deb992df      none                null              local
vagrant@worker2:~$
```

- Describe them.

Launch of the Dockercoins application on Swarm

4. Create a network to isolate all services of the application. View details of our network.

```
vagrant@Manager:~$ docker network create --driver overlay dockercoins-overlay
n16xx5zs37ntbvi8ml6yib4ja
vagrant@Manager:~$
vagrant@Manager:~$ docker network inspect dockercoins-overlay
[
  {
    "Name": "dockercoins-overlay",
    "Id": "n16xx5zs37ntbvi8ml6yib4ja",
    "Created": "2023-06-12T13:22:30.50508073Z",
    "Scope": "swarm",
    "Driver": "overlay",
    "EnableIPv6": false,
    "IPAM": {
      "Driver": "default",
      "Options": null,
      "Config": [
        {
          "Subnet": "10.0.1.0/24",
          "Gateway": "10.0.1.1"
        }
      ]
    },
    "Internal": false,
    "Attachable": false,
    "Ingress": false,
    "ConfigFrom": {
      "Network": ""
    },
    "ConfigOnly": false,
    "Containers": null,
    "Options": {
      "com.docker.network.driver.overlay.vxlanid_list": "4097"
    },
    "Labels": null
  }
]
```

5. Create the service running the redis database.

- Wait until the server is in "running"

```
vagrant@Manager:~$ docker service create --name redis --network dockercoins-overlay redis
nk1xxn10f6tprl04agb8vvrhb
overall progress: 1 out of 1 tasks
1/1: running [=====>]
verify: Service converged
vagrant@Manager:~$ docker service ps redis
```

ID	NAME	IMAGE	NODE	DESIRED STATE	CURRENT STATE	ERROR	PORTS
28sle927peze	redis.1	redis:latest	worker2	Running	Running less than a second ago		

```
vagrant@Manager:~$
```

- Once redis is ready, run the hasher, rng, and worker services.

```
vagrant@Manager:~$ docker service create --name woker --network dockercoins-overlay brahimhamdi/worker
afrr4orspumbomn55p4wu6fhu
overall progress: 1 out of 1 tasks
1/1: running [=====]
verify: Service converged
vagrant@Manager:~$ docker service create --name rng -p 8001-8005:80 --network dockercoins-overlay brahimhamdi/rng
xqca13af35jum8xmhcnhkbmj
overall progress: 1 out of 1 tasks
1/1: running [=====]
verify: Service converged
vagrant@Manager:~$ docker service create --name hasher -p 8006-8010:80 --network dockercoins-overlay brahimhamdi/hasher
ugg5b7i17wfxomag3hpdrc72
overall progress: 1 out of 1 tasks
1/1: running [=====]
verify: Service converged
vagrant@Manager:~$ docker service create --name webui -p 8000:80 --network dockercoins-overlay brahimhamdi/webui
14f2qd4i3hsthdryw94ax7a1v
overall progress: 1 out of 1 tasks
1/1: running [=====]
verify: Service converged
vagrant@Manager:~$
```

- Check that these services are "running".

```
vagrant@Manager:~$ docker service ls
ID                NAME      MODE     REPLICAS  IMAGE                                  PORTS
ugg5b7i17wfx     hasher    replicated 1/1        brahimhamdi/hasher:latest           *:8006-8010->80/tcp
nk1xxn10f6tp     redis     replicated 1/1        redis:latest                         *:8001-8005->80/tcp
xqca13af35ju     rng       replicated 1/1        brahimhamdi/rng:latest              *:8000->80/tcp
14f2qd4i3hst     webui     replicated 1/1        brahimhamdi/webui:latest
afrr4orspumb     woker     replicated 1/1        brahimhamdi/worker:latest

vagrant@Manager:~$ docker service ps woker rng hasher redis webui
ID                NAME      IMAGE                                  NODE     DESIRED STATE  CURRENT STATE    ERROR     PORTS
s9vas6ch0y7v     hasher.1  brahimhamdi/hasher:latest            Manager  Running        Running 2 minutes ago
28sle927peze     redis.1   redis:latest                         worker2   Running        Running 8 minutes ago
42lsx2rdj6cg     rng.1     brahimhamdi/rng:latest               worker1   Running        Running 3 minutes ago
2yvtzca10lko     webui.1   brahimhamdi/webui:latest             worker1   Running        Running 9 seconds ago
7rwbq2inhsax     woker.1   brahimhamdi/worker:latest            Manager  Running        Running 6 minutes ago
vagrant@Manager:~$
```

- Give the IP address of each container as well as the node on which it is run.

```
vagrant@Manager:~$ docker service inspect woker | grep Addr
"Addr": "10.0.1.5/24"
vagrant@Manager:~$ docker service inspect rng | grep Addr
"Addr": "10.0.0.5/24"
"Addr": "10.0.1.8/24"
vagrant@Manager:~$ docker service inspect hasher | grep Addr
"Addr": "10.0.0.7/24"
"Addr": "10.0.1.11/24"
vagrant@Manager:~$ docker service inspect redis | grep Addr
"Addr": "10.0.1.2/24"
vagrant@Manager:~$
vagrant@Manager:~$ docker service inspect webui | grep Addr
"Addr": "10.0.0.9/24"
"Addr": "10.0.1.13/24"
vagrant@Manager:~$
```

Scaling on the swarm

6. scale out the worker service to 10 replicas.
 - Once all the replicas are "running", display the webui. What is the rate of generation of dockercoins?

```
vagrant@Manager:~$ docker service scale woker=10
woker scaled to 10
overall progress: 10 out of 10 tasks
1/10: running [=====]
2/10: running [=====]
3/10: running [=====]
4/10: running [=====]
5/10: running [=====]
6/10: running [=====]
7/10: running [=====]
8/10: running [=====]
9/10: running [=====]
10/10: running [=====]
verify: Service converged
vagrant@Manager:~$ docker service ps woker
```

ID	NAME	IMAGE	NODE	DESIRED STATE	CURRENT STATE	ERROR	PORTS
7rwbq2inhsax	woker.1	brahimhamdi/worker:latest	Manager	Running	Running 12 minutes ago		
yw6m5z9bo9n1	woker.2	brahimhamdi/worker:latest	worker2	Running	Running less than a second ago		
w0yueniojkk5	woker.3	brahimhamdi/worker:latest	worker1	Running	Running less than a second ago		
pp4kejk9i9p	woker.4	brahimhamdi/worker:latest	Manager	Running	Running about a minute ago		
ka54q8jy6qdr	woker.5	brahimhamdi/worker:latest	worker2	Running	Running less than a second ago		
Spkw7yu2obqn	woker.6	brahimhamdi/worker:latest	worker1	Running	Running less than a second ago		
mboylwkk6yl9	woker.7	brahimhamdi/worker:latest	worker2	Running	Running less than a second ago		
yorp5x6f3084	woker.8	brahimhamdi/worker:latest	worker1	Running	Running less than a second ago		
nl4vcji8r4md	woker.9	brahimhamdi/worker:latest	Manager	Running	Running about a minute ago		
02iawxoyd45g	woker.10	brahimhamdi/worker:latest	Manager	Running	Running about a minute ago		

```
vagrant@Manager:~$
```