

# Containerization and Big Data: Exercise 3-2

Brandon Hosley

July 3, 2020

## 3 Multi-Container Apps on multi-node with Swarm

### 3.6 Preparing virtual Nodes with Docker Machine

```
bhos12@us2004lts:~$ docker-machine create -d virtualbox vm02
2 root      20 0      0      0      0 S      0.0    0.0    0:00.02 kthreadd
3 root      0 -20    0      0      0 I      0.0    0.0    0:00.00 rcu_gp
4 root      0 -20    0      0      0 I      0.0    0.0    0:00.00 rcu_par_gp
6 root      0 -20    0      0      0 I      0.0    0.0    0:00.00 kworker/0:0H-kblockd
9 root      0 -20    0      0      0 I      0.0    0.0    0:00.00 mm_percpu_wq
10 root     20 0      0      0      0 S      0.0    0.0    0:00.02 ksoftirqd/0
11 root     20 0      0      0      0 I      0.0    0.0    0:15.11 rcu_sched
12 root     rt 0      0      0      0 S      0.0    0.0    0:00.33 migration/0
13 root    -51 0      0      0      0 S      0.0    0.0    0:00.00 idle inject/0
14 root     20 0      0      0      0 S      0.0    0.0    0:00.00 cpuhp/0
15 root     20 0      0      0      0 S      0.0    0.0    0:00.00 cpuhp/1
16 root    -51 0      0      0      0 S      0.0    0.0    0:00.00 idle inject/1
17 root     rt 0      0      0      0 S      0.0    0.0    0:00.49 migration/1
bhos12@us2004lts:~$ docker-machine create -d virtualbox vm02
Running pre-create checks...
Creating machine...
(vm02) Copying /home/bhos12/.docker/machine/cache/boot2docker.iso to /home/bhos12/.docker/machine/machines/
vm02/boot2docker.iso...
(vm02) Creating VirtualBox VM...
(vm02) Creating SSH key...
(vm02) Starting the VM...
(vm02) Check network to re-create if needed...
(vm02) Waiting for an IP...
```

```
bhos12@us2004lts:~$ docker-machine create -d virtualbox vm02
Waiting for machine to be running, this may take a few minutes...
Detecting operating system of created instance...
Waiting for SSH to be available...
Detecting the provisioner...
Provisioning with boot2docker...
Copying certs to the local machine directory...
Copying certs to the remote machine...
Setting Docker configuration on the remote daemon...
Checking connection to Docker...
Docker is up and running!
To see how to connect your Docker Client to the Docker Engine running on this virtual machine, run: docker-
machine env vm03
bhos12@us2004lts:~$ docker-machine ls
NAME    ACTIVE   DRIVER        STATE     URL                         SWARM   DOCKER   ERRORS
vm01    -        virtualbox    Running   tcp://192.168.99.100:2376   v19.03.12
vm02    -        virtualbox    Running   tcp://192.168.99.101:2376   v19.03.12
vm03    -        virtualbox    Running   tcp://192.168.99.102:2376   v19.03.12
bhos12@us2004lts:~$
```

### 3.7 Swarm Cluster with Docker Swarm

```
bhos12@us2004lts: ~  
vm02 - virtualbox Running tcp://192.168.99.101:2376 v19.03.12  
vm03 - virtualbox Running tcp://192.168.99.102:2376 v19.03.12  
bhos12@us2004lts:~$ docker-machine ssh vm01  
(^>)  
/) TC (\ Core is distributed with ABSOLUTELY NO WARRANTY.  
(/_ _ _\) www.tinycorelinux.net  
  
docker@vm01:~$ docker swarm init --advertise-addr 192.168.99.100  
Swarm initialized: current node (ildmzldspur10ky7j unpumfsk) is now a manager.  
  
To add a worker to this swarm, run the following command:  
  
    docker swarm join --token SWMTKN-1-23feiboanuk4txkz8ke3u4s7vzjdu3uozaht2zk8810fpor6a-708vmw4ve7njdxvyn  
0c91qj56 192.168.99.100:2377  
  
To add a manager to this swarm, run 'docker swarm join-token manager' and follow the instructions.  
  
docker@vm01:~$
```

```
bhos12@us2004lts: ~  
bhos12@us2004lts:~$ docker-machine ssh vm01 "docker node ls"  
ID HOSTNAME STATUS AVAILABILITY MANAGER STATUS ENGINE V  
VERSION  
ildmzldspur10ky7j unpumfsk * vm01 Ready Active Leader 19.03.12  
t9kfchmiqr7bvqk8hwcdd96jj vm02 Ready Active 19.03.12  
91wbmud79jw6fiswlb2gx47m vm03 Ready Active 19.03.12  
bhos12@us2004lts:~$
```

### 3.8 Build Cassandra Cluster

```
version: "3.7"  
  
services:  
  # Node01  
  cassandra01:  
    image: cassandra:3.11  
    environment:  
      CASSANDRA_BROADCAST_ADDRESS: "cassandra01"  
    deploy:  
      restart_policy:  
        condition: on-failure  
        max_attempts: 3  
        window: 120s  
      placement:  
        constraints:  
          - node.hostname == vm01  
    ports:  
      - 9042  
    volumes:  
      - cass-data:/var/lib/cassandra  
    networks:  
      - cass-net  
  
  # Node02  
  cassandra02:  
    image: cassandra:3.11
```

```

environment:
  CASSANDRA_BROADCAST_ADDRESS: "cassandra02"
  CASSANDRA_SEEDS: "cassandra01"
depends_on:
  - cassandra-1
deploy:
  restart_policy:
    condition: on-failure
    max_attempts: 3
    window: 120s
  placement:
    constraints:
      - node.hostname == vm02
volumes:
  - cass-data:/var/lib/cassandra
networks:
  - cass-net

# Node03
cassandra03:
  image: cassandra:3.11
  environment:
    CASSANDRA_BROADCAST_ADDRESS: "cassandra03"
    CASSANDRA_SEEDS: "cassandra01"
  depends_on:
    - cassandra-1
  deploy:
    restart_policy:
      condition: on-failure
      max_attempts: 3
      window: 120s
    placement:
      constraints:
        - node.hostname == vm03
  volumes:
    - cass-data:/var/lib/cassandra
  networks:
    - cass-net

networks:
  cass-net:

volumes:
  cass-data:

```

```
bhost2@us2004its: ~
docker@vm01:~/casscluster$ vi docker-compose.yml
docker@vm01:~/casscluster$ docker stack deploy --compose-file docker-compose.yml casscluster
Creating network casscluster_cass-net
Creating service casscluster_cassandra03
Creating service casscluster_cassandra01
Creating service casscluster_cassandra02
docker@vm01:~/casscluster$ docker stack ls
NAME                SERVICES          ORCHESTRATOR
casscluster         3                  Swarm
docker@vm01:~/casscluster$
```

  

```
bhost2@us2004its: ~
docker@vm01:~/casscluster$ docker stack ps casscluster
ID                        NAME                IMAGE                NODE                DESIRED STATE        CURRENT STATE
t1p4i6l8xkm             casscluster_cassandra02.1  cassandra:3.11      vm02                Running              Running about a minute a
f61fd3y492se            casscluster_cassandra03.1  cassandra:3.11      vm03                Running              Running about a minute a
4xrxz4fchqun9           casscluster_cassandra02.1  cassandra:3.11      vm02                Shutdown             Failed about a minute ag
e266oqpm60hn            casscluster_cassandra01.1  cassandra:3.11      vm01                Running              Running 2 minutes ago
xct3u5t6lxsg            casscluster_cassandra03.1  cassandra:3.11      vm03                Shutdown             Failed about a minute ag
docker@vm01:~/casscluster$ docker stack services casscluster
ID                        NAME                MONS                REPLICAS            IMAGE                PORTS
wpggru13um7p             casscluster_cassandra02  replicated          1/1                 cassandra:3.11
puf8iwx0ozs              casscluster_cassandra03  replicated          1/1                 cassandra:3.11
ycm7hjv60xr9             casscluster_cassandra01  replicated          1/1                 cassandra:3.11    *:30000->9042/tcp
docker@vm01:~/casscluster$ docker node ls
ID                        HOSTNAME                STATUS              AVAILABILITY          MANAGER STATUS          ENGINE VERSION
1idmz1dspur10ky7junpumsk *  vm01                   Ready               Active                 Leader                  19.03.12
c9kfcmbiqrbvqk8hwcdd96jj  vm02                   Ready               Active                 Leader                  19.03.12
91wbumud79jw6f1swlb2gx47m  vm03                   Ready               Active                 Leader                  19.03.12
docker@vm01:~/casscluster$
```