Application Containerization And Orchestration Lab

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Batch – DevOps B4

EXPERIMENT-4

AIM: Working with Docker Network

STEPS TO COMPLETE:

Step 1 - Create Network

The first step is to create a network using the CLI. This network will allow us to attach multiple containers which will be able to discover each other.

In this example, we're going to start by creating a *backend-network*. All containers attached to our backend will be on this network.

Task: Create Network

To start with we create the network with our predefined name.

“ docker network create backend-network ”

```
C:\Users\91983>docker network create backend-network
27130245fc1194d87ad6e36ac5c41860e61e020e9eddb827f7f631bc3a82eba7
```

Task: Connect To Network

When we launch new containers, we can use the *--net* attribute to assign which network they should be connected to.

“ docker run -d --name=redis --net=backend-network redis “

```
C:\Users\91983>docker run -d --name=redis --net=backend-network redis
e86c2a2e5325f69540b752254ce8fe1ad31c872b9f6cb3353c609a3733125ccb
```

In the next step we'll explore the state of the network.

Step 2 - Network Communication

Unlike using links, *docker network* behave like traditional networks where nodes can be attached/detached.

Task: Explore

The first thing you'll notice is that Docker no longer assigns environment variables or updates the hosts file of containers. Explore using the following two commands and you'll notice it no longer mentions other containers.

“ docker run --net=backend-network alpine ping -c1 redis ”

```
C:\Users\91983>docker run --net=backend-network alpine ping -c1 redis
Unable to find image 'alpine:latest' locally
latest: Pulling from library/alpine
96526aa774ef: Pull complete
Digest: sha256:eece025e432126ce23f223450a0326fbebde39cdf496a85d8c016293fc851978
Status: Downloaded newer image for alpine:latest
PING redis (172.18.0.2): 56 data bytes
64 bytes from 172.18.0.2: seq=0 ttl=64 time=0.564 ms

--- redis ping statistics ---
1 packets transmitted, 1 packets received, 0% packet loss
round-trip min/avg/max = 0.564/0.564/0.564 ms
```

Step 3 - Connect Two Containers

Docker supports multiple networks and containers being attached to more than one network at a time.

For example, let's create a separate network with a Node.js application that communicates with our existing Redis instance.

Task

The first task is to create a new network in the same way.

“ docker network create frontend-network ”

```
C:\Users\91983>docker network create frontend-network
10d02e98b93857ba955be44462a8e1f8d16b91c5d86524efd625ca0457401440
```

When using the *connect* command it is possible to attach existing containers to the network.

“ docker network connect frontend-network redis ”

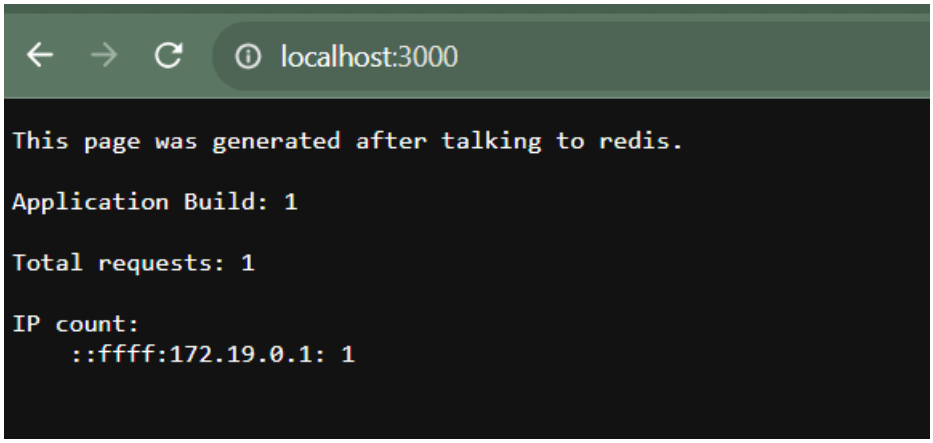
```
C:\Users\91983>docker network connect frontend-network redis
```

When we launch the web server, given it's attached to the same network it will be able to communicate with our Redis instance.

“ docker run -d -p 3000:3000 --net=frontend-network katacoda/redis-node-docker-example ”

```
C:\Users\91983>docker run -d -p 3000:3000 --net=frontend-network katacoda/redis-node-docker-example
Unable to find image 'katacoda/redis-node-docker-example:latest' locally
latest: Pulling from katacoda/redis-node-docker-example
[DEPRECATION NOTICE] Docker Image Format v1, and Docker Image manifest version 2, schema 1 support will be removed in an upcoming release. Suggest the autho
r of docker.io/katacoda/redis-node-docker-example:latest to upgrade the image to the OCI Format, or Docker Image manifest v2, schema 2. More information at
https://docs.docker.com/go/deprecated-image-specs/
12b41071e6ce: Pull complete
a3ed95caeb02: Pull complete
49a025abf7e3: Pull complete
1fb1c0be01ab: Pull complete
ae8c1f781cde: Pull complete
db73207ad2ae: Pull complete
446b13034c13: Pull complete
Digest: sha256:1aae9759464f00953c8e078a0e0d0649622fef9dd5655b1491f9ee589ae904b4
Status: Downloaded newer image for katacoda/redis-node-docker-example:latest
152b9ddc8e4dd6f49151321f24498f94d594332662def6c109ea2b291963befd
```

You can test it using **curl docker:3000** **or** **localhost:3000**



Step 4 - Create Aliases

Links are still supported when using *docker network* and provide a way to define an Alias to the container name. This will give the container an extra DNS entry name and way to be discovered. When using --link the embedded DNS will guarantee that localised lookup result only on that container where the --link is used.

The other approach is to provide an alias when connecting a container to a network.

Connect Container with Alias

The following command will connect our Redis instance to the frontend-network with the alias of *db*.

“ docker network create frontend-network2 ”

```
C:\Users\91983>docker network create frontend-network2
efc4ae4660af06c4fc99c724123ea2c8f5b85aac7774f80070a20c46bedee312
```

“ docker network connect --alias db frontend-network2 redis ”

```
C:\Users\91983>docker network connect --alias db frontend-network2 redis
```

When containers attempt to access a service via the name db, they will be given the IP address of our Redis container.

“ docker run --net=frontend-network2 alpine ping -c1 db ”

```
C:\Users\91983>docker run --net=frontend-network2 alpine ping -c1 db
PING db (172.20.0.2): 56 data bytes
64 bytes from 172.20.0.2: seq=0 ttl=64 time=0.496 ms

--- db ping statistics ---
1 packets transmitted, 1 packets received, 0% packet loss
round-trip min/avg/max = 0.496/0.496/0.496 ms
```

Step 5 - Disconnect Containers

With our networks created, we can use the CLI to explore the details.

The following command will list all the networks on our host.

“ docker network ls ”

```
C:\Users\91983>docker network ls
NETWORK ID     NAME                DRIVER    SCOPE
27130245fc11   backend-network     bridge    local
463659457a3e   bridge              bridge    local
10d02e98b938   frontend-network    bridge    local
efc4ae4660af   frontend-network2   bridge    local
c2ce936c2fa1   host                host      local
1f3825773539   none                null      local
```

We can then explore the network to see which containers are attached and their IP addresses.

“ docker network inspect frontend-network ”

```
C:\Users\91983>docker network inspect frontend-network
[
    {
        "Name": "frontend-network",
        "Id": "10d02e98b93857ba955be44462a8e1f8d16b91c5d86524efd625ca0457401440",
        "Created": "2023-11-13T05:24:29.78327665Z",
        "Scope": "local",
        "Driver": "bridge",
        "EnableIPv6": false,
        "IPAM": {
            "Driver": "default",
            "Options": {},
            "Config": [
                {
                    "Subnet": "172.19.0.0/16",
                    "Gateway": "172.19.0.1"
                }
            ]
        },
        "Internal": false,
        "Attachable": false,
        "Ingress": false,
        "ConfigFrom": {
            "Network": ""
        },
        "ConfigOnly": false,
        "Containers": {
            "152b9ddc8e4dd6f49151321f24498f94d594332662def6c109ea2b291963befd": {
                "Name": "reverent_blackburn",
                "EndpointID": "5f1e53916c19c2f64df164f635bf918af7316517bb508b4c9d8eb8e18ec7a7da",
                "MacAddress": "02:42:ac:13:00:03",
                "IPv4Address": "172.19.0.3/16",
                "IPv6Address": ""
            },
            "e86c2a2e5325f69540b752254ce8fe1ad31c872b9f6cb3353c609a3733125ccb": {
                "Name": "redis",
                "EndpointID": "0811322f2a9a959140b82a835e1635e97db0e5e766b156fc9fe6eca313ebb2b6",
                "MacAddress": "02:42:ac:13:00:02",
                "IPv4Address": "172.19.0.2/16",
                "IPv6Address": ""
            }
        },
        "Options": {},
        "Labels": {}
    }
]
```

The following command disconnects the redis container from the *frontend-network*.

“ docker network disconnect frontend-network redis ”

```
C:\Users\91983>docker network disconnect frontend-network redis
```

The following command deletes the created network:

“ docker network rm <network-name> ”

```
C:\Users\91983>docker network ls
NETWORK ID     NAME                DRIVER    SCOPE
27130245fc11   backend-network     bridge    local
463659457a3e   bridge              bridge    local
10d02e98b938   frontend-network    bridge    local
efc4ae4660af   frontend-network2   bridge    local
c2ce936c2fa1   host                host      local
1f3825773539   none                null      local

C:\Users\91983>docker network rm backend-network
backend-network

C:\Users\91983>docker network ls
NETWORK ID     NAME                DRIVER    SCOPE
463659457a3e   bridge              bridge    local
10d02e98b938   frontend-network    bridge    local
efc4ae4660af   frontend-network2   bridge    local
c2ce936c2fa1   host                host      local
1f3825773539   none                null      local

C:\Users\91983>docker network rm frontend-network
frontend-network

C:\Users\91983>docker network rm frontend-network2
frontend-network2

C:\Users\91983>docker network ls
NETWORK ID     NAME      DRIVER    SCOPE
463659457a3e   bridge    bridge    local
c2ce936c2fa1   host      host      local
1f3825773539   none      null      local
```