Task 1: Deploy Application inside a network

1. Create prestaNetwork

```
(base) lydiapc@MacBook-Air-de-Lydia Dockercours % docker network create prestaNetwork
a0182282a594df9b93e0ae0c66dff95d49b9e91da8dee6a75a107d1eb6d50975
(base) lydiapc@MacBook-Air-de-Lydia Dockercours % docker network ls
NETWORK ID      NAME            DRIVER    SCOPE
c8d6e13f311d    bridge          bridge    local
cf38fdab4775    host            host      local
e82e6d1847e0    none            null      local
a0182282a594    prestaNetwork   bridge    local
(base) lydiapc@MacBook-Air-de-Lydia Dockercours % █
```

2. Create two containers

a. Container mariabd as a database :

```
PS C:\Users\BK> docker run -d --name prestashop --network prestaNetwork -e DB_SERVER=mariadb_hichem -e DB_NAME=prestashop_db -e DB_USER=pr
tashop_data:/var/data/html prestashop/prestashop
fb4bbee4b0dc265aa457914a790087a4e76ff49cb95a491c46a91e43dcffb8fc
PS C:\Users\BK> docker exec -ti -u 0 prestashop apt-get update
Get:1 http://deb.debian.org/debian bookworm InRelease [151 kB]
Get:2 http://deb.debian.org/debian bookworm-updates InRelease [52.1 kB]
Get:3 http://deb.debian.org/debian-security bookworm-security InRelease [48.0 kB]
Get:4 http://deb.debian.org/debian bookworm/main amd64 Packages [8780 kB]
Get:5 http://deb.debian.org/debian bookworm-updates/main amd64 Packages [6668 B]
Get:6 http://deb.debian.org/debian-security bookworm-security/main amd64 Packages [106 kB]
Fetched 9144 kB in 3s (2989 kB/s)
Reading package lists... Done
```

b. Container prestashop :

```
PS C:\Users\BK> docker volume create --name prestashop_data
prestashop_data
PS C:\Users\BK> docker run -d --name mariadb --network prestaNetwork -e MYSQL_ROOT_PASSWORD=0000 -e MYSQL_DATABASE=prestashop_db -e MYSQL_USER=p
restashop_user -e MYSQL_PASSWORD=0000 -v mariadb_data:/var/lib/mysql mariadb
Unable to find image 'mariadb:latest' locally
latest: Pulling from library/mariadb
cbe3537751ce: Pull complete
5bfcd11f8751: Pull complete
ed018e89b8db: Pull complete
3e4cf40a46f9: Pull complete
938b1b815dca: Pull complete
07e09e75520d: Pull complete
82012f0ef36f: Pull complete
6430910462f4: Pull complete
Digest: sha256:c006c05608604cf21c9f5b13af3ba7d6ccb3df5bc042c3fe294e0b6d34689b55
Status: Downloaded newer image for mariadb:latest
485604e2e645c9e265fd68e78f05dd5fc931aeb76baef92d5cd1f82134d7f7f3
```

Note : the two containers had been added to the prestaNetwork when they are created

3. Install ping inside each container and ping eachother using their name

First we inspected the prestaNetwork to verify that the two containers are in :

```
PS C:\Users\BK> docker network inspect prestaNetwork
[
    {
        "Name": "prestaNetwork",
        "Id": "4e74320e9ed2f8568eae693b04a35a3f20206c6928e115c28dde6c614c23c6f0",
        "Created": "2023-12-07T09:40:02.408237974Z",
        "Scope": "local",
        "Driver": "bridge",
        "EnableIPv6": false,
        "IPAM": {
            "Driver": "default",
            "Options": {},
            "Config": [
                {
                    "Subnet": "172.22.0.0/16",
                    "Gateway": "172.22.0.1"
                }
            ]
        },
        "Internal": false,
        "Attachable": false,
        "Ingress": false,
        "ConfigFrom": {
            "Network": ""
        },
        "ConfigOnly": false,
        "Containers": {
            "82b2d352b3b275b69341d989c90a3787f610c5abcc2d66dba94d94ca72d633a2": {
                "Name": "mariadb",
                "EndpointID": "b07f179047b367f38abe1b7ccac994df318b76e02e4f938ab2f6a7f21b2c0df2",
                "MacAddress": "02:42:ac:16:00:02",
                "IPv4Address": "172.22.0.2/16",
                "IPv6Address": ""
            },
            "a8c18e32a4062edbf5086e72784526da008fa81ead61c0436b64d8f9f44273ef": {
                "Name": "prestashop",
                "EndpointID": "4332a9b3510cb8dcb60fad01b46b26e2294324ad3bc26fb6d20385d95dc17920",
                "MacAddress": "02:42:ac:16:00:03",
                "IPv4Address": "172.22.0.3/16",
                "IPv6Address": ""
```

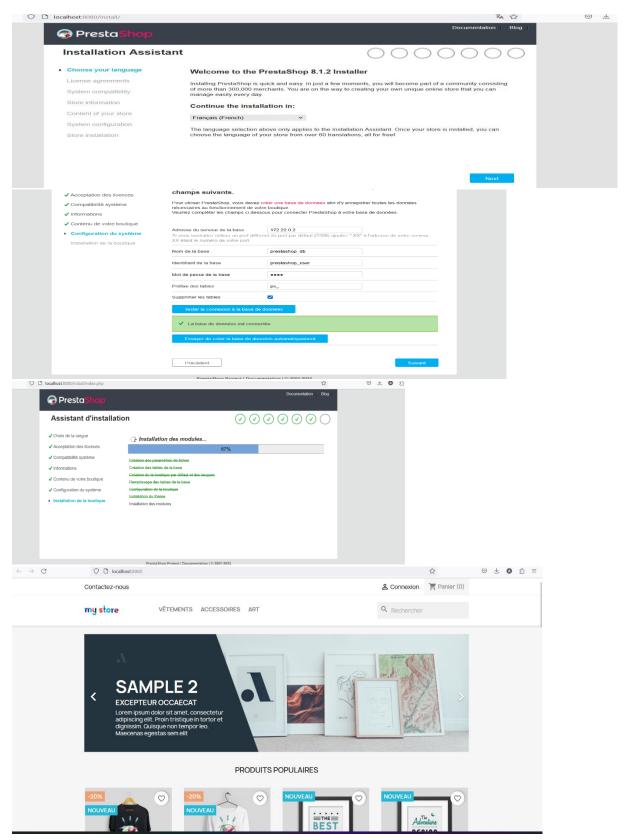Then we verified if both containers can communicate :

Ping mariadb from prestashop :

```
exit
PS C:\Users\BK> docker exec -it prestashop bash
I have no name!@a8c18e32a406:/$ ping mariadb
PING mariadb (172.22.0.2) 56(84) bytes of data.
64 bytes from mariadb.prestaNetwork (172.22.0.2): icmp_seq=1 ttl=64 time=0.078 ms
64 bytes from mariadb.prestaNetwork (172.22.0.2): icmp_seq=2 ttl=64 time=0.088 ms
64 bytes from mariadb.prestaNetwork (172.22.0.2): icmp_seq=3 ttl=64 time=0.053 ms
64 bytes from mariadb.prestaNetwork (172.22.0.2): icmp_seq=4 ttl=64 time=0.052 ms
```

Ping pretashop from mariadb :

```
I have no name!@82b2d352b3b2:/$ ping prestashop
PING prestashop (172.22.0.3) 56(84) bytes of data.
64 bytes from prestashop.prestaNetwork (172.22.0.3): icmp_seq=1 ttl=64 time=0.2
64 bytes from prestashop.prestaNetwork (172.22.0.3): icmp_seq=2 ttl=64 time=0.1
64 bytes from prestashop.prestaNetwork (172.22.0.3): icmp_seq=3 ttl=64 time=0.1
64 bytes from prestashop.prestaNetwork (172.22.0.3): icmp_seq=4 ttl=64 time=0.0
64 bytes from prestashop.prestaNetwork (172.22.0.3): icmp_seq=5 ttl=64 time=0.1
```

Access localhost :8080

Task02 : Create Two Networks and à Router

1. **Create ntworks with the specified cidr**

```
PS C:\Users\BK> docker network create --subnet=10.0.1.0/24 mariadb-network
625e2916d2ef30f755d0cc06c6d0f905edca6b73646db5efba585a7d966cd591
PS C:\Users\BK> docker network create --subnet=10.0.0.0/24 prestashop-network
e2427abd544f55155a5cdf7b1658ce4999b5c2321bfeacd6a977d594e312abaf
PS C:\Users\BK> c
```

2. **Connect each container to its network**

```
PS C:\Users\BK> docker network connect prestashop-network prestashop
PS C:\Users\BK> docker network connect mariadb-network mariadb
PS C:\Users\BK> docker inspect prestashop
[
    {
```

3. **Create the route container and connect it :**

```
PS C:\Users\BK> docker run -d --name router --network prestashop-network --privileged -p 80:80 ngi
a91ca7bb1459e0d75df83d6da6a2e23b41235c2103d1eac6ec843c3cf09d5a90
PS C:\Users\BK> docker network connect mariadb-network router
PS C:\Users\BK>
```

We inspected the router to verify that it is connected to networks prestashop-network and mariadb-network

        },
        "SandboxKey": "/var/run/docker/netns/bf45c25899c1",
        "SecondaryIPAddresses": null,
        "SecondaryIPv6Addresses": null,
        "EndpointID": "",
        "Gateway": "",
        "GlobalIPv6Address": "",
        "GlobalIPv6PrefixLen": 0,
        "IPAddress": "",
        "IPPrefixLen": 0,
        "IPv6Gateway": "",
        "MacAddress": "",
        "Networks": {
            "mariadb-network": {
                "IPAMConfig": {},
                "Links": null,
                "Aliases": [
                    "a91ca7bb1459"
                ],
                "NetworkID": "625e2916d2ef30f755d0cc06c6d0f905edca6b73646db5efba585a7d966cd591",
                "EndpointID": "42f91e8a4db355a709f87c7ed14f1a99909112ce40f9cdb37668cbb1b571c790",
                "Gateway": "10.0.1.1",
                "IPAddress": "10.0.1.3",
                "IPPrefixLen": 24,
                "IPv6Gateway": "",
                "GlobalIPv6Address": "",
                "GlobalIPv6PrefixLen": 0,
                "MacAddress": "02:42:0a:00:01:03",
                "DriverOpts": {}
            },
            "prestashop-network": {
                "IPAMConfig": null,
                "Links": null,
                "Aliases": [
                    "a91ca7bb1459"
                ],
                "NetworkID": "e2427abd544f55155a5cdf7b1658ce4999b5c2321bfeacd6a977d594e312abaf",
                "EndpointID": "cf8d5c2d55c54daee484ab8fb88bde860928071f4e9622d85bf3977c89dee085",
                "Gateway": "10.0.0.1",
                "IPAddress": "10.0.0.3",
                "IPPrefixLen": 24,
                "IPv6Gateway": "",
                "GlobalIPv6Address": "",
                "GlobalIPv6PrefixLen": 0,
                "MacAddress": "02:42:0a:00:00:03",
                "DriverOpts": null
            }
        }

4. Access the router and modify the table :

```
PS C:\Users\BK> docker exec -it router bash
```

```
root@35757f7e68e5:/# ip route del 10.0.0.0/24 via 10.0.1.3 dev eth1
root@35757f7e68e5:/# ip route del 10.0.1.0/24 via 10.0.0.3 dev eth0
root@35757f7e68e5:/# ip route add 10.0.1.0/24 via 10.0.1.3
root@35757f7e68e5:/# ip route add 10.0.0.0/24 via 10.0.0.3
root@35757f7e68e5:/# ip route show
default via 10.0.1.1 dev eth1
10.0.0.0/24 via 10.0.0.3 dev eth0
10.0.1.0/24 via 10.0.1.3 dev eth1
```

Note : we can reach the conatiner prestahop (frontend) from mariadb (backed) using traceroute command :

```
root@485604e2e645:/# traceroute 10.0.0.2
traceroute to 10.0.0.2 (10.0.0.2), 30 hops max, 60 byte packets
 1  10.0.1.1 (10.0.1.1)  4.138 ms  0.682 ms  0.595 ms
 2  * * *
 3  * * *
 4  * * *
 5  * * *
 6  * * *
 7  *^C
root@485604e2e645:/#
```