🐳 Docker Networking🌐:

Docker networking is how Docker containers communicate with each other, with the host machine, and with the outside world (internet or other networks).

- When you create containers, Docker automatically connects them to a default network unless you specify otherwise.
- You can also create custom networks to control how containers talk to each other.

Why🤔is Docker Networking:

- Enables communication between containers (e.g., web server container talking to a database container).
- Defines how and which container ports are published to the outside world.
- Provides isolation and security between containers.

Types of Docker Networks : Docker has 4 main types of networks by default.

1️⃣. bridge (default) network :

Bridge network is Docker's default private network where containers on the same host can communicate with each other using IP addresses.

- When you start a container without specifying a network, it connects to this default bridge network.
- Requires port mapping to access containers externally.

Reason for Use:

- To isolate container traffic from the host and other networks.
- To allow containers on the same host to communicate securely.

2️⃣ . host network :

The container shares the host's networking namespace. No network isolation, the container uses the host's IP address and ports directly.

- Ports do not need to be published explicitly.

Reason for Use:

- When a container needs direct access to the host's network interfaces.
- For applications that require low latency.

3 . none network :

The container has no network.

- Container is completely isolated from any network.
- No communication with other containers or the outside world.

Reason for Use:

- Useful for running containers without network access.

4 . overlay network :

Enables communication between containers running on different Docker hosts.

- Used mainly in Docker Swarm or Kubernetes clusters.

Reason for Use:

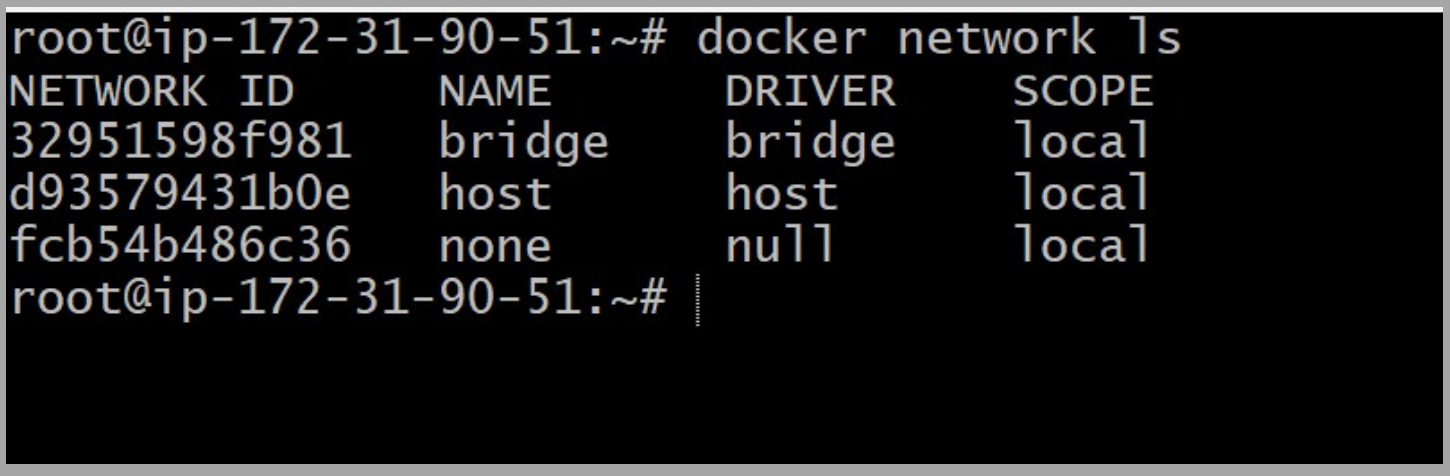
- For multi-host container deployments, such as in orchestration platforms or clusters.

Note : You cannot remove Docker's default networks (bridge, host, and none) because they are built-in and essential for Docker to function properly.

Understand How Networking Work's - Practically :

Check the Default Networks which is available by default.

```
docker network ls
```

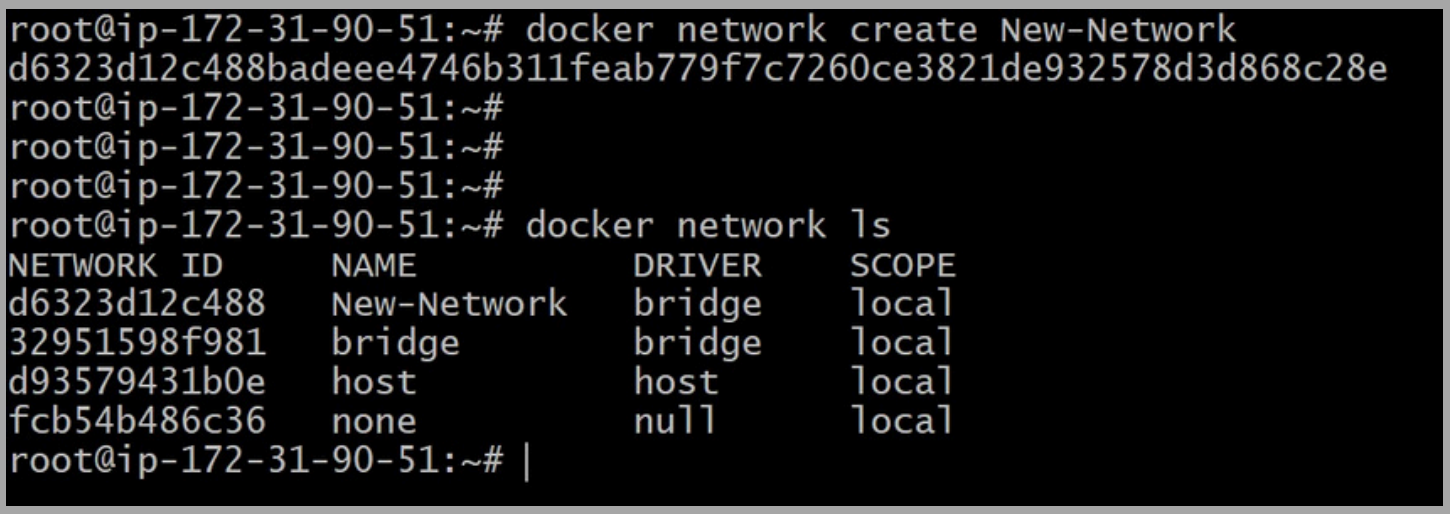


- when we check with this command shows default networks — bridge, host, and none this are default Docker networks automatically created by Docker when you install it.

Let's Understand about Bridge Network:

Create a Custom Bridge Network using:

```
docker network create my-Network
```



Run a Container and Attach to the Custom Network using:

```
docker run -dit --name mypractice --network New-Network nginx
```

- `-d` runs the container in detached mode (in the background)
- `-i` keeps STDIN open
- `-t` allocates a terminal
- `--name mypractice` names the container nginx
- `--network New-Network` connects the container to your custom network

Verify the Container is Connected to Your Network:

```
docker inspect my-Network
```

```
root@ip-172-31-90-51:~# docker run -dit --name mypractice --network New-Network nginx
Unable to find image 'nginx:latest' locally
latest: Pulling from library/nginx
61320b01ae5e: Pull complete
670a101d432b: Pull complete
405bd2df85b6: Pull complete
cc80efff8457: Pull complete
2b9310b2ee4b: Pull complete
6c4aa022e8e1: Pull complete
abddc69cb49d: Pull complete
Digest: sha256:fb39280b7b9eba5727c884a3c7810002e69e8f961cc373b89c92f14961d903a0
Status: Downloaded newer image for nginx:latest
17747f4a81fd26b36478e8fdae47faa0760155a19f1d16ec9388d2a3ff52bb1e
root@ip-172-31-90-51:~#
root@ip-172-31-90-51:~#
root@ip-172-31-90-51:~# docker network inspect New-Network
[
    {
        "Name": "New-Network",
        "Id": "d6323d12c488badeee4746b311feab779f7c7260ce3821de932578d3d868c28e",
        "Created": "2025-05-22T13:16:46.009087955Z",
        "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": ""
```

Let'S know about Host-Network :

Create and Use Docker Host Network:

Actually, you don’t need to create a host network — Docker already provides it by default.

🔹 Step 1: Check Available Networks

```
docker network ls
```

You will see something like:

```
NETWORK ID NAME DRIVER SCOPE abc123456789
bridge  bridge  local  def987654321  host
host local
```

🔹 Step 2: Use the Host Network

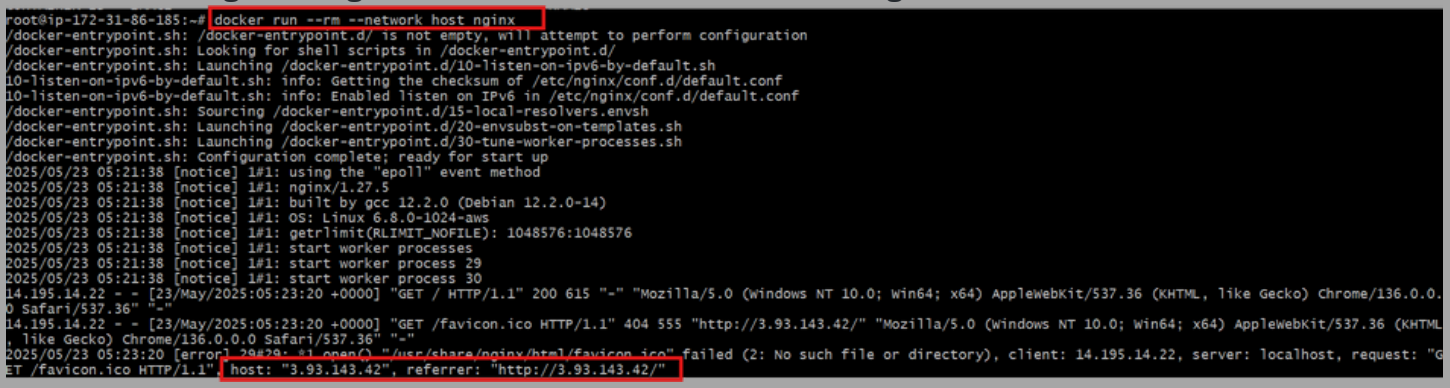
You can run any container using the host network:

```
docker run --rm --network host nginx
```

✅ Explanation of Each Part:

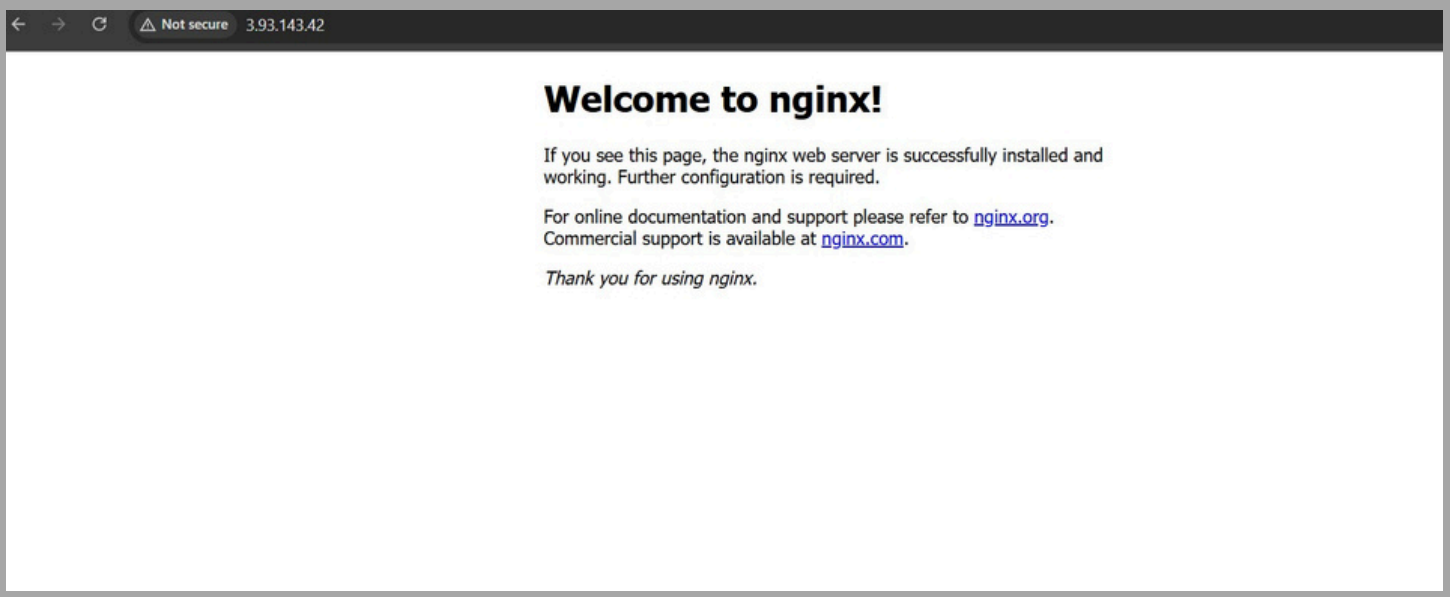
- `docker run` : Start a new container
- `--rm` Automatically remove the container when it stops
- `--network host` : Use the host's network stack (not Docker's virtual bridge)
- `<image-name>` The Docker image you want to run (e.g., nginx)

This will start Nginx using the host's network, not Docker's bridge network.



🔹 Step 3: You can then access it via:

```
http://localhost:<port>
```



⚠ Why Use `--rm`?

- Keeps things clean — no leftover containers.
- Useful for testing or temporary services.

🛑 You cannot create another host network — Docker allows only one host network per host (because it's directly tied to the OS network stack).

Let's Know about Docker None Network:

🔹 Step 1: Run a Container with none Network

```
docker run --name mycontainer --network none -dt nginx
```

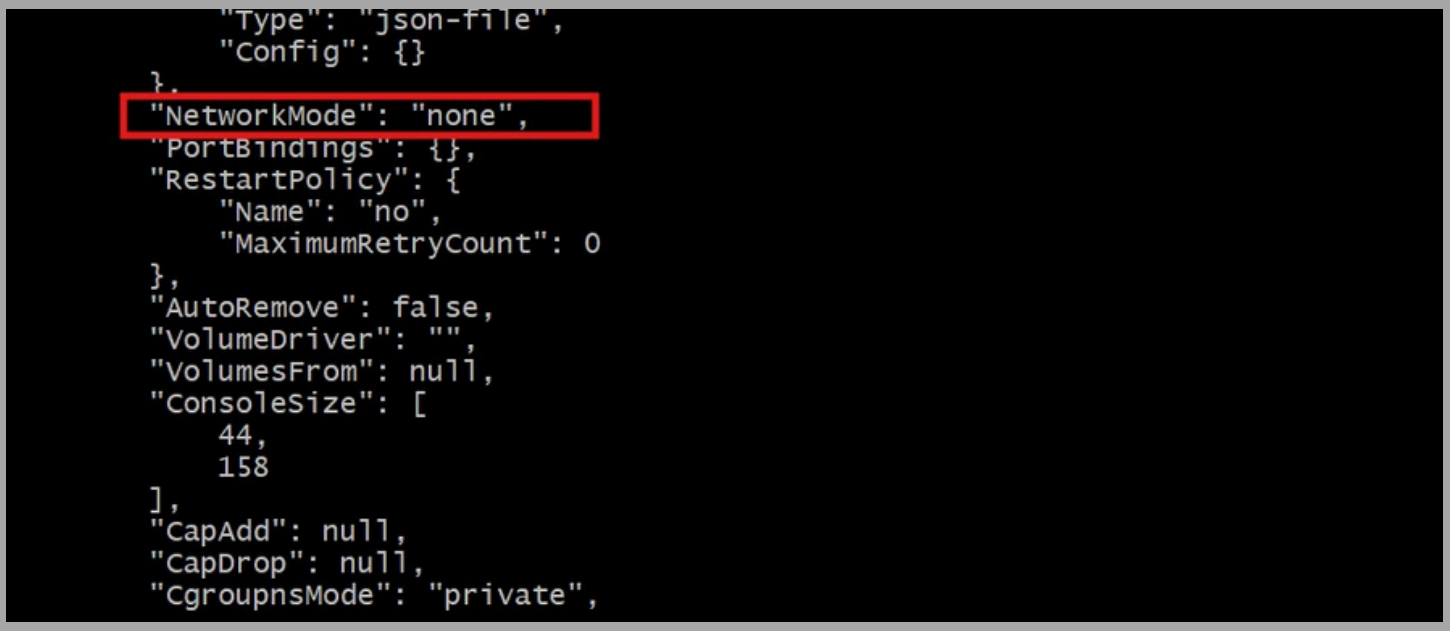
```
root@ip-172-31-86-185:~# docker run --name mycontainer --network none -dt nginx
dc2cdebd65f7d9bd70aa9819969de0f92f950d96dceb5dffaa888d5aa7688530
root@ip-172-31-86-185:~# docker ps
CONTAINER ID   IMAGE     COMMAND                  CREATED         STATUS         PORTS     NAMES
dc2cdebd65f7   nginx     "/docker-entrypoint.…"   8 seconds ago   Up 7 seconds             mycontainer
root@ip-172-31-86-185:~#
root@ip-172-31-86-185:~# docker inspect dc2cdebd65f7
[
    {
        "Id": "dc2cdebd65f7d9bd70aa9819969de0f92f950d96dceb5dffaa888d5aa7688530",
        "Created": "2025-05-23T05:50:25.480634456Z",
        "Path": "/docker-entrypoint.sh",
        "Args": [
            "nginx",
            "-g",
            "daemon off;"
        ],
        "State": {
            "Status": "running",
            "Running": true,
            "Paused": false,
            "Restarting": false,
```

✅ What This Command Does :

- `docker run` : Runs a new container
- `--name mycontainer` Names the container mycontainer
- `--network none` Disables all networking (no internet, no ports, no communication)
- `-d` Runs in detached mode (in the background)
- `-t` Allocates a pseudo-TTY (usually for interactive use, not needed here)
- `nginx` Uses the nginx image to run a web server

🔹 Step 2 : Check the network :

```
docker inspect container id or image-name
```


"Type": "json-file",
"Config": {}
},
"NetworkMode": "none",
"PortBindings": {},
"RestartPolicy": {
"Name": "no",
"MaximumRetryCount": 0
},
"AutoRemove": false,
"VolumeDriver": "",
"VolumesFrom": null,
"ConsoleSize": [
44,
158
],
"CapAdd": null,
"CapDrop": null,
"CgroupnsMode": "private",