



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.

1. 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.

2 . 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
```

```
root@ip-172-31-90-51:~# docker network ls
NETWORK ID          NAME                DRIVER              SCOPE
32951598f981        bridge             bridge              local
d93579431b0e        host               host                local
fcb54b486c36        none              null                local
root@ip-172-31-90-51:~#
```

- 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.
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Let's Understand about Bridge Network:

Create a Custom Bridge Network using:

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

```
root@ip-172-31-90-51:~# docker network create New-Network
d6323d12c488badeee4746b311feab779f7c7260ce3821de932578d3d868c28e
root@ip-172-31-90-51:~#
root@ip-172-31-90-51:~#
root@ip-172-31-90-51:~#
root@ip-172-31-90-51:~# docker network ls
NETWORK ID          NAME                DRIVER              SCOPE
d6323d12c488        New-Network         bridge              local
32951598f981        bridge              bridge              local
d93579431b0e        host                host                local
fcb54b486c36        none                null                local
root@ip-172-31-90-51:~# |
```

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:

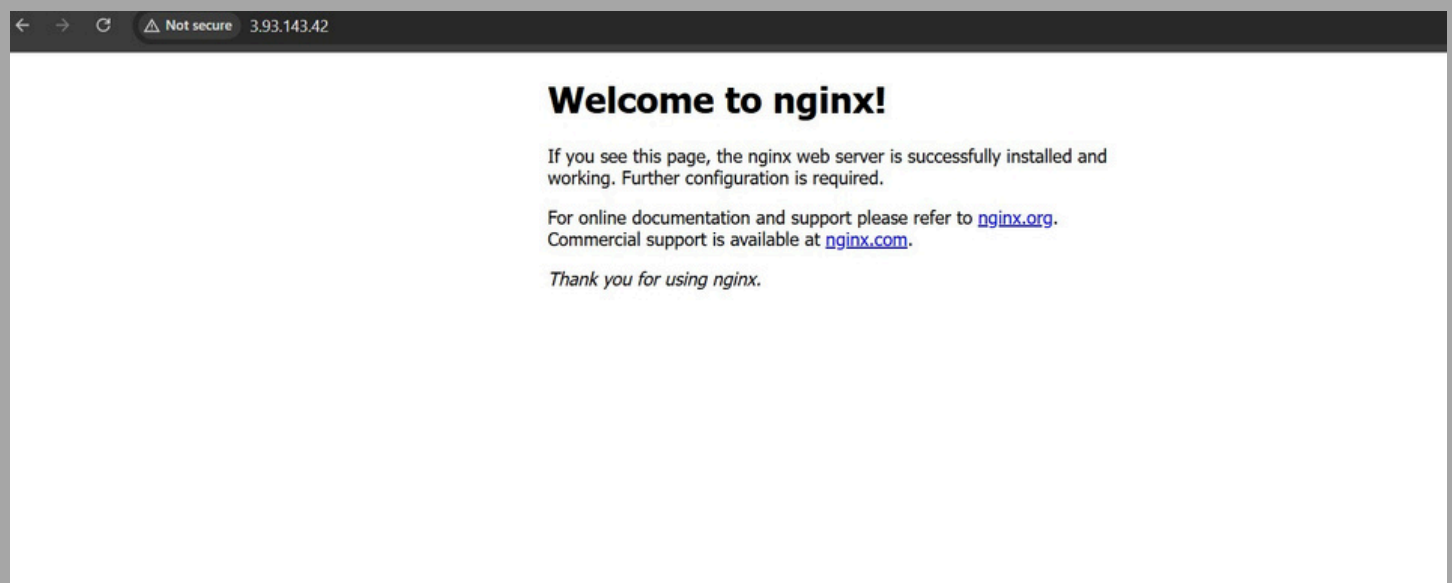
- `docker run` : Start a new container
- `--rm` Automatically remove the container when it stops
- `--network host` : Use the host's network stack (not Docker's virtual bridge)
- `<image-name>` The Docker image you want to run (e.g., `nginx`)

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

```
root@ip-172-31-86-185:~# docker run --rm --network host nginx
/docker-entrypoint.sh: /docker-entrypoint.d/ is not empty, will attempt to perform configuration
/docker-entrypoint.sh: Looking for shell scripts in /docker-entrypoint.d/
/docker-entrypoint.sh: Launching /docker-entrypoint.d/10-listen-on-ipv6-by-default.sh
10-listen-on-ipv6-by-default.sh: info: Getting the checksum of /etc/nginx/conf.d/default.conf
10-listen-on-ipv6-by-default.sh: info: Enabled listen on IPv6 in /etc/nginx/conf.d/default.conf
/docker-entrypoint.sh: Sourcing /docker-entrypoint.d/15-local-resolvers.envsh
/docker-entrypoint.sh: Launching /docker-entrypoint.d/20-envsubst-on-templates.sh
/docker-entrypoint.sh: Launching /docker-entrypoint.d/30-tune-worker-processes.sh
/docker-entrypoint.sh: Configuration complete; ready for start up
2025/05/23 05:21:38 [notice] 1#1: using the "epoll" event method
2025/05/23 05:21:38 [notice] 1#1: nginx/1.27.5
2025/05/23 05:21:38 [notice] 1#1: built by gcc 12.2.0 (Debian 12.2.0-14)
2025/05/23 05:21:38 [notice] 1#1: OS: Linux 6.8.0-1024-aws
2025/05/23 05:21:38 [notice] 1#1: getrlimit(RLIMIT_NOFILE): 1048576:1048576
2025/05/23 05:21:38 [notice] 1#1: start worker processes
2025/05/23 05:21:38 [notice] 1#1: start worker process 29
2025/05/23 05:21:38 [notice] 1#1: start worker process 30
14.195.14.22 - - [23/May/2025:05:23:20 +0000] "GET / HTTP/1.1" 200 615 "-" "Mozilla/5.0 (Windows NT 10.0; Win64; x64) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/136.0.0.0 Safari/537.36" "-"
14.195.14.22 - - [23/May/2025:05:23:20 +0000] "GET /favicon.ico HTTP/1.1" 404 555 "http://3.93.143.42/" "Mozilla/5.0 (Windows NT 10.0; Win64; x64) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/136.0.0.0 Safari/537.36" "-"
2025/05/23 05:23:20 [error] 29#29: *1 open() "/usr/share/nginx/html/favicon.ico" failed (2: No such file or directory), client: 14.195.14.22, server: localhost, request: "GET /favicon.ico HTTP/1.1", host: "3.93.143.42", referer: "http://3.93.143.42/"
```

◆ 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",
```