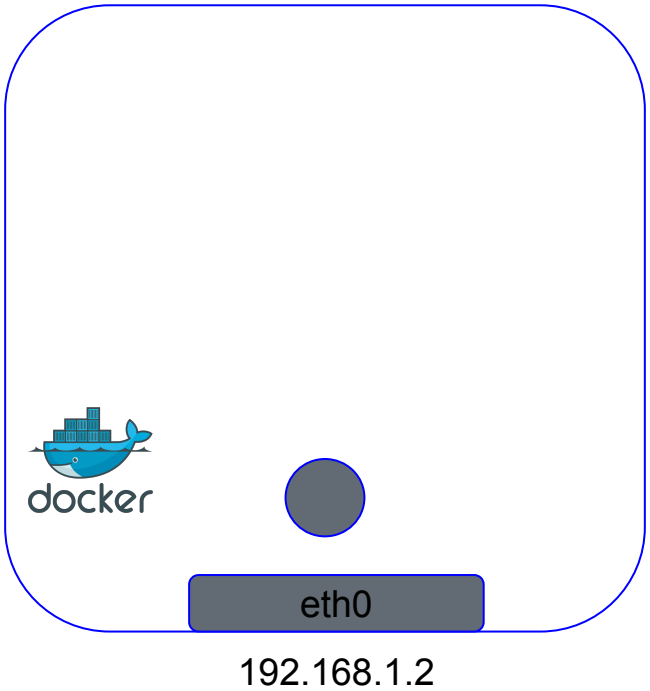
Инструменты и средства программирования

Лекция 2

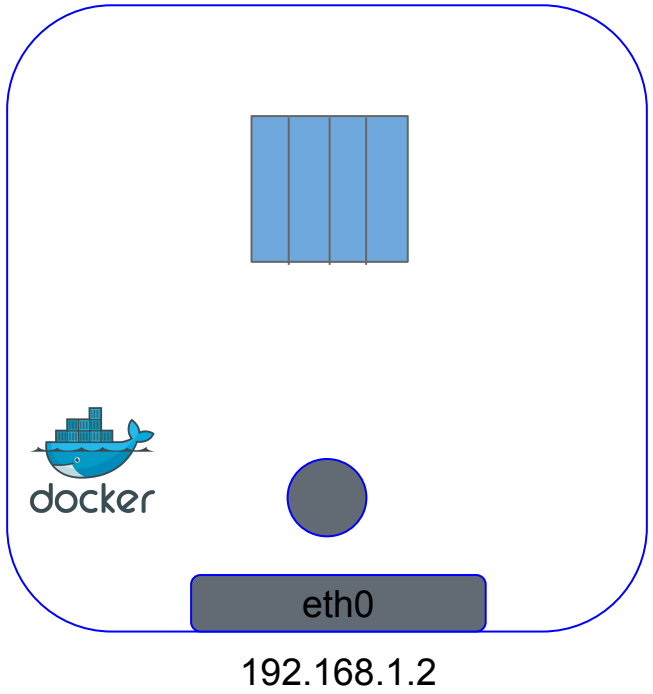
Docker networking

Docker networking



Docker networking. None network

```
docker run --network none web-app:1.0.0
```



Docker networking. None network

```
docker run --network none web-app:1.0.0
```

```
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```

```
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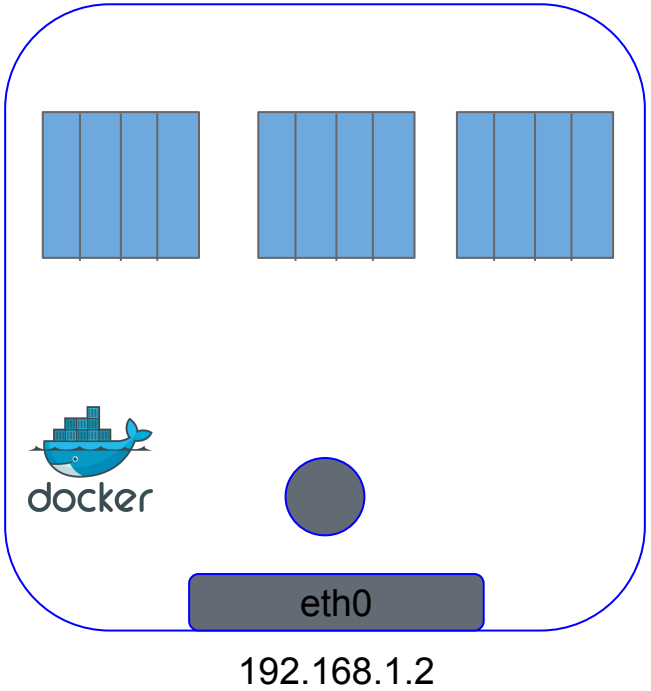
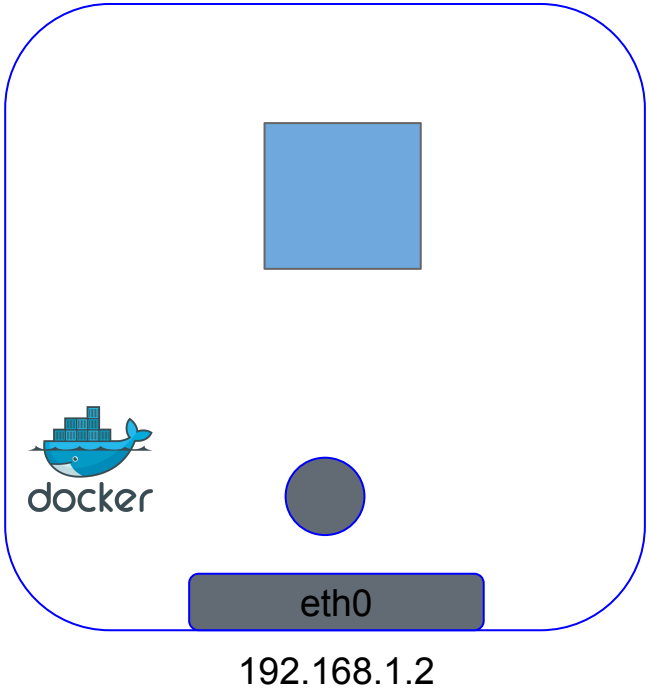


Docker networking. Host network

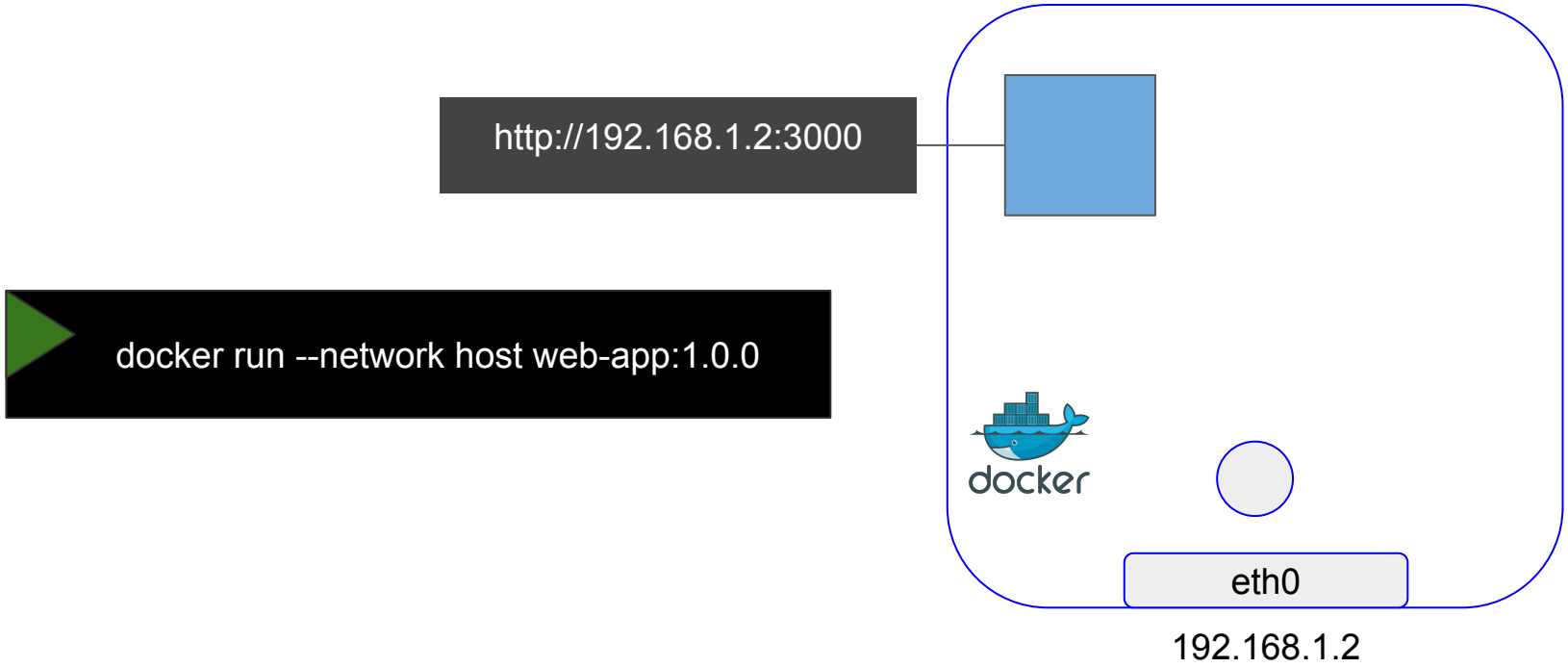
При использовании host нетворка контейнер стартует в том же пространстве имен, что и хост машина. Этот механизм позволяет использовать сеть хоста напрямую.

По скорости почти нет просадок, то есть скорость примерно аналогична реальной машине, но возможны конфликты портов.

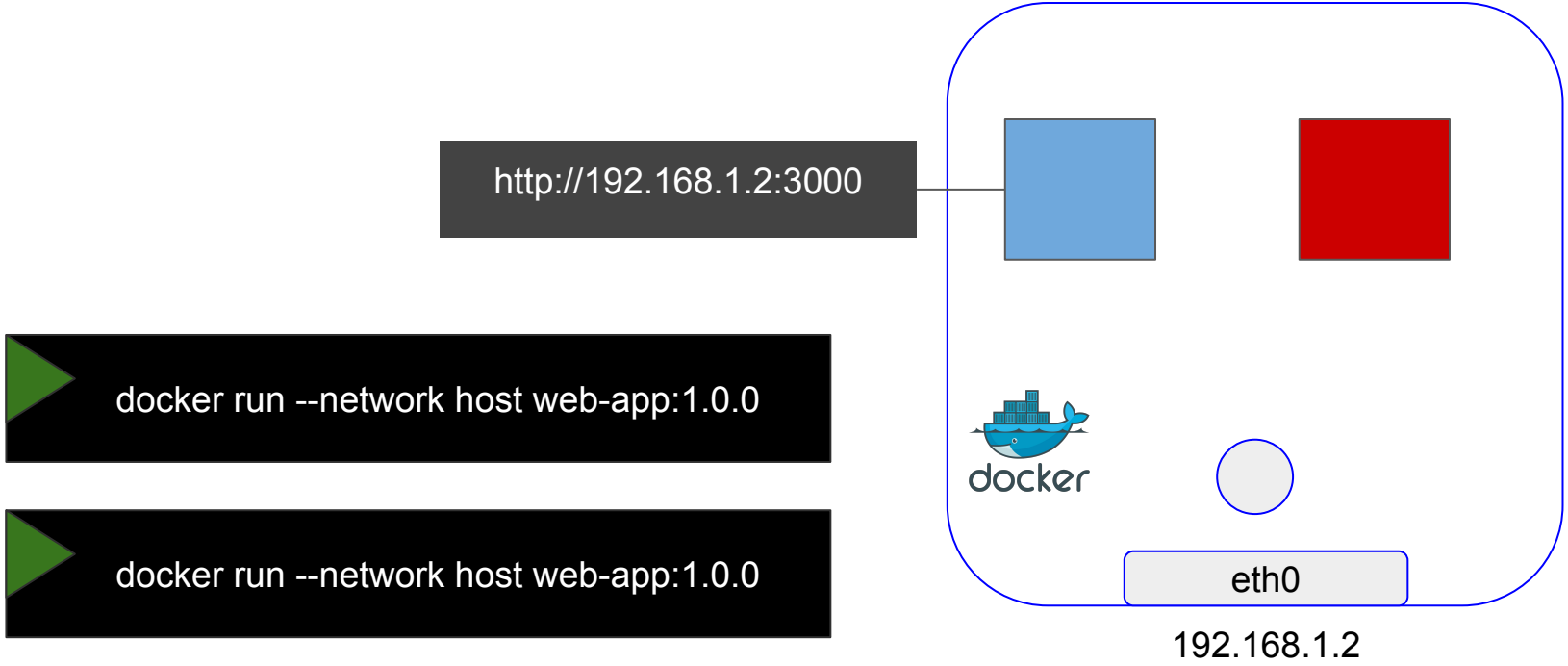
```
docker run --network host web-app:1.0.0
```



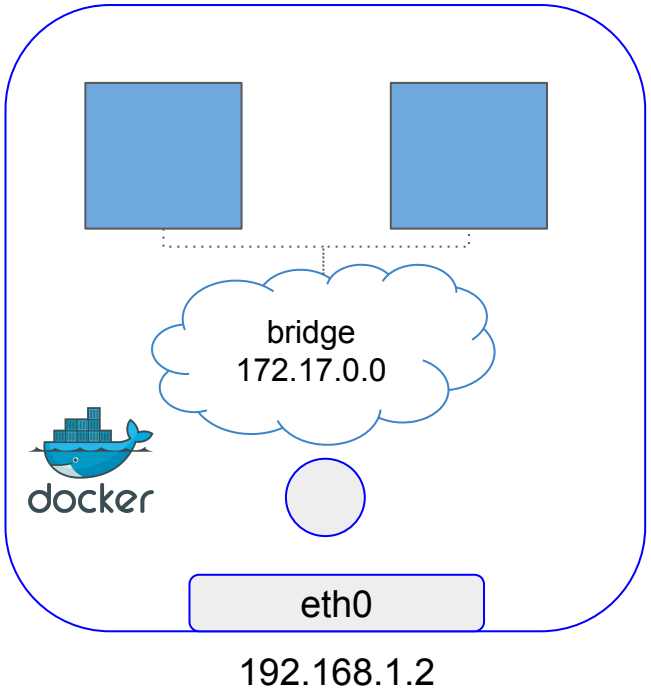
Docker networking. Host network



Docker networking. Host network



Docker networking. Bridge network



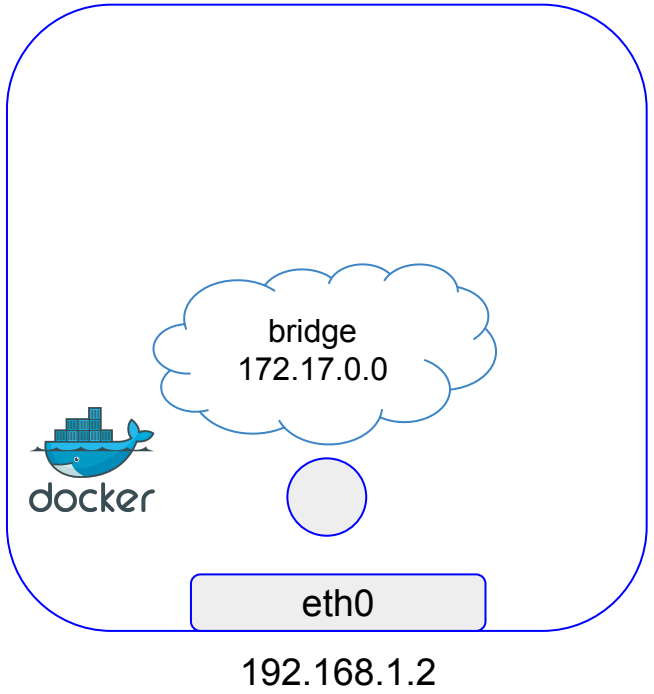

```
docker run web-app:1.0.0
```

```
docker run web-app:1.0.0
```

Docker networking. Bridge network

Сетевой драйвер по умолчанию — **BRIDGE**.

Сети типа Bridge обычно используются когда вы запускаете разные приложения в отдельных контейнерах и при этом они должны взаимодействовать друг с другом.



Docker networking. Bridge network

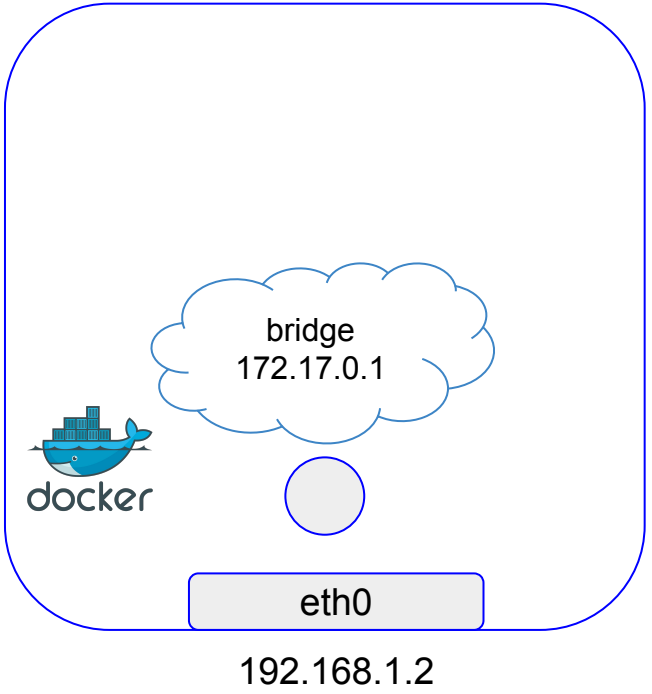
Docker обращается к сети как “bridge”

```
vitaly@vitaly-machine:~$ docker network ls
NETWORK ID          NAME                                DRIVER
359a3539dae4        bridge                              bridge
2d1c01e8526a        docker_gwbridge                     bridge
44140f7cc868        host                                host
y04zotslbz12        ingress                             overlay
```

ifconfig

ip link

```
docker0: flags=4099<UP,BROADCAST,MULTICAST>  mtu 1500
        inet 172.17.0.1  netmask 255.255.0.0  broadcast 172.17.255.255
        ether 02:42:13:7f:4d:b6  txqueuelen 0  (Ethernet)
        RX packets 0  bytes 0 (0.0 B)
        RX errors 0  dropped 0  overruns 0  frame 0
        TX packets 0  bytes 0 (0.0 B)
        TX errors 0  dropped 0 overruns 0  carrier 0  collisions 0
```



docker0 - эта же сеть на хост машине.

Docker networking. Bridge network

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```
vitaly@vitaly-machine:~$ docker network ls
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y04zotslbz12        ingress                             overlay
```

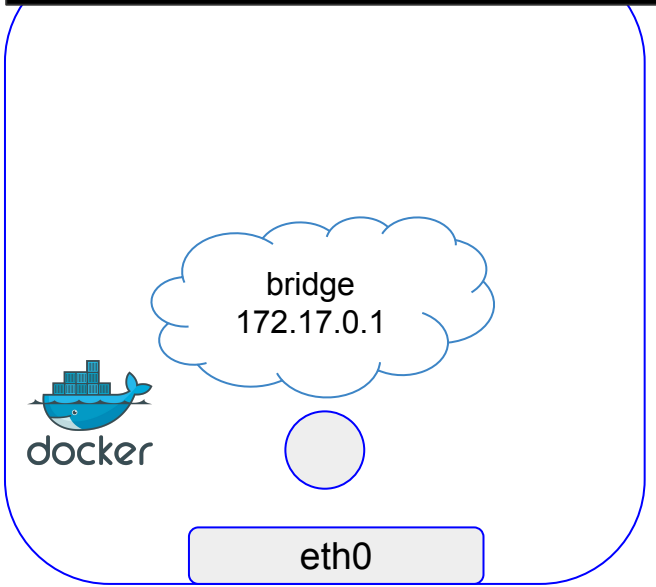
ifconfig

ip link

```
docker0: flags=4099<UP,BROADCAST,MULTICAST>  mtu 1500
        inet 172.17.0.1  netmask 255.255.0.0  broadcast 172.17.255.255
        ether 02:42:13:7f:4d:b6  txqueuelen 0  (Ethernet)
        RX packets 0  bytes 0 (0.0 B)
        RX errors 0  dropped 0  overruns 0  frame 0
        TX packets 0  bytes 0 (0.0 B)
        TX errors 0  dropped 0 overruns 0  carrier 0  collisions 0
```

docker0 - эта же сеть на хост машине.

ip link add docker0 type bridge



192.168.1.2

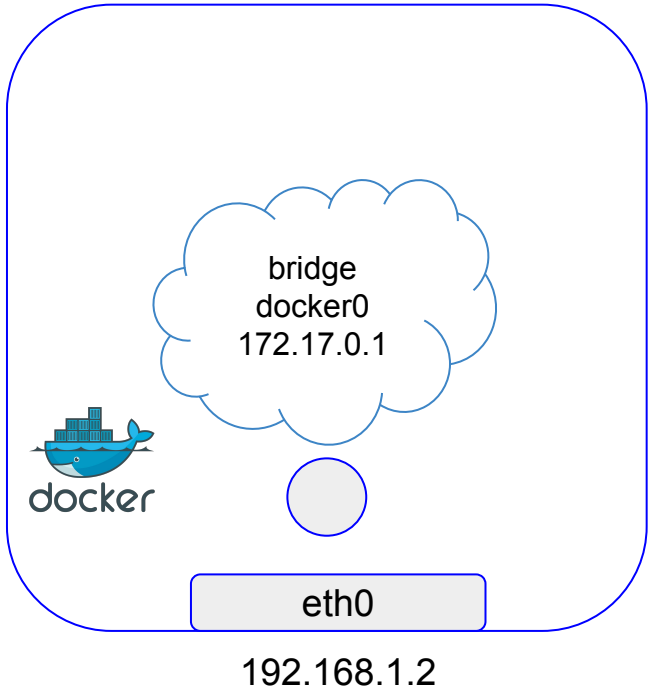
Docker networking. Bridge network

bridge:

- как интерфейс для хоста;
- как свитч в пространства имен или контейнера на хосте.

```
ip addr
```

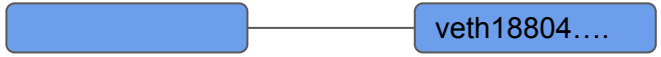
```
9: docker0: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500
    link/ether 02:42:13:7f:4d:b6 brd ff:ff:ff:ff:ff:ff
    inet 172.17.0.1/16 brd 172.17.255.255 scope global
       valid_lft forever preferred_lft forever
    inet6 fe80::42:13ff:fe7f:4db6/64 scope link
       valid_lft forever preferred_lft forever
```



Docker networking. Bridge network

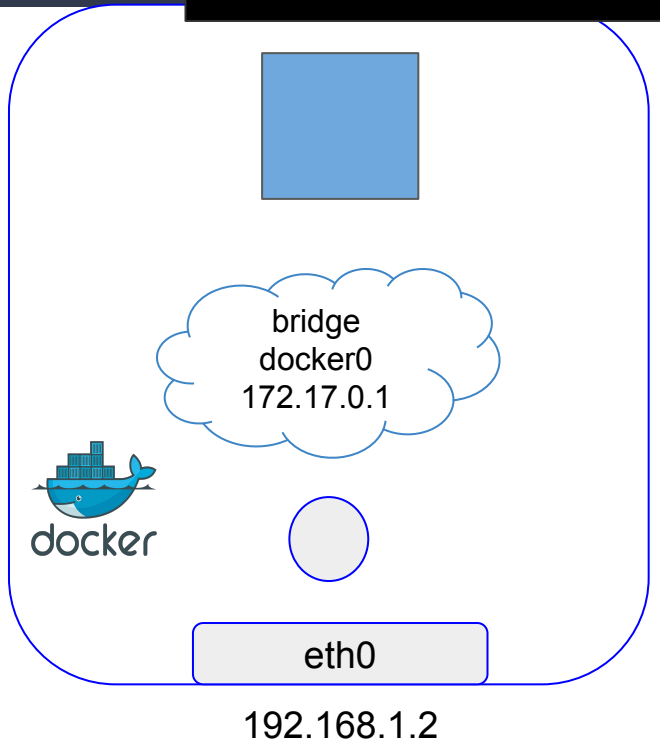
ip addr

```
9: docker0: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500
    link/ether 02:42:13:7f:4d:b6 brd ff:ff:ff:ff:ff:ff
    inet 172.17.0.1/16 brd 172.17.255.255 scope global
       valid_lft forever preferred_lft forever
    inet6 fe80::42:13ff:fe7f:4db6/64 scope link
       valid_lft forever preferred_lft forever
```



ip link

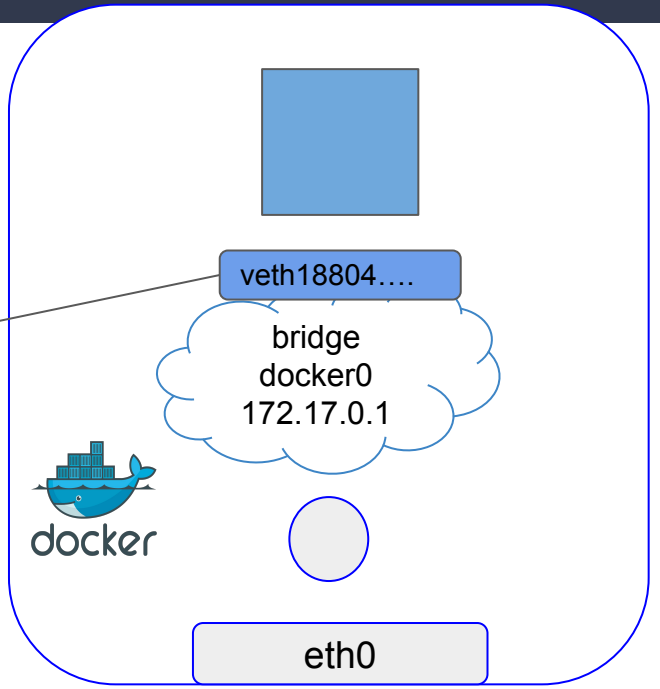
```
20: veth18804e6@if19: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc noqueue master docker0 state UP mode DEFAULT group default
    link/ether 9e:d7:7e:bf:5d:e1 brd ff:ff:ff:ff:ff:ff link-netnsid 2
```



Docker networking. Bridge network

ip addr

```
9: docker0: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500
    link/ether 02:42:13:7f:4d:b6 brd ff:ff:ff:ff:ff:ff
    inet 172.17.0.1/16 brd 172.17.255.255 scope global
       valid_lft forever preferred_lft forever
    inet6 fe80::42:13ff:fe7f:4db6/64 scope link
       valid_lft forever preferred_lft forever
```

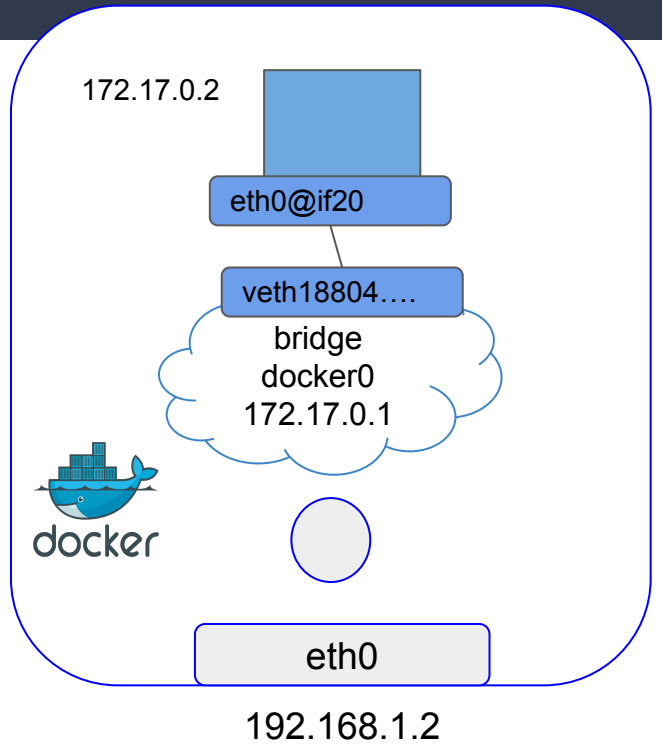


ip link

```
20: veth18804e6@if19: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc noqueue master docker0 state UP mode DEFAULT group default
    link/ether 9e:d7:7e:bf:5d:e1 brd ff:ff:ff:ff:ff:ff link-netnsid 2
```

Docker networking. Bridge network

```
vitaly@vitaly-machine:~$ docker inspect --format '{{.State.Pid}}' sad_thompson
27210
vitaly@vitaly-machine:~$ sudo nsenter -t 27210 -n ip addr show
1: lo: <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue state UNKNOWN group defa
    link/loopback 00:00:00:00:00:00 brd 00:00:00:00:00:00
    inet 127.0.0.1/8 scope host lo
       valid_lft forever preferred_lft forever
19: eth0@if20: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc noqueue state
    link/ether 02:42:ac:11:00:02 brd ff:ff:ff:ff:ff:ff link-netnsid 0
    inet 172.17.0.2/16 brd 172.17.255.255 scope global eth0
       valid_lft forever preferred_lft forever
vitaly@vitaly-machine:~$
```



ip link

```
20: veth18804e6@if19: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc noqueue master docker0 state UP mode DEFAULT group default
    link/ether 9e:d7:7e:bf:5d:e1 brd ff:ff:ff:ff:ff:ff link-netnsid 2
```

Docker networking. Bridge network

The same algorithm is followed every time a new container is created:

1) docker создает пространство имен;
2) создается пара интерфейсов;
3) один присоединяется к контейнеру, а второй к существующей сети.

Docker networking. User-defined bridge network

- docker network create my-net
- docker run --network my-net web-app:1.0.0
- ip link

```
12: docker0: <NO-CARRIER,BROADCAST,MULTICAST,UP> mtu 1500 qdisc noqueue state DOWN mode DEFAULT group
    link/ether 02:42:63:03:db:68 brd ff:ff:ff:ff:ff:ff
18: veth79757c4@if17: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc noqueue master docker_gwbridge
    link/ether 4a:85:6f:d4:42:cc brd ff:ff:ff:ff:ff:ff link-netnsid 1
20: br-a9953e83cb08: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc noqueue state UP mode DEFAULT gr
    link/ether 02:42:a5:59:93:5d brd ff:ff:ff:ff:ff:ff
22: vethce29812@if21: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc noqueue master br-a9953e83cb08
    link/ether d2:89:f8:cc:48:d3 brd ff:ff:ff:ff:ff:ff link-netnsid 2
```

Docker networking. User-defined bridge network

```
12: docker0: <NO-CARRIER,BROADCAST,MULTICAST,UP> mtu 1500 qdisc noqueue state DOWN mode DEFAULT group
    link/ether 02:42:63:03:db:68 brd ff:ff:ff:ff:ff:ff
18: veth79757c4@if17: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc noqueue master docker_gwbridge
    link/ether 4a:85:6f:d4:42:cc brd ff:ff:ff:ff:ff:ff link-netnsid 1
20: br-a9953e83cb08: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc noqueue state UP mode DEFAULT gr
    link/ether 02:42:a5:59:93:5d brd ff:ff:ff:ff:ff:ff
22: vethce29812@if21: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc noqueue master br-a9953e83cb08
    link/ether d2:89:f8:cc:48:d3 brd ff:ff:ff:ff:ff:ff link-netnsid 2
```

```
vitaly@vitaly-machine:~$ docker exec -ti suspicious_chebyshev ip addr
1: lo: <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue state UNKNOWN group default qlen 1000
    link/loopback 00:00:00:00:00:00 brd 00:00:00:00:00:00
    inet 127.0.0.1/8 scope host lo
       valid_lft forever preferred_lft forever
21: eth0@if22: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc noqueue state UP group default
    link/ether 02:42:ac:1a:00:02 brd ff:ff:ff:ff:ff:ff link-netnsid 0
    inet 172.26.0.2/16 brd 172.26.255.255 scope global eth0
       valid_lft forever preferred_lft forever
vitaly@vitaly-machine:~$
```

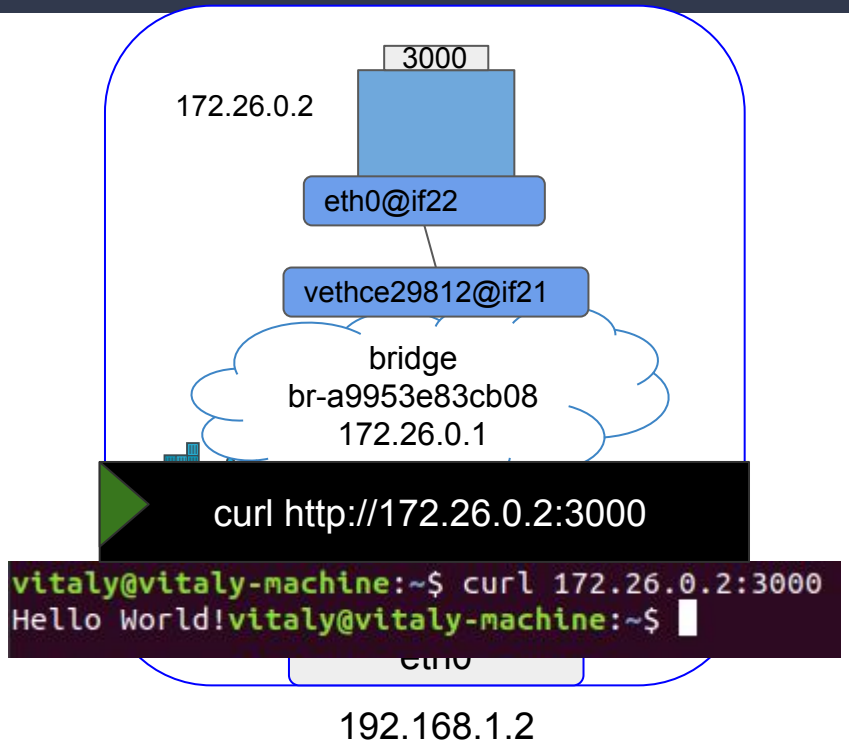
Docker networking. User-defined bridge network

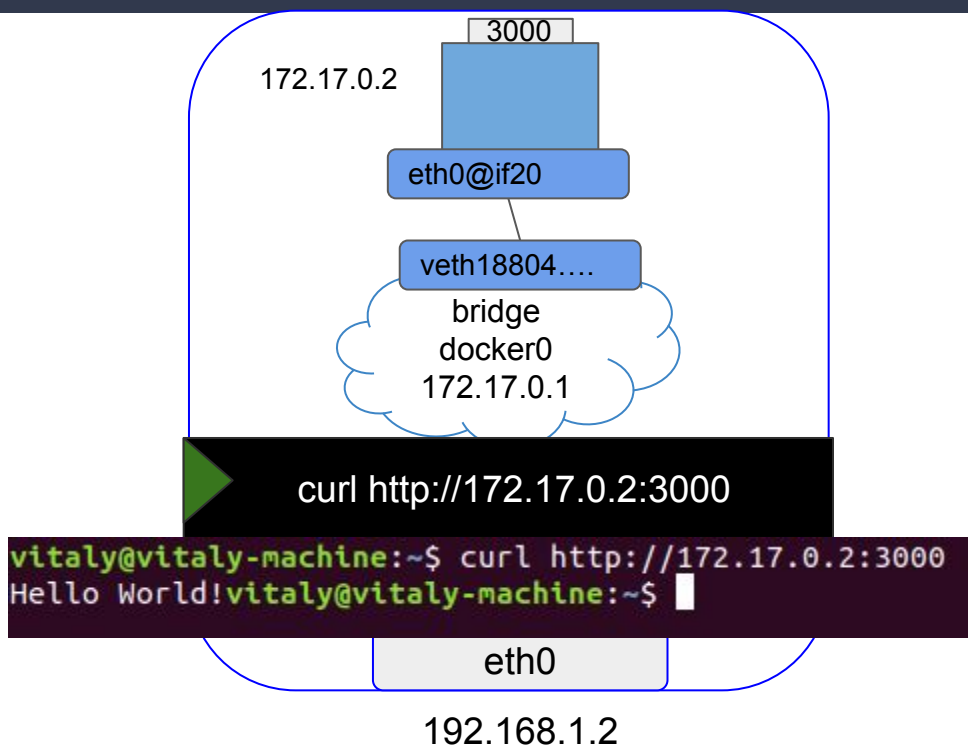
```
"IPAM": {
    "Driver": "default",
    "Options": {},
    "Config": [
        {
            "Subnet": "172.26.0.0/16",
            "Gateway": "172.26.0.1"
        }
    ]
},
```

docker network inspect my-net

```
"Containers": {
    "b492ed64f903e786cf4bb440a01e9ec8f5316e928be40e5ca10f2d9d6f433efa": {
        "Name": "suspicious_chebyshev",
        "EndpointID": "ac3e3c84cb29bd57e388276ea5aac24eaad4b004999da8bd6387ca1a33dca055",
        "MacAddress": "02:42:ac:1a:00:02",
        "IPv4Address": "172.26.0.2/16",
        "IPv6Address": ""
    }
},
```

Docker networking. Port mapping

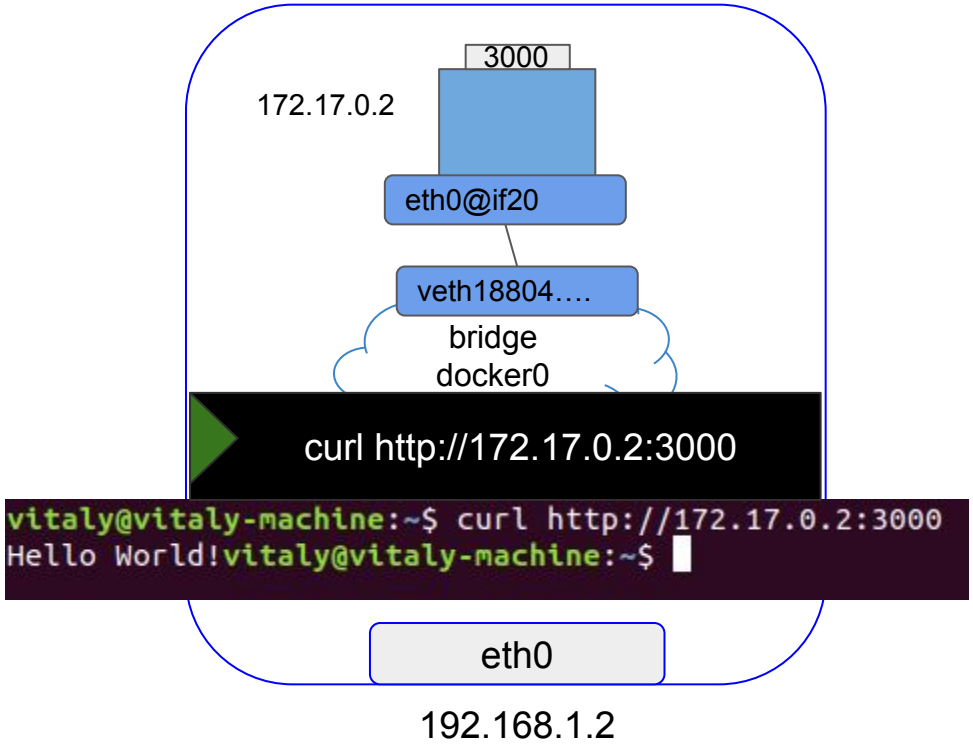




Docker networking. Port mapping

```
curl http://172.17.0.2:3000
```

curl: (7) Failed to connect...

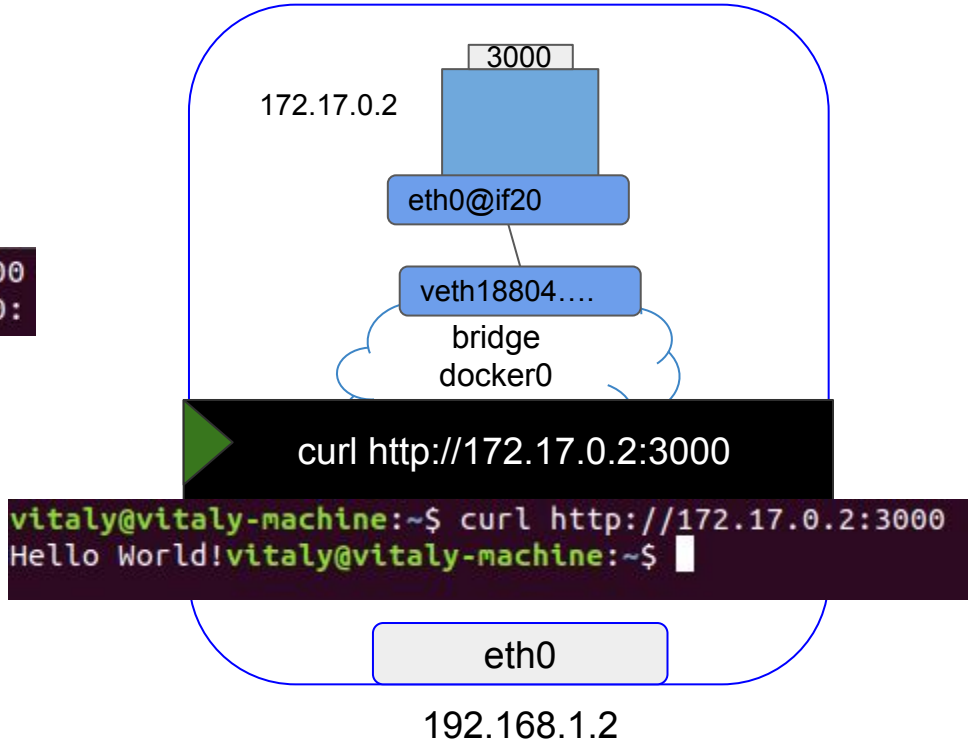


Docker networking. Port mapping

curl http://172.17.0.2:3000

curl: (7) Failed to connect...

```
vitaly@vitaly-machine:~$ curl http://0.0.0.0:3000
curl: (7) Failed to connect to 0.0.0.0 port 3000:
```

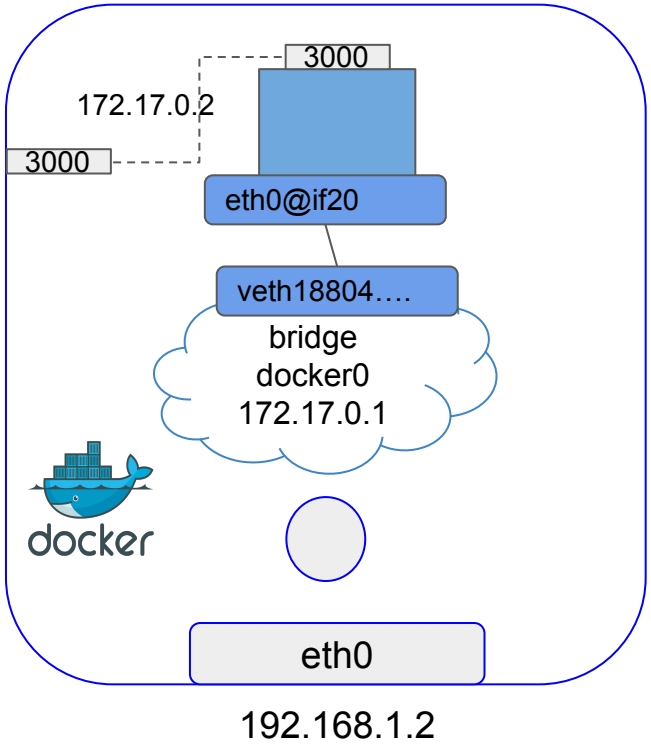


Docker networking. Port mapping

```
curl http://172.17.0.2:3000
```

```
vitaly@vitaly-machine:~$ curl 0.0.0.0:3000
Hello World!vitaly@vitaly-machine:~$
```

```
docker run -p 3000:3000 web-app:1.0.0
```



Вопросы ?

Спасибо за внимание