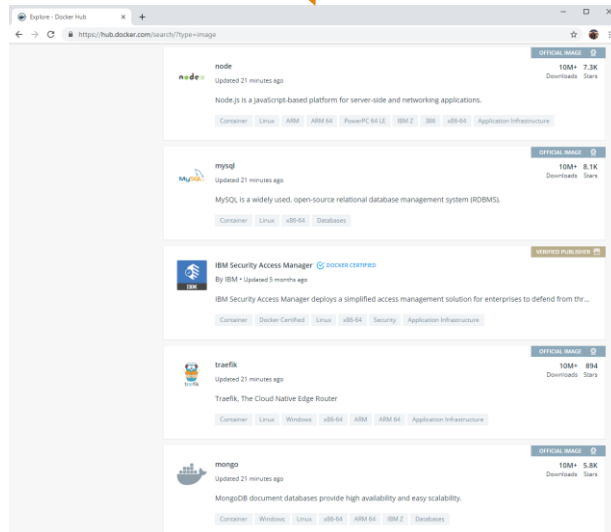
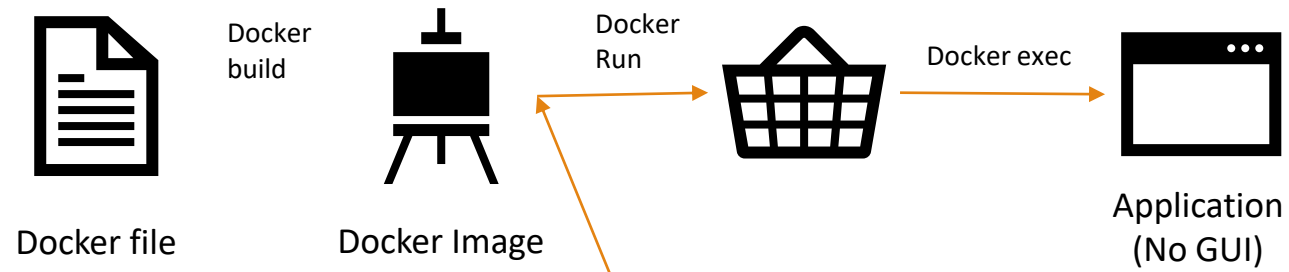


Docker Swarm For Windows

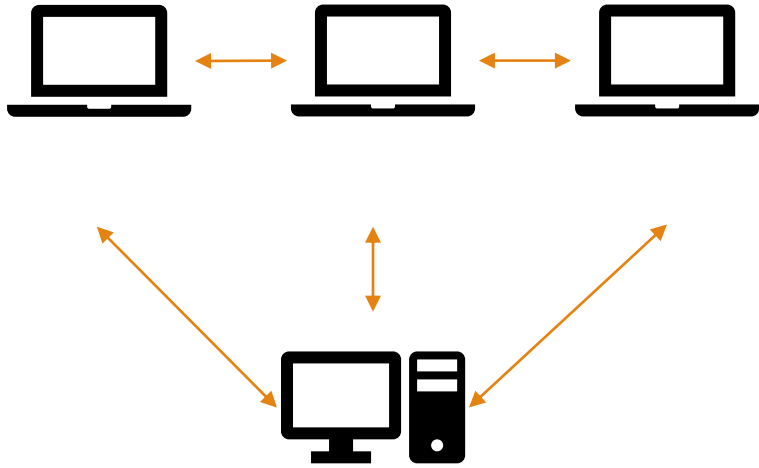
NG QI MING



How docker works



Docker Swarm



Technique to create and maintain a cluster

Manage a cluster of nodes

Docker Network Drivers

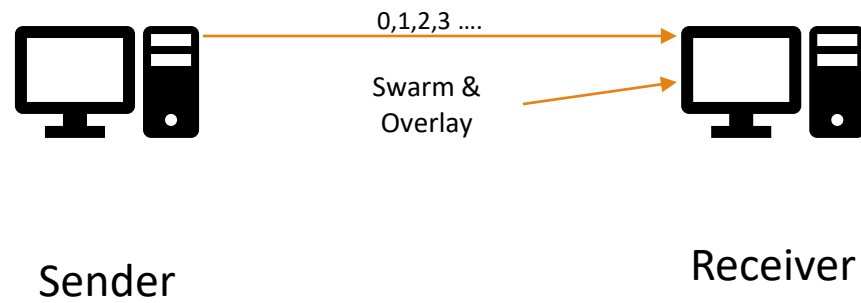


Nat Driver



- Overlay Network (TCP/UDP)
 - Transparent (physical)

Example: Sender and receiver test application (UDP)



Flow Diagram (Sender)

```
1 Obtain the base image of windows server core
2 FROM mcr.microsoft.com/windows/servercore:1607
3
4 Create a workdir
5 WORKDIR /numSender
6
7 Copy Number.exe app to work dir
8 COPY Number.exe /numSender
9
10 Copy all dll into dest
11 COPY msct128.dll /Windows/System32
12 COPY msct128.dll /Windows/System32
13 COPY Q5Core.dll /numSender
14 COPY Q5Network.dll /numSender
15 COPY msct140.dll /Windows/System32
16 COPY vcruntime140.dll /Windows/System32
17
18 COPY api-ms-win-crt-runtime-l1-1-0.dll /Windows/System32/downlevel
19 COPY api-ms-win-crt-heap-l1-1-0.dll /Windows/System32/downlevel
20 COPY api-ms-win-crt-environment-l1-1-0.dll /Windows/System32/downlevel
21 COPY api-ms-win-crt-stdio-l1-1-0.dll /Windows/System32/downlevel
22 COPY api-ms-win-crt-math-l1-1-0.dll /Windows/System32/downlevel
23 COPY api-ms-win-crt-string-l1-1-0.dll /Windows/System32/downlevel
24 COPY api-ms-win-crt-time-l1-1-0.dll /Windows/System32/downlevel
25 COPY api-ms-win-crt-convert-l1-1-0.dll /Windows/System32/downlevel
26 COPY api-ms-win-crt-filesystem-l1-1-0.dll /Windows/System32/downlevel
27 COPY api-ms-win-crt-utility-l1-1-0.dll /Windows/System32/downlevel
28
29
30 RUN Powershell.exe -Command \
31 $ErrorActionPreference = 'Stop'; \
32 $ProgressPreference = 'SilentlyContinue'; \
33 Invoke-WebRequest https://download.microsoft.com/download/9/3/9/933CF1E7-E6A4-478B-96E7-D4B285925880/vc
34
35 .\OUTFile "C:\VC_Poll11_K06.exe" \ \
```

Docker file

Build

```
C:\>docker image ls
```

REPOSITORY	TAG	IMAGE ID	CREATED	SIZE
numreceiverimage	latest	d1edb3365c52	4 hours ago	11.1GB
numsenderimage	latest	864e04358d65	4 hours ago	11.1GB
mcr.microsoft.com/windows/servercore	1607	fdb7406d4a70	3 weeks ago	11GB

```
Administrator: Command Prompt

C:\Users\Administrator>docker swarm init --advertise-addr 10.2.40.57 --listen-addr 10.2.40.57:4789
Swarm initialized: current node (j1d9wvbaau4aq2fgia13uzakv) is now a manager.
To add a worker to this swarm, run the following command:
    docker swarm join --token SWMTKN-1-3dng6e3jrr7bok1d7v7t5u4viyhzomf38qae0vxxmwdbrowo32s-b66tb8fr5t6j251qqm0fcrcfc 10.2.40.57:4789
To add a manager to this swarm, run 'docker swarm join-token manager' and follow the instructions.

C:\Users\Administrator>_
```

Transfer token to receiver

```
Administrator: Command Prompt

C:\Users\Administrator>docker network create --driver overlay myoverlay
imhwfluvrgj6nemd4s20hl9t1

C:\Users\Administrator>_
```

Network create

Continue to next slide

Flow Diagram (Sender)

From previous slide

```
Administrator: Command Prompt
C:\Users\Administrator>docker service create --name senderApp --endpoint-mode dnsrr --network myoverlay --replicas 1 -t numsender
image
image numsenderimage:latest could not be accessed on a registry to record
its digest. Each node will access numsenderimage:latest independently,
possibly leading to different nodes running different
versions of the image.

vrfn72asw4iodh50y3vtw4jfr
overall progress: 1 out of 1 tasks
1/1: running [=====>]
verify: Service converged
C:\Users\Administrator>
```

Create sender service

```
Administrator: Command Prompt
verify: Service converged
C:\Users\Administrator>docker service create --name receiverapp --endpoint-mode dnsrr --network myoverlay --replicas 1 -t numrecei
verimage
image numreceiverimage:latest could not be accessed on a registry to record
its digest. Each node will access numreceiverimage:latest independently,
possibly leading to different nodes running different
versions of the image.

xjoznu2ap2vckiut2b60rjw9r
overall progress: 1 out of 1 tasks
1/1: running [=====>]
verify: Service converged
C:\Users\Administrator>
```

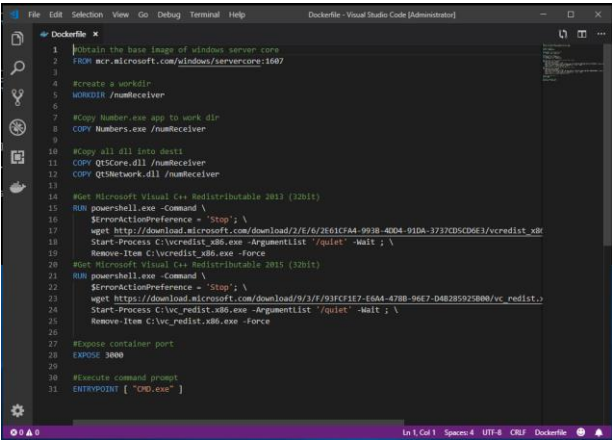
Create receiver service

```
Administrator: Command Prompt
C:\Users\Administrator>docker ps
CONTAINER ID        IMAGE               COMMAND             CREATED             STATUS              PORTS               NAMES
b9b5df30f99c       numsenderimage:late "CMD.exe"          6 minutes ago       Up 6 minutes       4000/tcp            App.1.td1718s2bz6crxnodqkztin

C:\Users\Administrator>docker exec -it b9b5df30f99c cmd.exe
```

Execute sender application

Flow Diagram (Receiver)



```
1 # Obtain the base image of windows server core
2 FROM mcr.microsoft.com/windows/servercore:1607
3
4 # Create a working directory
5 WORKDIR /numreceiver
6
7 # Copy Number.exe app to work dir
8 COPY Numbers.exe /numReceiver
9
10 # Copy all dll into dest
11 COPY QISCore.dll /numReceiver
12 COPY QISNetwork.dll /numReceiver
13
14 # Get Microsoft Visual C++ Redistributable 2015 (x64)
15 RUN powershell.exe -Command \
16     $ErrorActionPreference = "Stop"; \
17     wget http://download.microsoft.com/download/2/2F/2F61C244-8938-4E04-91DA-3727C5DC06E3/vcredist_x64.exe -OutFile vcredist_x64.exe; \
18     Start-Process C:\vcredist_x64.exe -ArgumentList "/quiet" -Wait; \
19     Remove-Item C:\vcredist_x64.exe -Force
20
21 # Get Microsoft Visual C++ Redistributable 2015 (x64)
22 RUN powershell.exe -Command \
23     $ErrorActionPreference = "Stop"; \
24     wget https://download.microsoft.com/download/9/3/9/93FC167-66A4-478B-96E7-D4B285927000/vc_redist.x64.exe -OutFile vc_redist.x64.exe; \
25     Start-Process C:\vc_redist_x64.exe -ArgumentList "/quiet" -Wait; \
26     Remove-Item C:\vc_redist_x64.exe -Force
27
28 # Expose container port
29 EXPOSE 3000
30
31 # Execute command prompt
32 ENTRYPOINT ["CMD.exe"]
```

Docker file

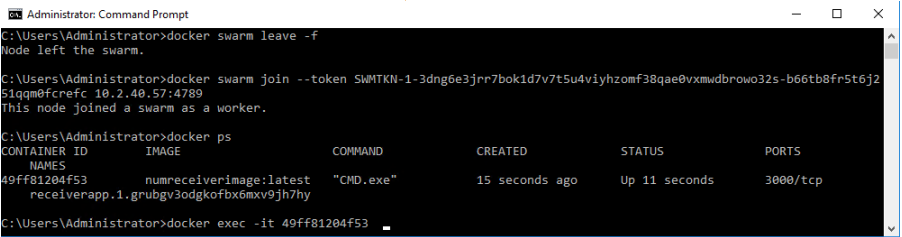
Build

```
C:\>docker image ls
```

REPOSITORY	TAG	IMAGE ID	CREATED	SIZE
numreceiverimage	latest	d1edb3365c52	4 hours ago	11.1GB
numsenderimage	latest	864e04358d65	4 hours ago	11.1GB
mcr.microsoft.com/windows/servercore	1607	fdb7406d4a70	3 weeks ago	11GB

Docker image

Token from sender



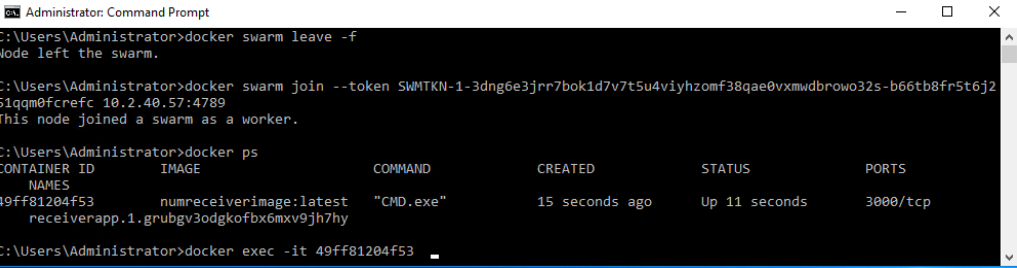
```
C:\Users\Administrator>docker swarm leave -f
Node left the swarm.

C:\Users\Administrator>docker swarm join --token SWMTKN-1-3dng6e3jrr7bok1d7v7t5u4viyhzomf38qae0vxxmudbrowo32s-b66tb8fr5t6j2
51qgm0fcrcfc 10.2.40.57:4789
This node joined a swarm as a worker.

C:\Users\Administrator>docker ps
CONTAINER ID        IMAGE               COMMAND             CREATED             STATUS              PORTS
49ff81204f53       numreceiverimage:latest "CMD.exe"          15 seconds ago     Up 11 seconds      3000/tcp
receiverapp.1.grubgv3odgk0fbx6mxv9jh7hy
```

Join swarm

After creating receiver service



```
C:\Users\Administrator>docker swarm leave -f
Node left the swarm.

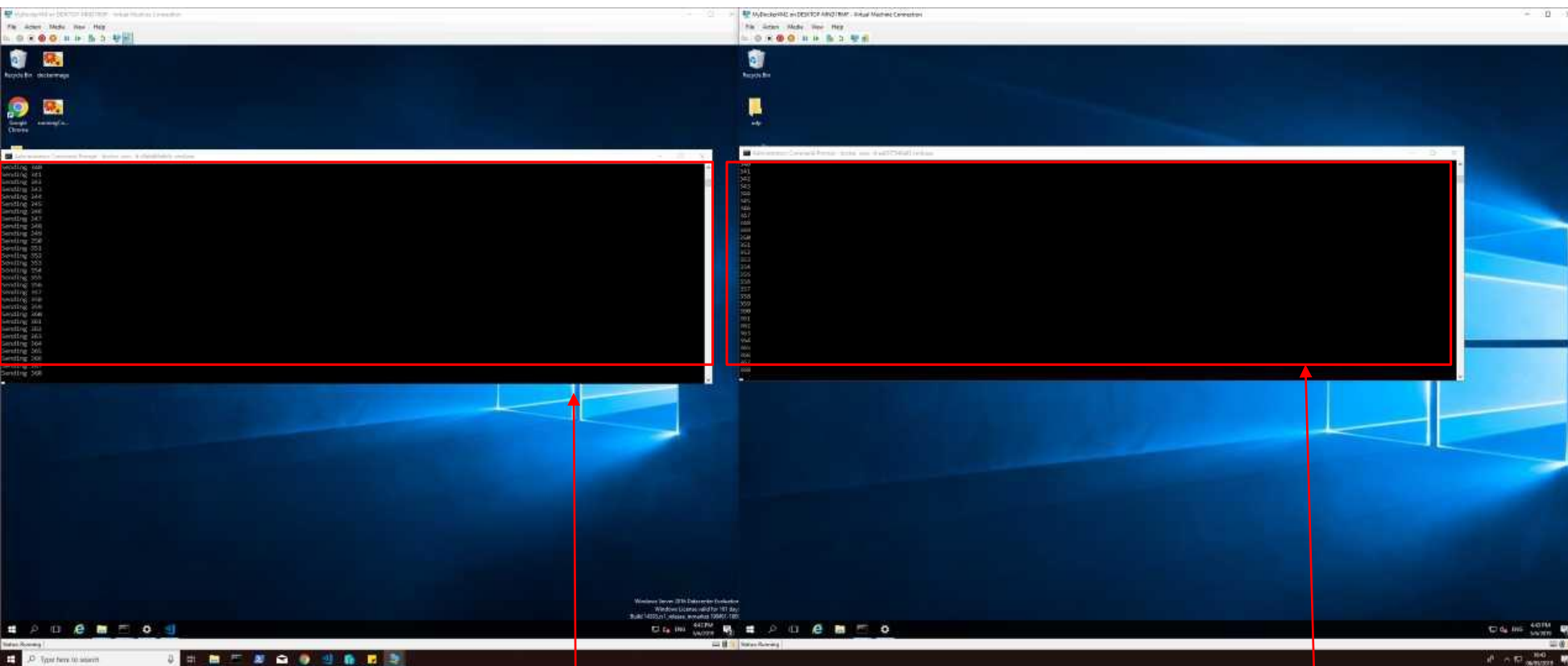
C:\Users\Administrator>docker swarm join --token SWMTKN-1-3dng6e3jrr7bok1d7v7t5u4viyhzomf38qae0vxxmudbrowo32s-b66tb8fr5t6j2
51qgm0fcrcfc 10.2.40.57:4789
This node joined a swarm as a worker.

C:\Users\Administrator>docker ps
CONTAINER ID        IMAGE               COMMAND             CREATED             STATUS              PORTS
49ff81204f53       numreceiverimage:latest "CMD.exe"          15 seconds ago     Up 11 seconds      3000/tcp
receiverapp.1.grubgv3odgk0fbx6mxv9jh7hy

C:\Users\Administrator>docker exec -it 49ff81204f53 _
```

Execute receiver application

Result



Sender

Receiver