

Create a swarm of four nodes, three managers and 1 worker.

1. Create two document-root-directories with content
2. Create a webserver of a downloaded CentOS image and upload it to the docker hub.
3. Create a swarm of three managers and one worker.
4. Create an overlay network for the swarm.
5. Create a service running webservercontainers running port 80.
Create a service running webservercontainers running port 90.

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1. Create two document-root-directories with content on a cental fileserver.

```
fileserv # echo "/www/html80 *(ro)" >> /etc/exports
fileserv # echo "/www/html90 *(ro)" >> /etc/exports
fileserv # mkdir -p /www/html80
fileserv # mkdir -p /www/html90
fileserv # echo "centweb80" > /www/html80/index.html
fileserv # echo "centweb90" > /www/html90/index.html
fileserv # exportfs -a
```

Mount the directories.

```
[root@lin70 ~]# mount fileserv:/www/html80 /www/html80
[root@lin70 ~]# mount fileserv:/www/html90 /www/html90
[root@lin71 ~]# mount fileserv:/www/html80 /www/html80
[root@lin71 ~]# mount fileserv:/www/html90 /www/html90
[root@lin72 ~]# mount fileserv:/www/html80 /www/html80
[root@lin72 ~]# mount fileserv:/www/html90 /www/html90
[root@lin73 ~]# mount fileserv:/www/html80 /www/html80
[root@lin73 ~]# mount fileserv:/www/html90 /www/html90
```

2. Create a webserver of a downloaded CentOS image and upload it to the docker hub.

```
[root@lin70 ~]# docker pull centos
Using default tag: latest
```

- Check you images on lin70.

```
[root@lin70 ~]# docker images
REPOSITORY TAG IMAGE ID CREATED SIZE
centos latest 98d35105a391 9 hours ago 192 MB
```

- Start the container. Name it centosbase.

```
[root@lin70 ~]# docker run -itd --name centosbase centos
```

- Make sure the container is running.

```
[root@lin70 ~]# docker ps -a
CONTAINER ID   IMAGE     COMMAND                  CREATED          STATUS          PORTS          NAMES
2fefdc1994c6   centos    "/bin/bash"             3 seconds ago   Up 2 seconds   centosbase
```

- Attach to the container and install httpd.

```
[root@lin70 ~]# docker attach centosbase
[root@2fefdc1994c6 /]# yum install -y httpd
```

- Leave the container.

```
<CTRL>PQ
```

- Commit container and clean up.

```
[root@lin70 ~]# docker commit -m="Added httpd to base CentOS image" \
centosbase uadmin/centweb
```

- Remove the container.

```
[root@lin70 ~]# docker rm -f centosbase
```

- Remove the original image.

```
[root@lin70 ~]# docker rmi centos
```

- List the new image

```
[root@lin70 ~]# docker images
REPOSITORY          TAG                 IMAGE ID            CREATED
SIZE
uadmin/centweb     latest             a867795f92d5       4 days ago
306 MB
```

- Log in to docker and push the image.

```
[root@lin70 ~]# docker login
Username: uadmin
Password: *****
Login Succeeded

[root@lin70 ~]# docker push uadmin/centweb
```

- Remove the centweb container.

```
[root@lin70 ~]# docker rm -f centweb
```

- Create the swarm.

```
[root@lin70 ~]# docker swarm init --advertise-addr 192.168.4.240
Swarm initialized: current node (nwauafseyb5jmk9httc84r82d) is now a
manager.
```

To add a worker to this swarm, run the following command:

```
docker swarm join \
  --token SWMTKN-1-5err6jh34bdfvdu3q3vcdsomhye8lgehn04ma8p4zbbqr6z2wt-
cs8rbx5zsdcpfiwjf90jheem0 \
  192.168.4.240:2377
```

To add a manager to this swarm, run 'docker swarm join-token manager' and follow the instructions.

```
[root@lin70 ~]# docker swarm join-token manager
```

To add a manager to this swarm, run the following command:

```
docker swarm join \
  --token SWMTKN-1-5err6jh34bdfvdu3q3vcdsomhye8lgehn04ma8p4zbbqr6z2wt-
57r497ljxwjfc54xmoi6et47i \
  192.168.4.240:2377
```

```
[root@lin71 ~]# docker swarm join \
> --token SWMTKN-1-5err6jh34bdfvdu3q3vcdsomhye8lgehn04ma8p4zbbqr6z2wt-
57r497ljxwjfc54xmoi6et47i \
> 192.168.4.240:2377
```

```
root@lin72 ~]# docker swarm join \
> --token SWMTKN-1-5err6jh34bdfvdu3q3vcdsomhye8lgehn04ma8p4zbbqr6z2wt-
57r497ljxwjfc54xmoi6et47i \
> 192.168.4.240:2377
```

This node joined a swarm as a manager.

```
[root@lin73 ~]# docker swarm join \
> --token SWMTKN-1-5err6jh34bdfvdu3q3vcdsomhye8lgehn04ma8p4zbbqr6z2wt-
cs8rbx5zsdcpfiwjf90jheem0 \
> 192.168.4.240:2377
```

This node joined a swarm as a worker.

4. Create an overlay network for the swarm.

```
[root@lin70 ~]# docker network create --driver overlay --subnet 10.0.5.0/24
webnet
3rqvijia0989n3m7gk8nh7s6x
```

5. Create a service running webservercontainers running port 80.
Create a service running webservercontainers running port 90.

```
[root@lin70 ~]# docker service create --name centweb80 --network webnet
--mount \
type=bind,source=/www/html80,target=/var/www/html --publish=80:80
uadmin/centweb \
/sbin/httpd -D FOREGROUND

[root@lin70 ~]# docker service create --name centweb90 --network webnet
--mount \
type=bind,source=/www/html90,target=/var/www/html --publish=90:80
uadmin/centweb \
/sbin/httpd -D FOREGROUND
```

- Scale the centweb80 service to 2
- Scale the centweb90 service to 4

```
[root@lin70 ~]# docker service scale centweb80=2
[root@lin70 ~]# docker service scale centweb90=4
```

- Check your containers.

```
[root@lin70 ~]# docker service ps centweb80
ID                NAME          IMAGE          NODE    DESIRED STATE
CURRENT STATE    ERROR        PORTS
jy07ek2d43d8    centweb80.1  uadmin/centweb:latest  lin70  Running
Running 6 minutes ago
mh6hg3wvfl1    centweb80.2  uadmin/centweb:latest  lin72  Running
Running 37 seconds ago

[root@lin70 ~]# docker service ps centweb90
ID                NAME          IMAGE          NODE    DESIRED STATE
CURRENT STATE    ERROR        PORTS
0m12hf861w8v    centweb90.1  uadmin/centweb:latest  lin71  Running
Running 6 minutes ago
q2y4d7shmolx    centweb90.2  uadmin/centweb:latest  lin72  Running
Running 41 seconds ago
letbghcy63v2    centweb90.3  uadmin/centweb:latest  lin73  Running
Running 40 seconds ago
mpv080o8sqk2    centweb90.4  uadmin/centweb:latest  lin70  Running
Running 41 seconds ago
```

From any browser, connect to any of the four swarmnodes to any of the two ports.