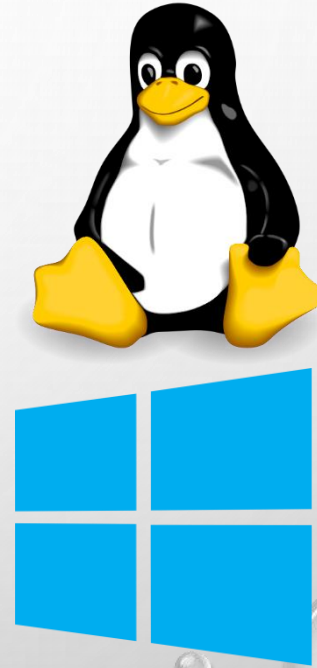
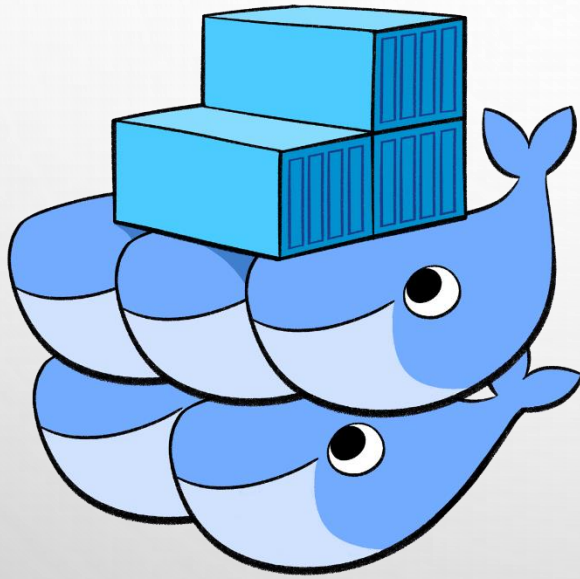


# Run hybrid (Linux & Windows) applications with Docker Swarm



Runcy Oommen

<http://runcy.me>

# TO-DO LIST

- Bring up instances of Windows Server, Ubuntu, CentOS
- Initialize swarm and join workers
- Apply appropriate labels for identification
- Setup an overlay network
- Create specific services for Windows & Linux
- Scaling up the services and node promotion
- Load balancing (\*BONUS\*)

# INSTANCES UP & RUNNING ON GCP



<input type="checkbox"/>	Name ^	Zone	Recommendation	Internal IP	External IP	Connect
<input type="checkbox"/>	✓ lb	asia-east1-a		10.140.0.6	10.140.0.6	SSH ▾
<input type="checkbox"/>	✓ manager	asia-east1-a		10.140.0.3	10.140.0.3	RDP ▾
<input type="checkbox"/>	✓ worker1	asia-east1-a		10.140.0.2	10.140.0.2	RDP ▾
<input type="checkbox"/>	✓ worker2	asia-east1-a		10.140.0.4	10.140.0.4	SSH ▾
<input type="checkbox"/>	✓ worker3	asia-east1-a		10.140.0.5	10.140.0.5	SSH ▾

# RESET WINDOWS PASSWORD FOR RDP

```
Welcome to Cloud Shell! Type "help" to get started.
```

```
runcy_oommen@meetupdemo-177413:~$ gcloud beta compute --project <project_id> reset-windows-password <instance_name> --zone <zone_name>
```

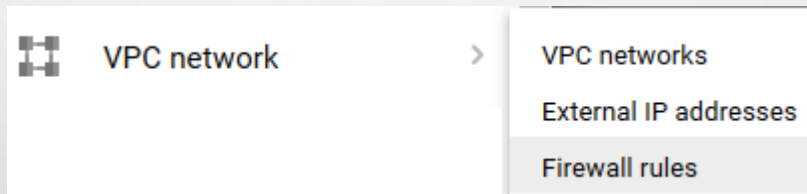
## INSTALL DOCKER (WINDOWS + LINUX)

- <https://store.docker.com/editions/enterprise/docker-ee-server-windows>
- <https://store.docker.com/editions/community/docker-ce-server-centos>
- <https://store.docker.com/editions/community/docker-ce-server-ubuntu>

# REQUIRED OPEN PORTS

- TCP port 2376 for secure Docker client communication. This port is required for Docker Machine to work. Docker Machine is used to orchestrate Docker hosts.
- TCP port 2377 . This port is used for communication between the nodes of a Docker Swarm or cluster. It only needs to be opened on manager nodes.
- TCP and UDP port 7946 for communication among nodes (container network discovery).
- UDP port 4789 for overlay network traffic (container ingress networking).

## CREATE GCP FIREWALL RULES



<input type="checkbox"/>	docker-swarm	dockerdemomeetup	Subnetworks: default	tcp:2376, tcp:2377, 3 more ▾	Allow	1000	default
<input type="checkbox"/>	docker-swarm-eg	dockerdemomeetup	Subnetworks: default	tcp:2377, udp:2377	Allow	1000	default

The background is a light gray gradient. In the top-left and bottom-right corners, there are several realistic-looking water droplets of various sizes, some overlapping. The text is centered in the middle of the slide.

That's the setup!  
**Let's make it happen...**



# INITIALIZE SWARM MANAGER

```
PS C:\dock> docker swarm init --advertise-addr 10.140.0.3 --listen-addr 10.140.0.3:2377
Swarm initialized: current node (67fxrta6pgyq2twfv0mh1fu1z) is now a manager.
```

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

```
docker swarm join \
--token SWMTKN-1-66c4swbnnd0s4kmzr2b6cguvqcr8htb4rjt2hwln19hcgx47f1-0pmwdrbva7ugbhgkqe629n873 \
10.140.0.3:2377
```

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

## JOIN WORKER NODES

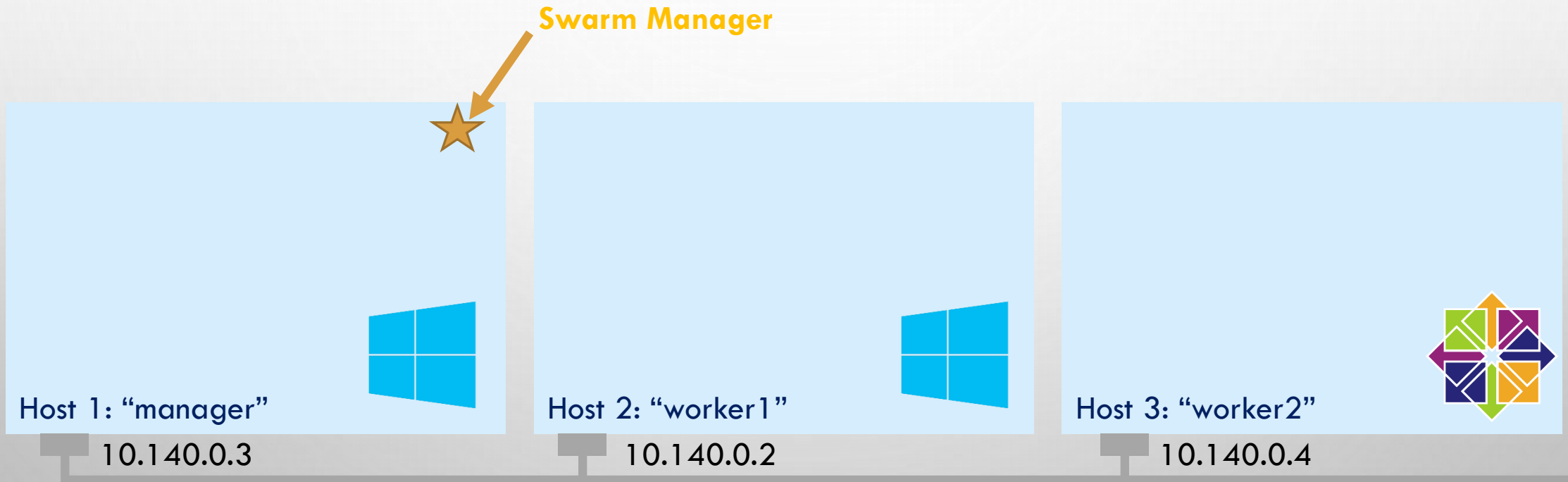
```
PS C:\Windows\system32> docker swarm join --token SWMTKN-1-66c4swbnnd0s4kmzr2b6cguvqcr8htb4rjt2hwln19hcgx47f1-0pmwdrbva7
ugbhgkqe629n873 10.140.0.3:2377
This node joined a swarm as a worker.
PS C:\Windows\system32>
```

```
[root@worker2 runcy_oommen]# docker swarm join --token SWMTKN-1-66c4swbnnd0s4kmzr2b6cguvqcr8htb4rjt2hwln19hcgx47
f1-0pmwdrbva7ugbhgkqe629n873 10.140.0.3:2377
This node joined a swarm as a worker.
[root@worker2 runcy_oommen]#
```

# CURRENT SWARM STATUS

```
PS C:\dock> docker node ls
ID
67fxrta6pgyq2twfv0mh1fu1z *
tekj5w795sdvd441s584ewxn1
vgzipunqcgaj0gql0t34dfyxn
PS C:\dock>
```

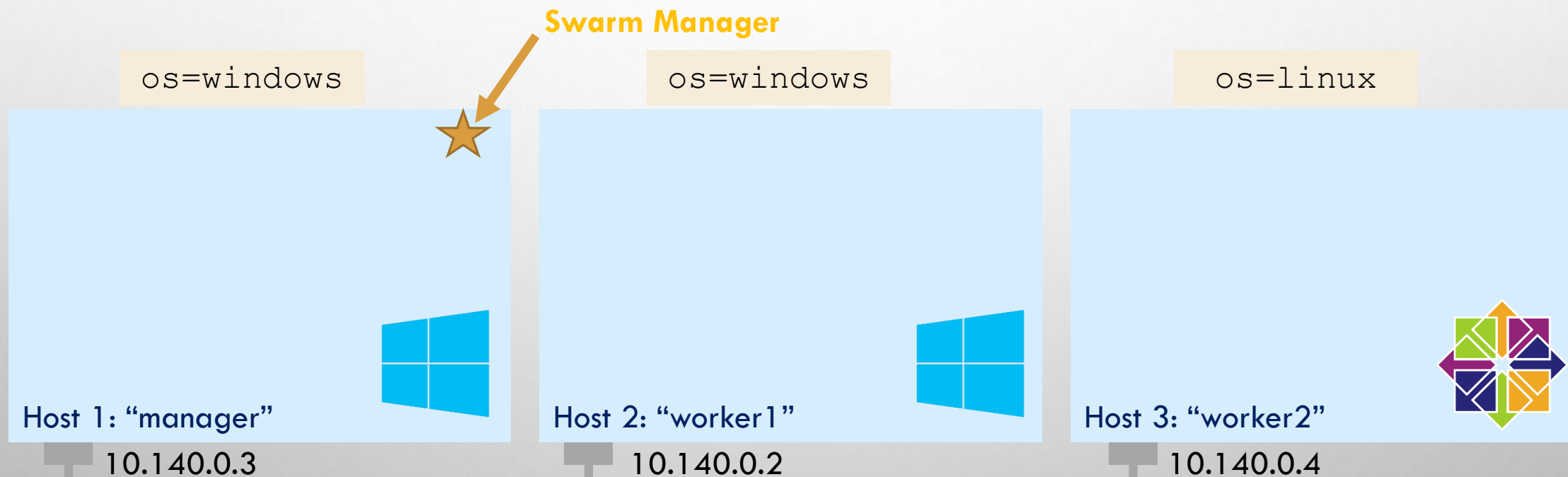
HOSTNAME	STATUS	AVAILABILITY	MANAGER STATUS
manager	Ready	Active	Leader
worker2	Ready	Active	
worker1	Ready	Active	





# LET'S LABEL 'EM

```
PS C:\dock> docker node update --label-add os=windows manager  
manager  
PS C:\dock> docker node update --label-add os=windows worker1  
worker1  
PS C:\dock> docker node update --label-add os=linux worker2  
worker2  
PS C:\dock> _
```



# VIEW LABELS

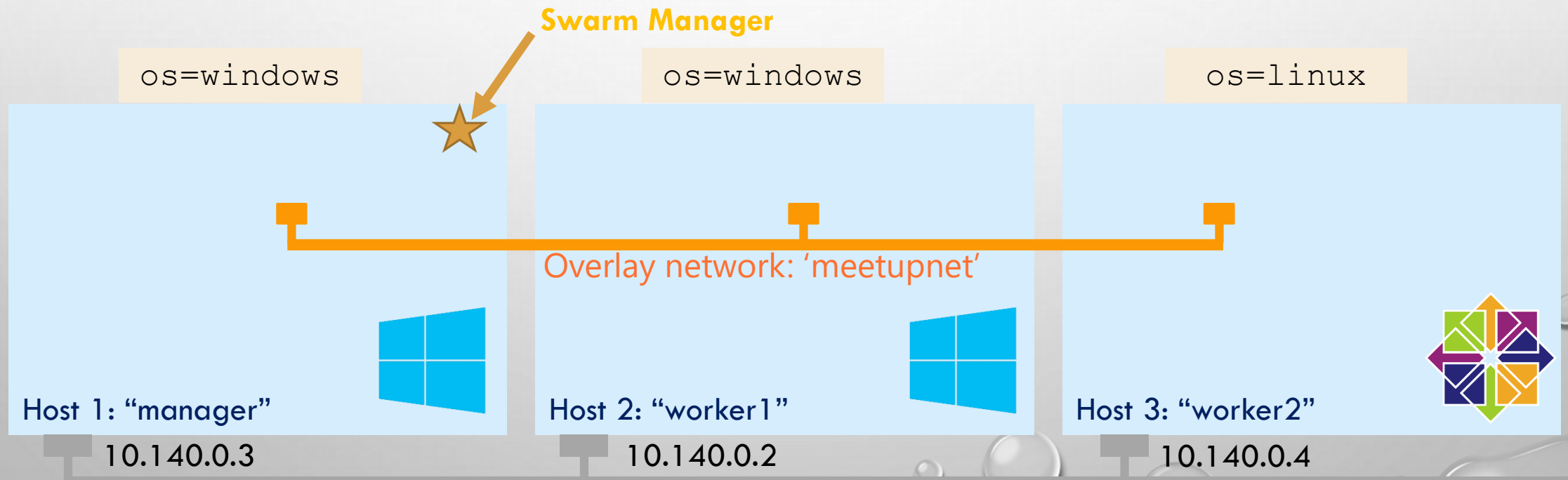
```
PS C:\dock> docker node inspect manager | findstr 'OS'
"OS": "windows"
PS C:\dock> docker node inspect worker1 | findstr 'OS'
"OS": "windows"
PS C:\dock> docker node inspect worker2 | findstr 'OS'
"OS": "linux"
PS C:\dock> _
```

# VIEW EXISTING NETWORKS

```
PS C:\dock> docker network ls
NETWORK ID          NAME                DRIVER              SCOPE
nc30mwb9z7r8       ingress            overlay            swarm
f681970f8608       nat               nat               local
d00cec06abdf       none             null              local
PS C:\dock> _
```

# CREATE APPLICATION OVERLAY NETWORK

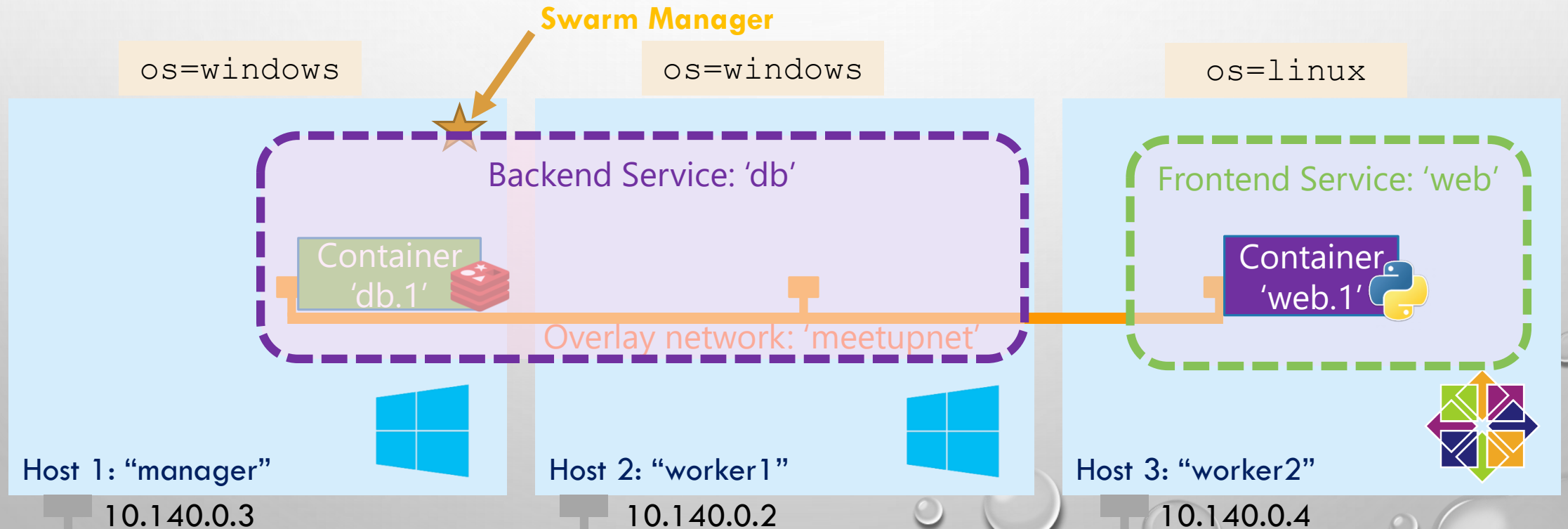
```
PS C:\dock> docker network create -d overlay meetupnet
f17cuimz7alu2zs0e03ra1lqz
PS C:\dock> docker network ls
NETWORK ID          NAME                DRIVER              SCOPE
nc30mwb9z7r8       ingress            overlay             swarm
f17cuimz7alu        meetupnet          overlay             swarm
r6819/0t8608       nat                nat                 local
d00cec06abdf       none              null                local
PS C:\dock>
```



# CREATE “DB” & “WEB” SERVICES

```
PS C:\dock> docker service create --name db --network meetupnet --constraint 'node.labels.os==windows' --endpoint-mode dnsrr redis:3.2.100-nanoserver_
```

```
PS C:\dock> docker service create --name web --network meetupnet --constraint 'node.labels.os==linux' --publish 80:80 ra  
dumatei/python-web_
```



# SCALE UP “DB”

```
PS C:\dock> docker service scale db=3
```

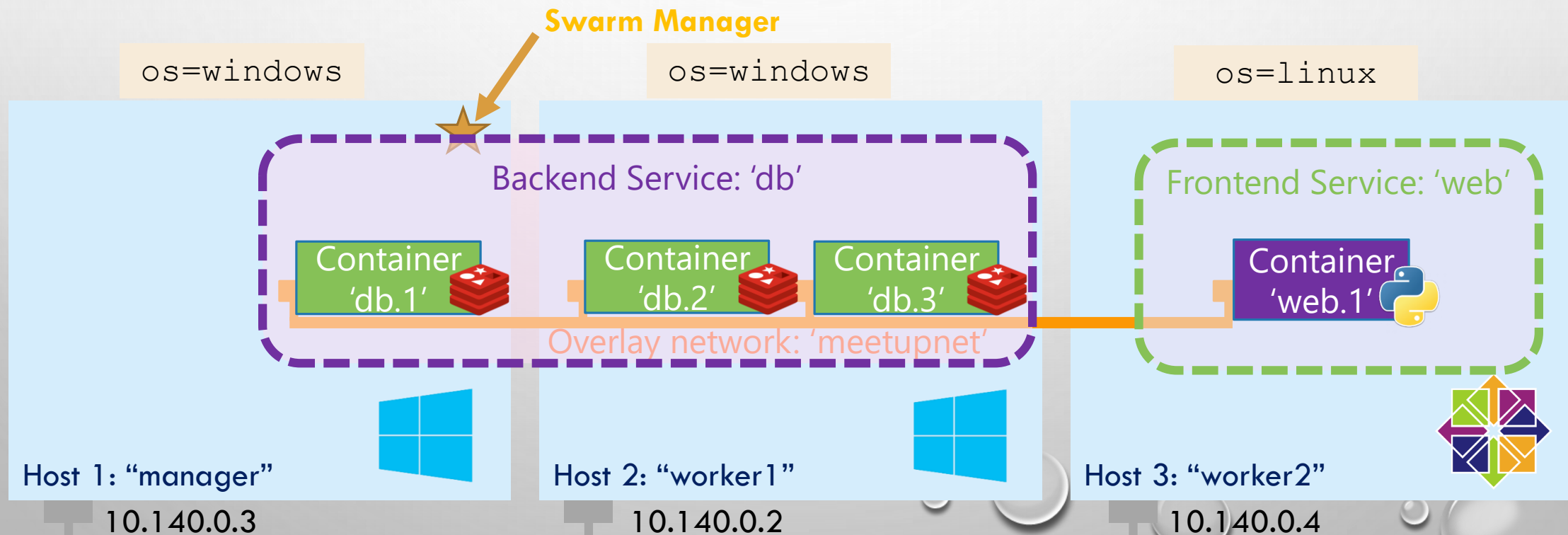
```
db scaled to 3
```

```
PS C:\dock> docker service ls
```

ID	NAME	MODE	REPLICAS	IMAGE
jtvou9mv8ome	web	replicated	1/1	radumatei/python-web:latest
mnocx24g2d8s	db	replicated	3/3	redis:3.2.100-nanoserver

```
PS C:\dock> docker service ps db
```

ID	NAME	IMAGE	NODE	DESIRED STATE	STATE	CURRENT STATE	ERROR	PORTS
wvsgoyn5j45r	db.1	redis:3.2.100-nanoserver	worker1	Running	Running	Running 19 hours ago		
q6rx6hmg7o01	db.2	redis:3.2.100-nanoserver	worker1	Running	Running	Running 4 seconds ago		
gwwpwq9vho2t	db.3	redis:3.2.100-nanoserver	manager	Running	Running	Running 4 seconds ago		



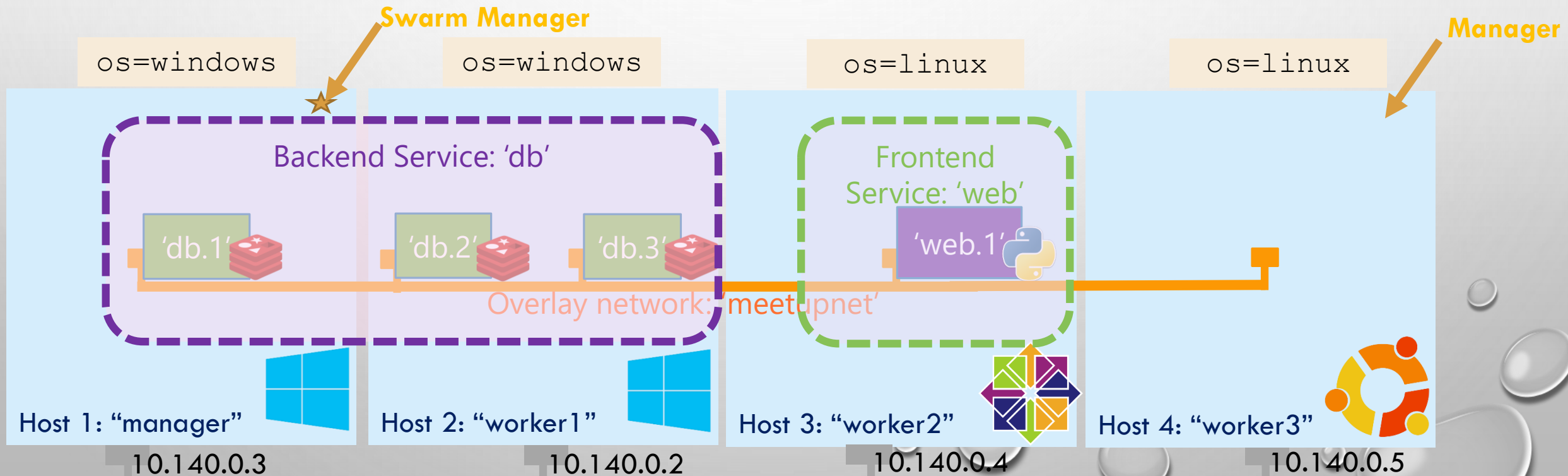


# ADD LINUX NODE & PROMOTE TO MANAGER

```
root@worker3:/home/runcy_oommen# docker swarm join --token SWMTKN-1-66ptuwyohs8fhcm9bw9w3ugc7uyr5q5p631st8g1f3lt98rpg7-5fubxwj7579244dkxp7blxfy4 10.140.0.3:2377
This node joined a swarm as a worker.
```

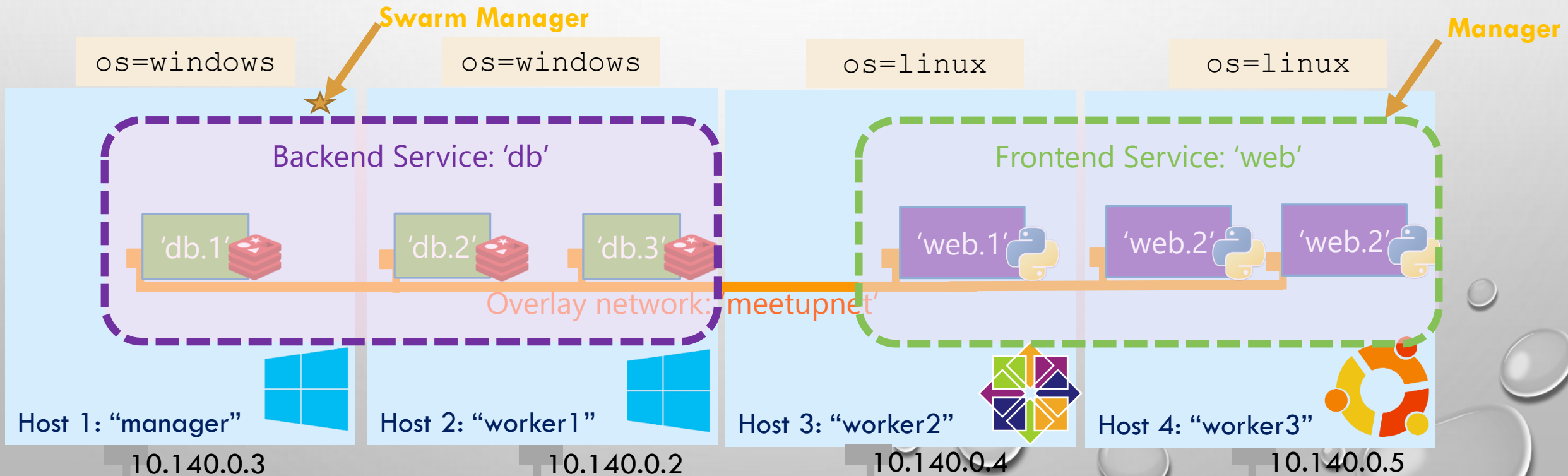
```
PS C:\dock> docker node update --label-add os=linux worker3
worker3
PS C:\dock> docker node promote worker3
Node worker3 promoted to a manager in the swarm.
PS C:\dock> docker node ls
```

ID	HOSTNAME	STATUS	AVAILABILITY	MANAGER STATUS
gph5x1yk6ytttzzj0q0or7ats	worker3	Ready	Active	<u>Reachable</u>
q993on61py44gi2cd3x4hpatm	worker1	Ready	Active	
qsu7q32lwzo4pd9vjh5sdfq1y	worker2	Ready	Active	
todk1f9csjqb61p3mey2i0mr5 *	manager	Ready	Active	Leader





# SCALE UP “WEB”

```
PS C:\dock> docker service scale web=3
web scaled to 3
PS C:\dock> docker service ls
ID                NAME  MODE      REPLICAS  IMAGE
jtvou9mv8ome     web   replicated 1/3       radumate/python-web:latest
mnocx24q2d8s     db    replicated 3/3       redis:3.2.100-nanoserver
PS C:\dock> docker service ps web
ID                NAME  IMAGE                                NODE    DESIRED STATE  CURRENT STATE      ERROR  PORTS
ei4freszsos6     web.1 radumate/python-web:latest          worker2 Running        Running 21 hours ago
rsunlxf8dv0v     web.2 radumate/python-web:latest          worker3 Running        Running 40 seconds ago
uc34ouzghdbx     web.3 radumate/python-web:latest          worker3 Running        Running 41 seconds ago
```





# ACCESS THE APPLICATION

  10.140.0.5

---

**Hello World!**



**Hostname:** a52ac66fc164  
**Visits:** *cannot connect to Redis, counter disabled*

  10.140.0.5

---

**Hello World!**

**Hostname:** 3d6485bfb7e5  
**Visits:** *cannot connect to Redis, counter disabled*

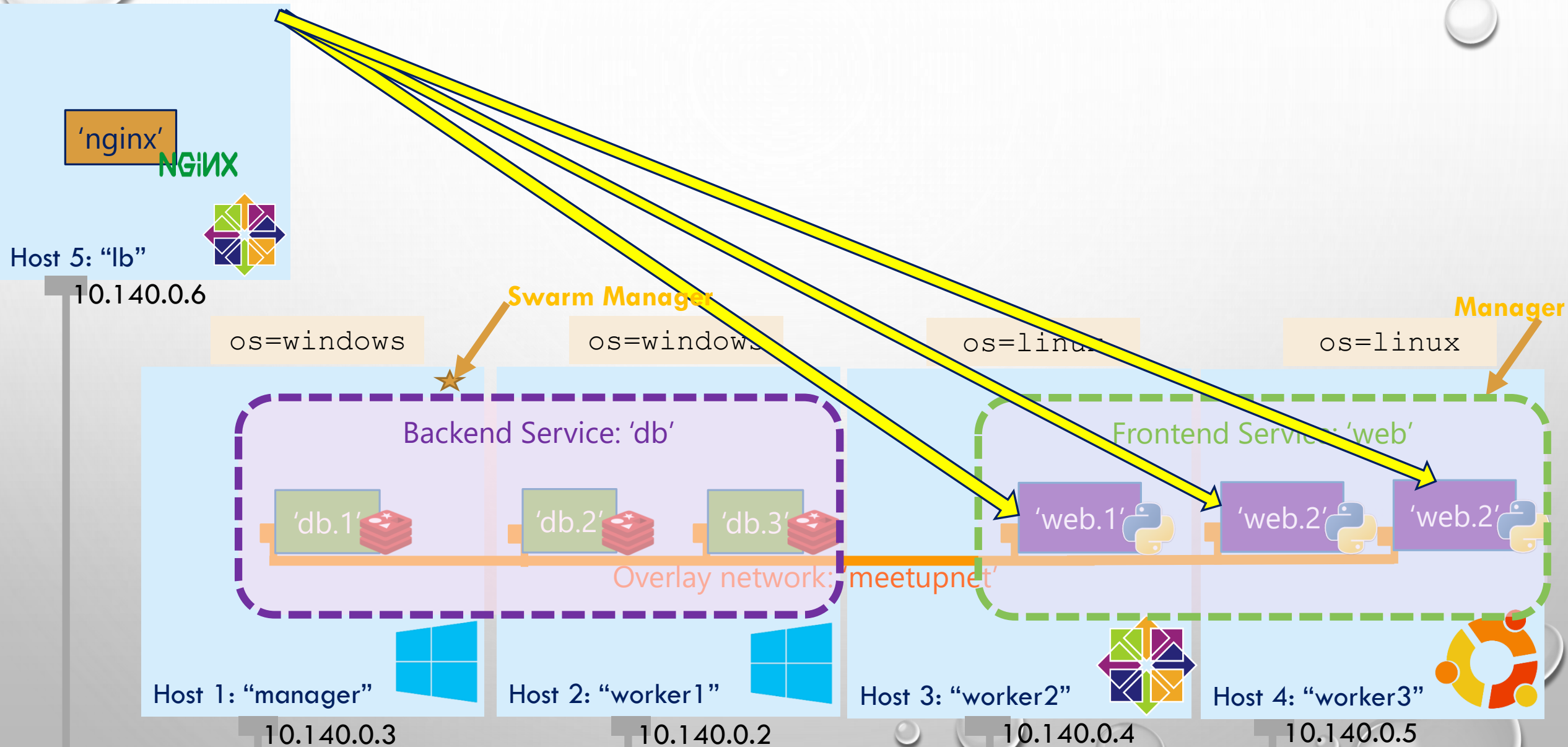
  10.140.0.4

---

**Hello World!**

**Hostname:** c26d9354f5b2  
**Visits:** *cannot connect to Redis, counter disabled*

# WE NEED A SINGLE URL!



# SETUP NGINX.CONF

```
PS C:\dock> docker service ps web
```

ID	NAME	IMAGE	NODE	DESIRED STATE	CURRENT STATE	ERROR	PORTS
ei4freszsos6	web.1	radumatei/python-web:latest	worker2	Running	Running 28 hours ago		
rsunlxf8dv0v	web.2	radumatei/python-web:latest	worker3	Running	Running 7 hours ago		
uc34ouzghdbx	web.3	radumatei/python-web:latest	worker3	Running	Running 7 hours ago		

```
[root@lb runcy_oommen]# cat nginx.conf

worker_processes 1;

events {
    worker_connections 1024;
}

http {
    include mime.types;
    default_type application/octet-stream;

    sendfile on;

    keepalive_timeout 65;

    server {
        listen 80;
        server_name localhost;

        location / {
            proxy_pass http://appcluster;
        }

    }

    upstream appcluster {
        server 10.140.0.4:80;
        server 10.140.0.5:80;
        server 10.140.0.5:80;
    }
}
```



# CREATE CUSTOM NGINX IMAGE

```
[root@lb runcy_oommen]# cat Dockerfile
FROM nginx
```

```
COPY nginx.conf /etc/nginx/nginx.conf
```

```
[root@lb runcy_oommen]# docker build . -t nginx:meetupdemo
Sending build context to Docker daemon 8.192kB
```

```
Step 1/2 : FROM nginx
```

```
---> b8efb18f159b
```

```
Step 2/2 : COPY nginx.conf /etc/nginx/nginx.conf
```

```
---> Using cache
```

```
---> 9e6bd2eb77c5
```

```
Successfully built 9e6bd2eb77c5
```

```
Successfully tagged nginx:meetupdemo
```

```
[root@lb runcy_oommen]# docker images
```

REPOSITORY	TAG	IMAGE ID	CREATED	SIZE
nginx	meetupdemo	9e6bd2eb77c5	About an hour ago	107MB
nginx	latest	b8efb18f159b	4 weeks ago	107MB

# RUN & VIEW THE APPLICATION

```
[root@1b runcy_oommen]# docker run -p 80:80 -d nginx:meetupdemo  
12bc40b8345c6c135b6e2da342744978b1a9d231f357b1543e2cec39cb720620
```

```
[root@1b runcy_oommen]# docker ps
```

CONTAINER ID	IMAGE	COMMAND	CREATED	STATUS	PORTS	NAMES
12bc40b8345c	nginx:meetupdemo	"nginx -g 'daemon ...'"	3 seconds ago	Up 2 seconds	0.0.0.0:80->80/tcp	keen_darwin

← ⓘ 10.140.0.6

**Hello World!**

**Hostname:** c26d9354f5b2

**Visits:** *cannot connect to Redis, counter disabled*

← ⓘ 10.140.0.6

**Hello World!**

**Hostname:** a52ac66fc164

**Visits:** *cannot connect to Redis, counter disabled*

← ⓘ 10.140.0.6

**Hello World!**

**Hostname:** 3d6485bf7e5

**Visits:** *cannot connect to Redis, counter disabled*



THANK YOU!

Command Reference:

<https://gist.github.com/roommen/1cb4e04ab42721b9c61f9f154196744b>

GitHub Repo:

[https://github.com/roommen/meetup/tree/master/Hybrid\\_DockerSwarm](https://github.com/roommen/meetup/tree/master/Hybrid_DockerSwarm)

