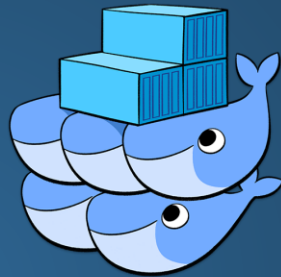


IMPLEMENTACIÓN DE  
**DOCKER SWARM**  
EN



**AMAZON WEB SERVICES**  
USANDO  
AUTO SCALING GROUPS  
Y  
ELASTIC LOAD BALANCING

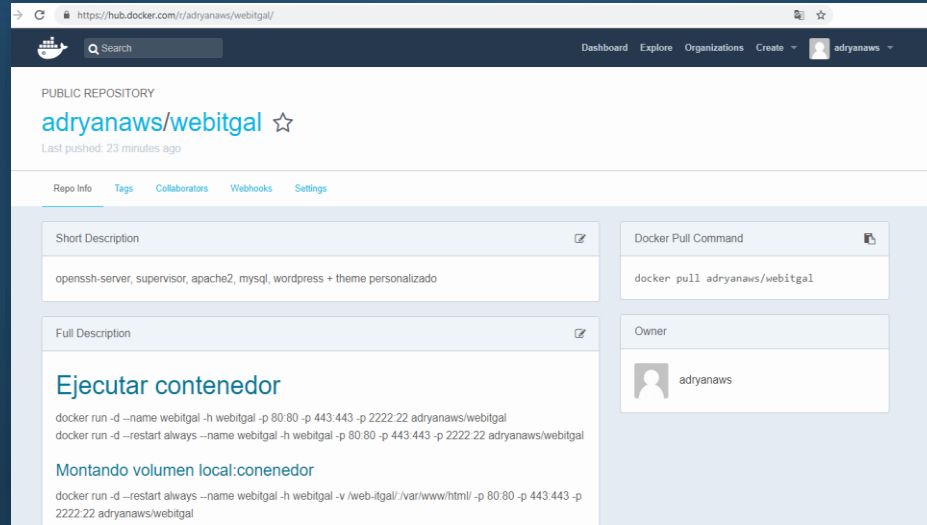
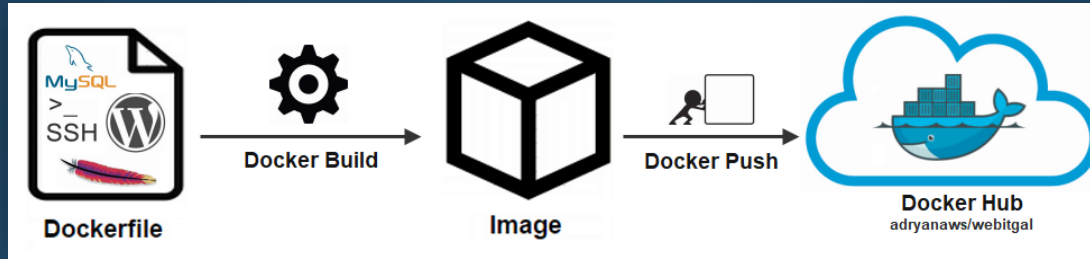
**Adrián Gómez Lois**

Administración de Sistemas Informáticos y Redes  
CIFP A Carballeira - Marcos Valcárcel  
Noviembre - 2018

# Creando un Dockerfile

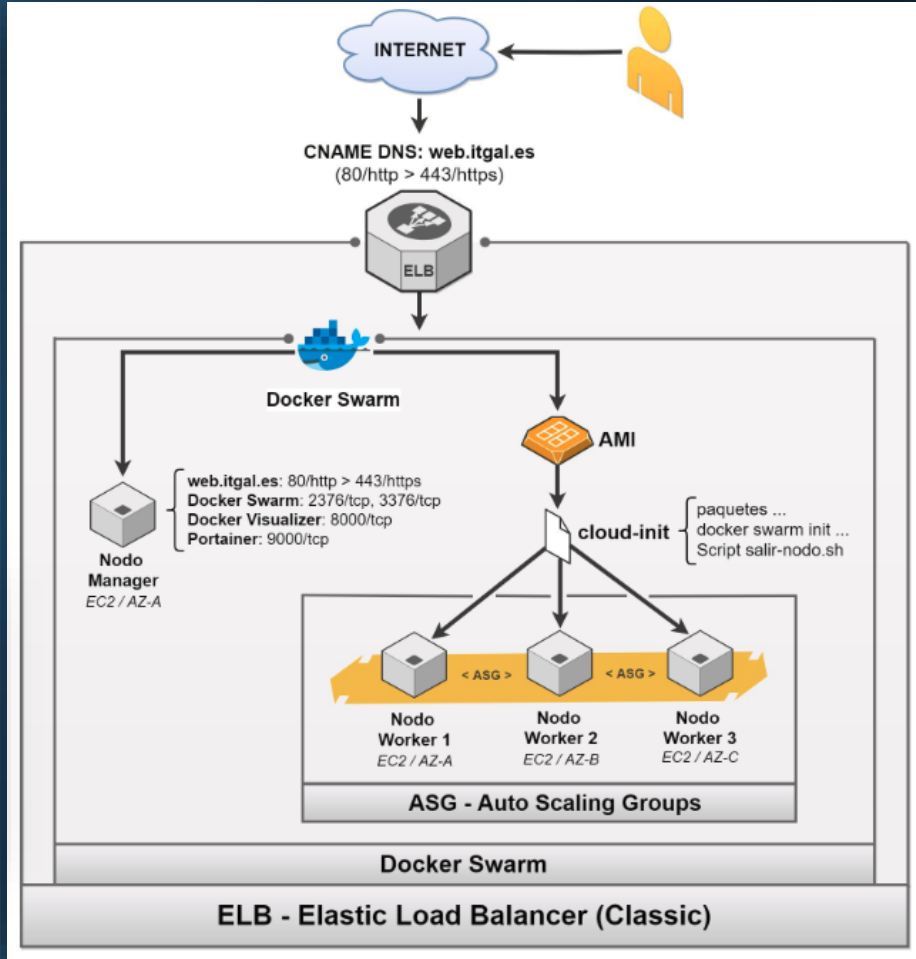
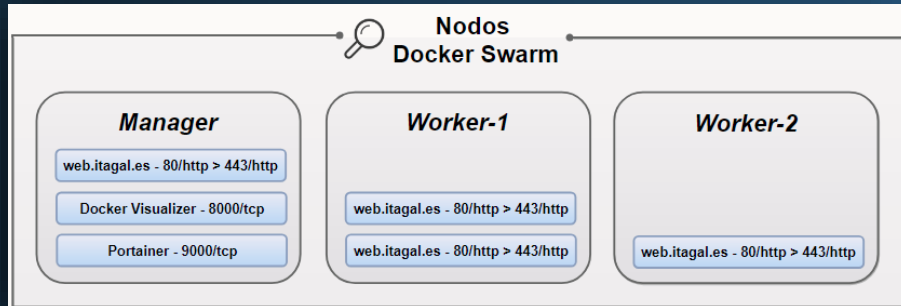
- Imagen limpia de Debian.
- Instalará los paquetes: net-tools, curl, mysql, apache2, php y otros paquetes necesarios relacionados: wget, nano, curl, openssh-server y supervisor.
- Creará una BBDD Wordpress con usuario y password y le otorgará permisos.
- Copiará un contenido de una instalación previamente configurada con un theme personalizado y adaptado de Wordpress, asignará el propietario www-data al directorio.
- Creará un directorio en el contenedor y copiará en él los certificados SSL para el dominio de la web. (Del dominio "itgal.es" adquirido a través del registrar (registrador) 1&1).
- Copiará dos ficheros Virtualhost previamente configurados al servidor Apache2 del contenedor y habilitará los módulos utilizados y necesarios para Apache2.
- Creará y configurará un usuario para para la conexión SSH al contenedor.
- Establecerá un banner motd personalizado.
- Expondrá públicamente los puertos para SSH/22, HTTP/80 y HTTPS/443.
- Establecerá como entrypoint (CMD) del contenedor la ejecución de supervisord.

# Subir imagen a Docker Hub



# Diagrama AWS:

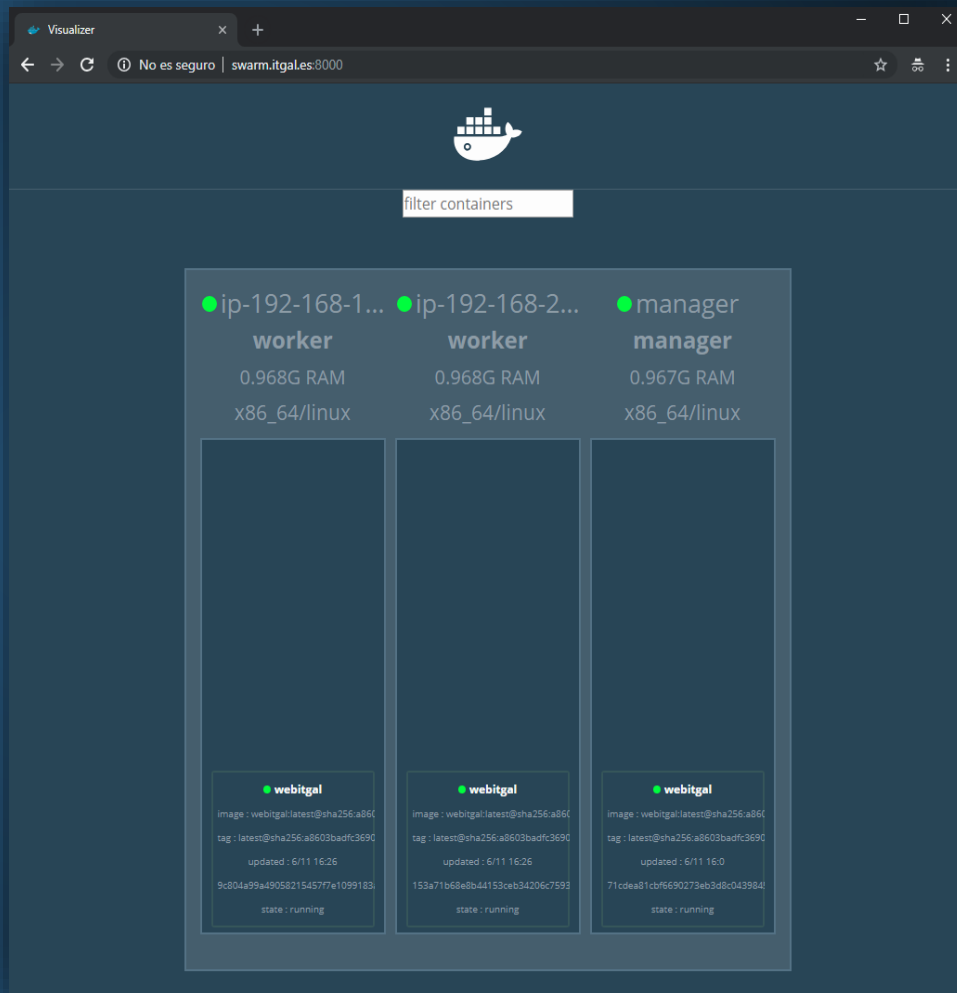
## Docker Swarm, Auto Scaling Group, Elastic Load Balancer



# Docker Swarm:

Crear el servicio con tres tareas de réplica en tres nodos desplegados con ASG

```
root@manager:~# docker service create \
> --name webitgal \
> --publish 80:80 \
> --publish 443:443 \
> --replicas 3 \
> --update-parallelism 1 \
> --update-delay 5s \
> --restart-condition on-failure \
> adryanaws/webitgal
8eoqdtcmx20mne3iepo2074px
overall progress: 3 out of 3 tasks
1/3: running [=====>]
2/3: running [=====>]
3/3: running [=====>]
verify: Service converged
```



# Elastic Load Balancer:

Balanceador de carga entre instancias EC2 gestionadas por ASG e instancia fija correspondiente al nodo manager.

The screenshot shows the AWS Management Console interface for an Elastic Load Balancer. The left sidebar contains navigation links for various AWS services. The main content area displays the configuration for the 'webitgal-elb' load balancer. The 'Instances' tab is selected, showing a table of instances. Below the table, there is a section for 'Edit Availability Zones'.

Instance ID	Name	Availability Zone	Status
i-03eb1d9f7026152b8	manager	us-east-2a	InService
i-099cfa1f37b387fd9	worker-asg	us-east-2a	InService
i-091d9052f05d11941	worker-asg	us-east-2c	InService
i-0e75f06d199d19785	worker-asg	us-east-2b	InService

Availability Zone	Subnet ID	Subnet CIDR	Instance Count	Healthy?
us-east-2a	subnet-0b19817cd7df19036	192.168.10.0/24	2	Yes
us-east-2b	subnet-0911a6029b2cfd1f	192.168.20.0/24	1	Yes
us-east-2c	subnet-0c9951c8e9731abb	192.168.30.0/24	1	Yes

Crear un registro CNAME en la configuración DNS que apunte al DNS Name del ELB

The screenshot shows the 'Basic Configuration' section of the Elastic Load Balancer configuration. The 'Name' field is set to 'webitgal-elb'. The 'DNS name' field is highlighted with a red arrow and contains the text 'webitgal-elb-1790521091.us-east-2.elb.amazonaws.com (A Record)'.

Load balancer: webitgal-elb

Description Instances Health Check Listeners Monitoring Tags Migration

Basic Configuration

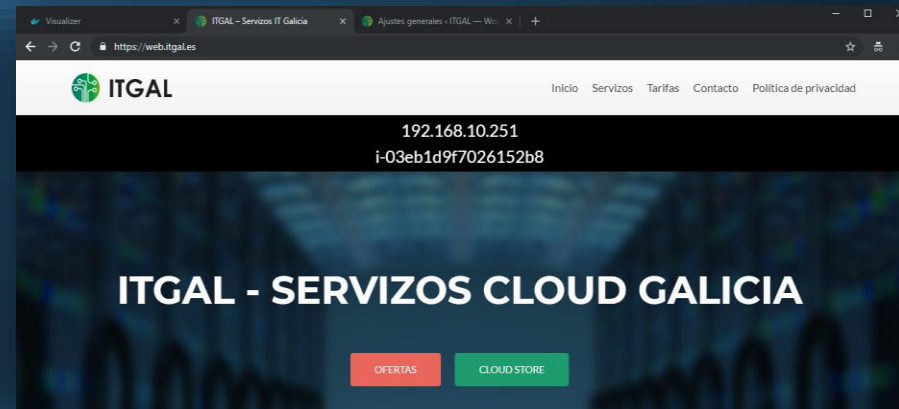
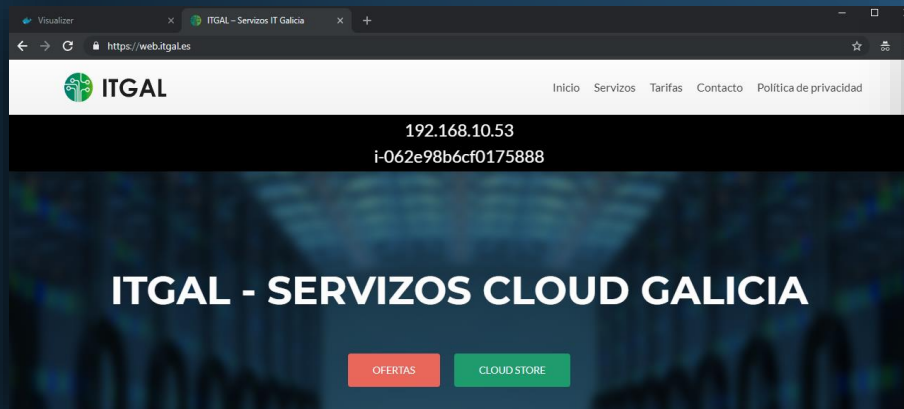
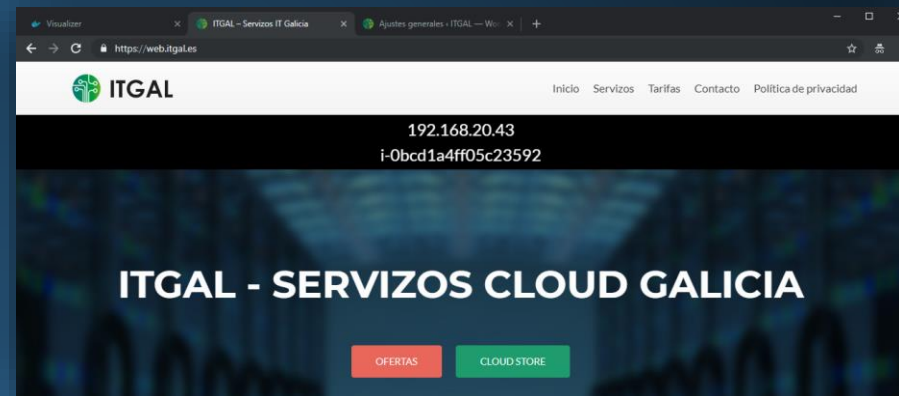
Name: webitgal-elb

\* DNS name: webitgal-elb-1790521091.us-east-2.elb.amazonaws.com (A Record)

# Elastic Load Balancer:

Balanceo de carga entre instancias EC2 (nodos Swarm). Para el servicio replicado "webital"

```
<div style="background-color:black;color:white;font-size:1.5em;text-align:center;padding:5px;width:100%">
<?php echo
file_get_contents("http://169.254.169.254/latest/meta-data/local-ipv4"); ?>
<br />
<?php echo
file_get_contents("http://169.254.169.254/latest/meta-data/instance-id"); ?>
</div>
```

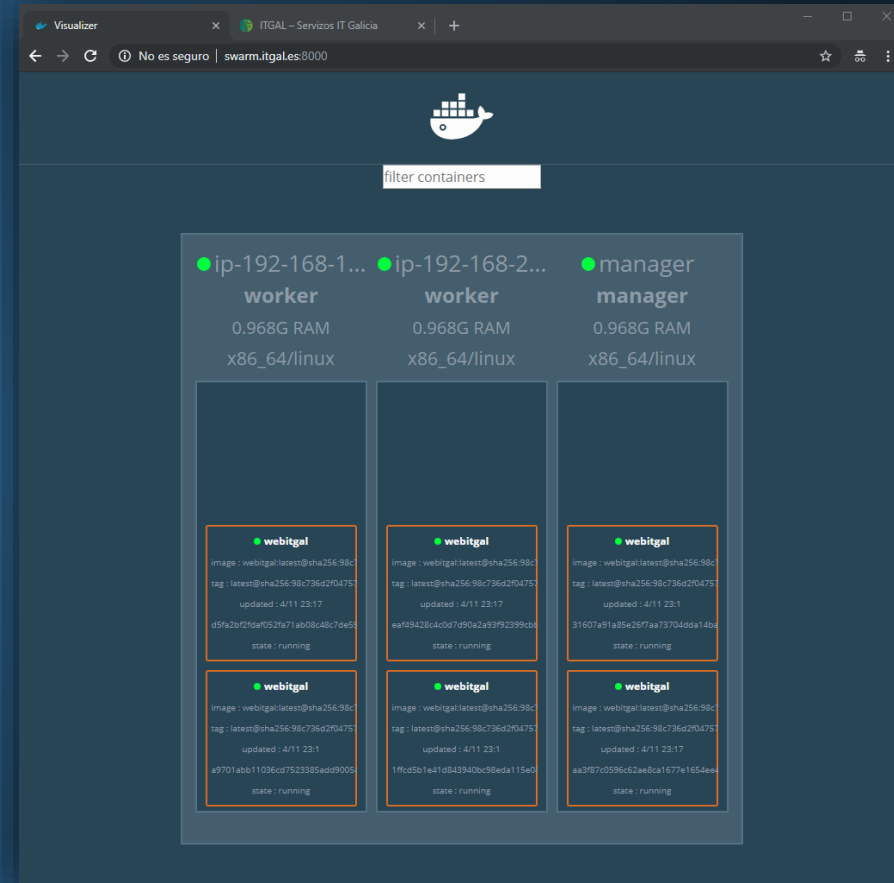




# Docker Swarm:

## Actualizar el servicio con tres tareas de réplica

```
root@manager:~# docker service update --replicas=6 webitgal
webitgal
overall progress: 6 out of 6 tasks
1/6: running [=====>]
2/6: running [=====>]
3/6: running [=====>]
4/6: running [=====>]
5/6: running [=====>]
6/6: running [=====>]
verify: Service converged
```





# Auto Scaling Group

Scale-out en una instancia que se agregará al nodo Swarm

The image shows the AWS Auto Scaling console. On the left, a list of Auto Scaling Groups is visible, with 'webitgal-asg' selected. A red arrow points to its 'Desired Capacity' of 2. The main panel displays the 'Edit details - webitgal-asg' dialog. In this dialog, the 'Launch Configuration' is set to 'webitgal-launch-asg'. The 'Desired Capacity' is set to 3, with a red arrow pointing to the input field. The 'Min' capacity is 0 and the 'Max' capacity is 6. The 'Availability Zone(s)' are set to 'us-east-2a', 'us-east-2b', and 'us-east-2c'. The 'Subnet(s)' are set to 'subnet-0b19817cd7df19036(192.168.10.0/24) | webitgal-subnet-a | us-east-2a', 'subnet-0c9951cf8e9731abb(192.168.30.0/24) | webitgal-subnet-c | us-east-2c', and 'subnet-0911a6029b2cdd1ff(192.168.20.0/24) | webitgal-subnet-b | us-east-2b'. The 'Classic Load Balancers' are set to 'webitgal-elb'. The 'Health Check Type' is 'EC2'. The 'Health Check Grace Period' is 100. The 'Instance Protection' is off. The 'Termination Policies' are set to 'Default'. The 'Launch Instances Using' radio buttons are set to 'Launch Configuration'.

**Edit details - webitgal-asg**

Launch Instances Using *i* ☐ Launch Template ☒ Launch Configuration

Launch Configuration *i* webitgal-launch-asg

Desired Capacity *i* 3 *←*

Min *i* 0

Max *i* 6

Availability Zone(s) *i* us-east-2a x us-east-2b x us-east-2c x

Subnet(s) *i* subnet-0b19817cd7df19036(192.168.10.0/24) | webitgal-subnet-a | us-east-2a x subnet-0c9951cf8e9731abb(192.168.30.0/24) | webitgal-subnet-c | us-east-2c x subnet-0911a6029b2cdd1ff(192.168.20.0/24) | webitgal-subnet-b | us-east-2b x

Classic Load Balancers *i* webitgal-elb x

Target Groups *i*

Health Check Type *i* EC2

Health Check Grace Period *i* 100

Instance Protection *i*

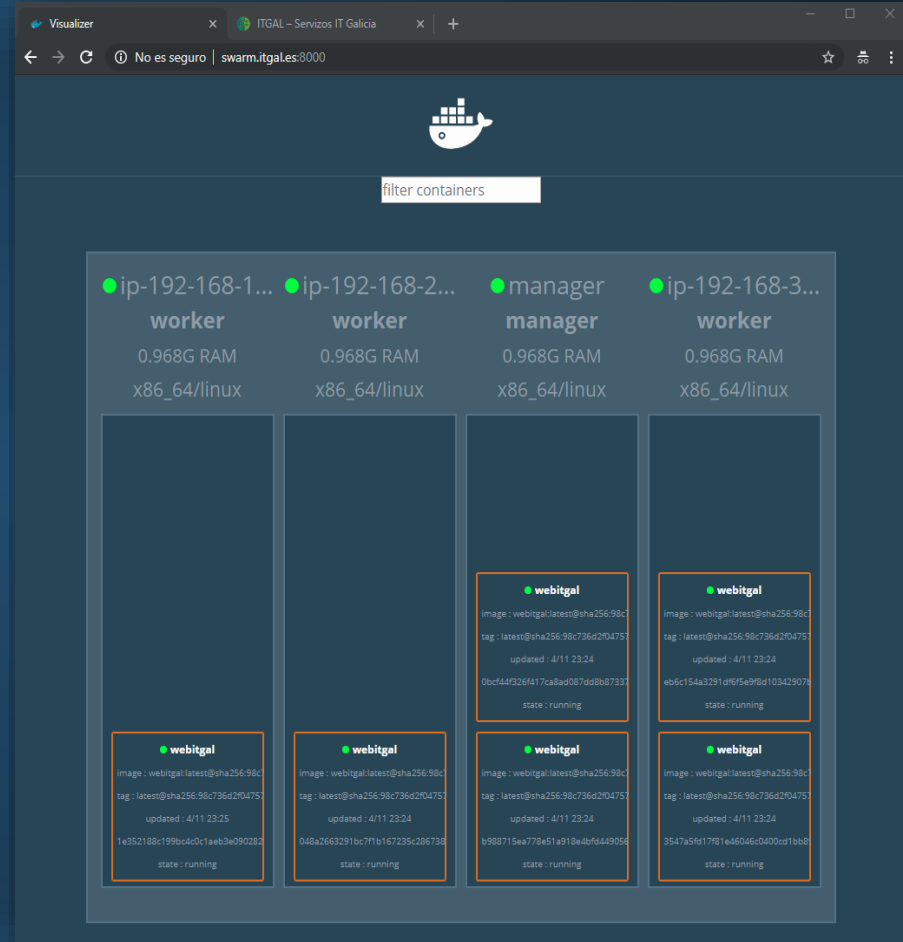
Termination Policies *i* Default x

Cancel Save

# Docker Swarm:

Actualización de servicio con las mismas tareas de réplicas anteriores, creando así el rebalanceo de carga entre los nodos del Swarm

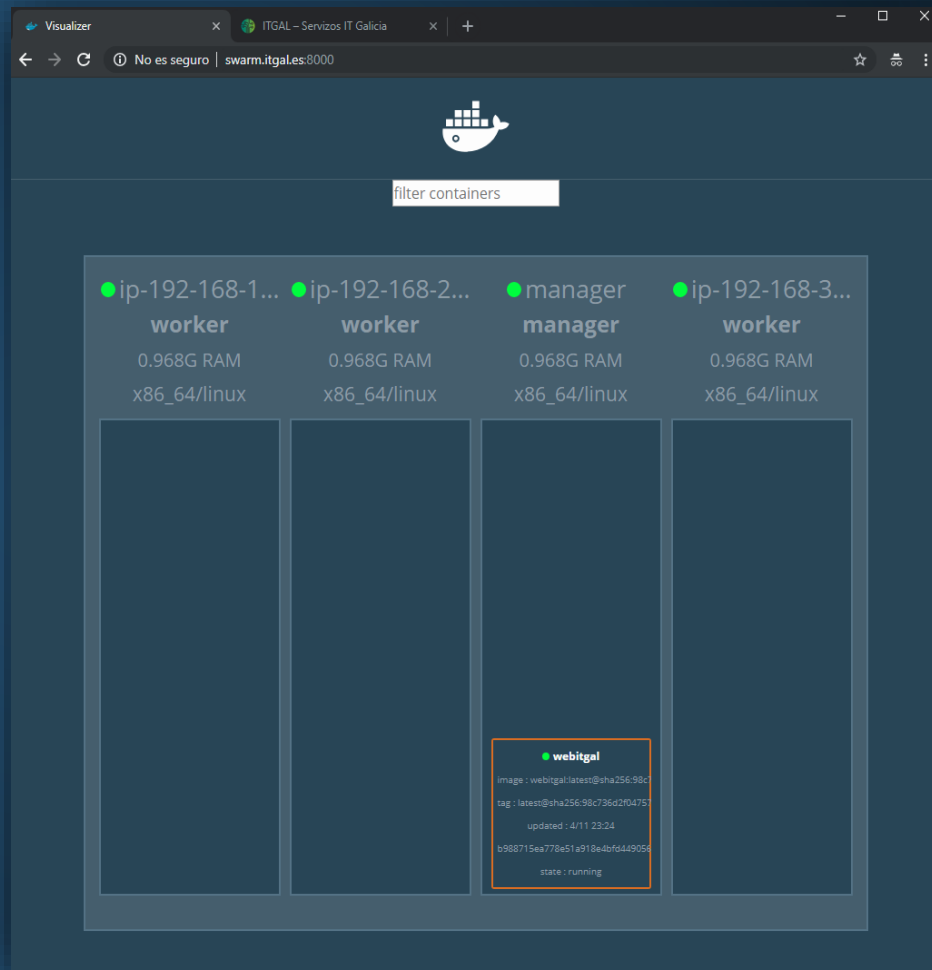
```
root@manager:~# docker service update --force webitgal
webitgal
overall progress: 6 out of 6 tasks
1/6: running [=====>]
2/6: running [=====>]
3/6: running [=====>]
4/6: running [=====>]
5/6: running [=====>]
6/6: running [=====>]
verify: Service converged
```



# Docker Swarm:

Actualización de servicio para reducir las tareas de réplicas a uno

```
root@manager:~# docker service update --replicas=1
webitgal
webitgal
overall progress: 1 out of 1 tasks
1/1: running
[=====>]
verify: Service converged
```



# Auto Scaling Group

Scale-in a cero en todas las instancias desplegadas

The screenshot displays the AWS Management Console interface for an Auto Scaling Group named 'webitgal-asg'. On the left, the 'Details' tab is active, showing the 'Desired Capacity' as 3, with a red arrow pointing to it. The 'Launch Configuration' is 'webitgal-launch-asg'. On the right, the 'Edit details - webitgal-asg' modal is open. In this modal, the 'Launch Instances Using' section has 'Launch Configuration' selected. The 'Launch Configuration' dropdown is set to 'webitgal-launch-asg'. The 'Desired Capacity' field is highlighted with a red arrow and contains the value 0. The 'Min' field is 0 and the 'Max' field is 6. The 'Availability Zone(s)' section shows three zones: 'us-east-2a', 'us-east-2b', and 'us-east-2c'. The 'Subnet(s)' section lists three subnets: 'subnet-0b19817cd7df19036(192.168.10.0/24) | webitgal-subnet-a | us-east-2a', 'subnet-0c9951cf8e9731abb(192.168.30.0/24) | webitgal-subnet-c | us-east-2c', and 'subnet-0911a6029b2cddd1f(192.168.20.0/24) | webitgal-subnet-b | us-east-2b'. The 'Classic Load Balancers' section shows 'webitgal-elb'.

**Create Auto Scaling group** **Actions**

Filter:

Name	Launch Configuration	Instances
webitgal-asg	webitgal-launch-asg	3

**Auto Scaling Group: webitgal-asg**

**Details** **Activity History** **Scaling Policies**

**Launch Configuration** **Desired Capacity** **Min** **Max**

webitgal-launch-asg 3 0 6

**Edit details - webitgal-asg**

**Launch Instances Using**

☐ Launch Template  
☒ Launch Configuration

**Launch Configuration** webitgal-launch-asg

**Desired Capacity** 0  
**Min** 0  
**Max** 6

**Availability Zone(s)** us-east-2a x us-east-2b x us-east-2c x

**Subnet(s)**

- subnet-0b19817cd7df19036(192.168.10.0/24) | webitgal-subnet-a | us-east-2a x
- subnet-0c9951cf8e9731abb(192.168.30.0/24) | webitgal-subnet-c | us-east-2c x
- subnet-0911a6029b2cddd1f(192.168.20.0/24) | webitgal-subnet-b | us-east-2b x

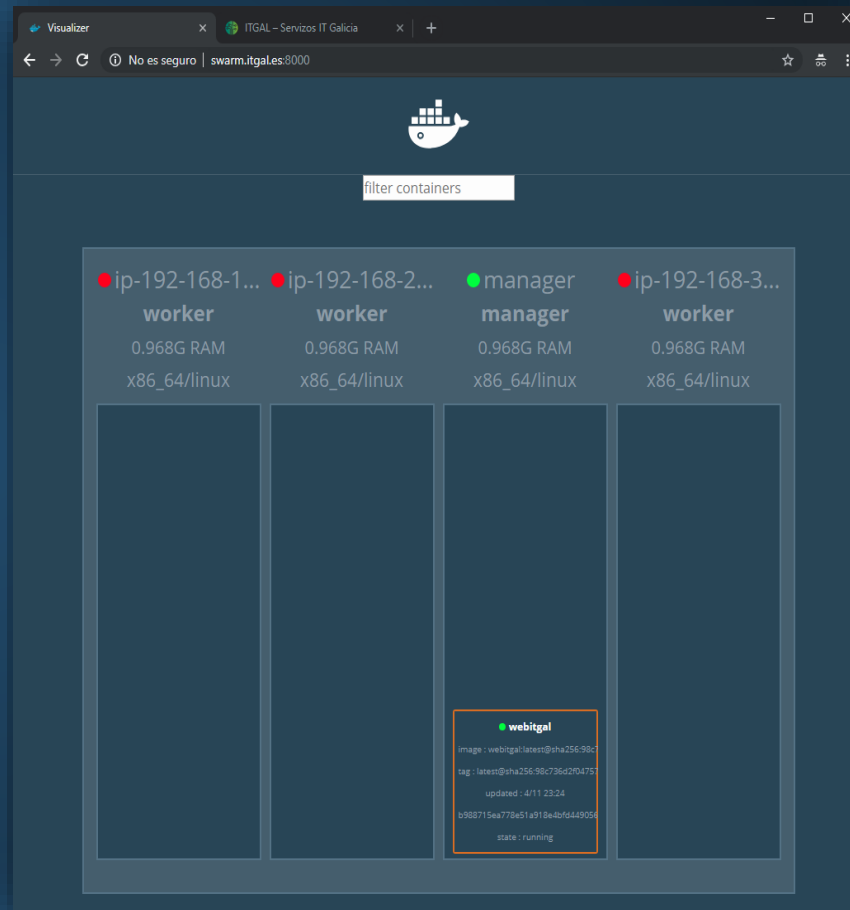
**Classic Load Balancers** webitgal-elb x

# Docker Swarm:

Después del scale-in a cero, el estado de los nodos es "Down"

```
root@manager:~# docker node ls
```

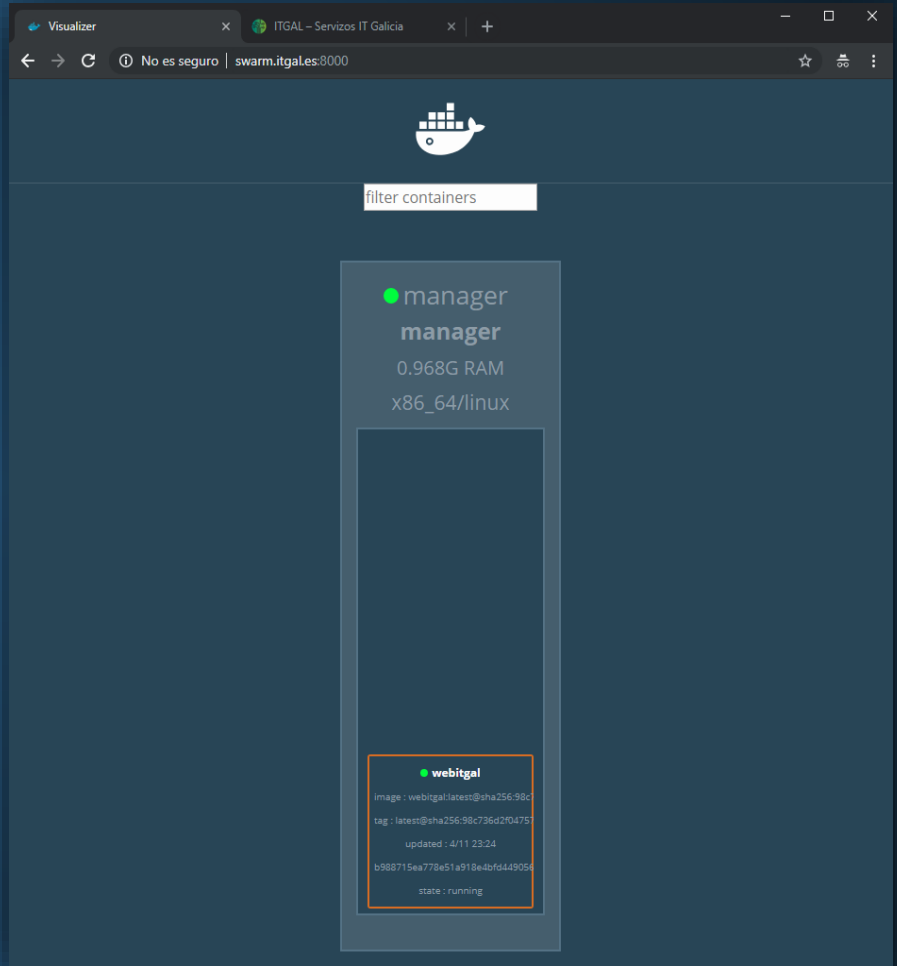
ID	HOSTNAME	STATUS
AVAILABILITY	MANAGER	STATUS
ENGINE	VERSION	
eyxf2pqhfbprckm6db44761zj	ip-192-168-10-64	Down
Active		18.06.1-ce
qw84n3ev09yhc30vlmddrwpzb	ip-192-168-20-133	Down
Active		18.06.1-ce
togf7g1cv22rol9c9jowj1ioh	ip-192-168-30-222	Down
Active		18.06.1-ce
b5mm1cmv2d2jr1dgh5r1r3oqk *	manager	Ready
Active	Leader	18.06.1-ce



## Bash Script:

Script para eliminar nodos “down” del Swarm de nodos. (Instancias en estado “terminated”)

```
#!/bin/bash
nodo_down=$(docker node ls | grep Down | sed -n '1p' |
awk '{print $1}')
while [ "$nodo_down" != "" ];
do
    nodo_down=$(docker node ls | grep Down | sed -n '1p'
| awk '{print $1}')
    docker node rm --force "$nodo_down"
done
```





<https://www.youtube.com/watch?v=HzsBiJgrOo>

## **\$>WHOAMI**

- [adrianlois@zonasystem.com](mailto:adrianlois@zonasystem.com)
- <https://zonasystem.com>
- [@adrianlois\\_](#)