

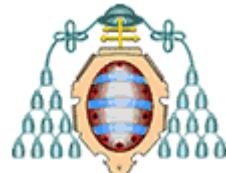
# Cloud Computing

Jesús Morán y Cristian Augusto

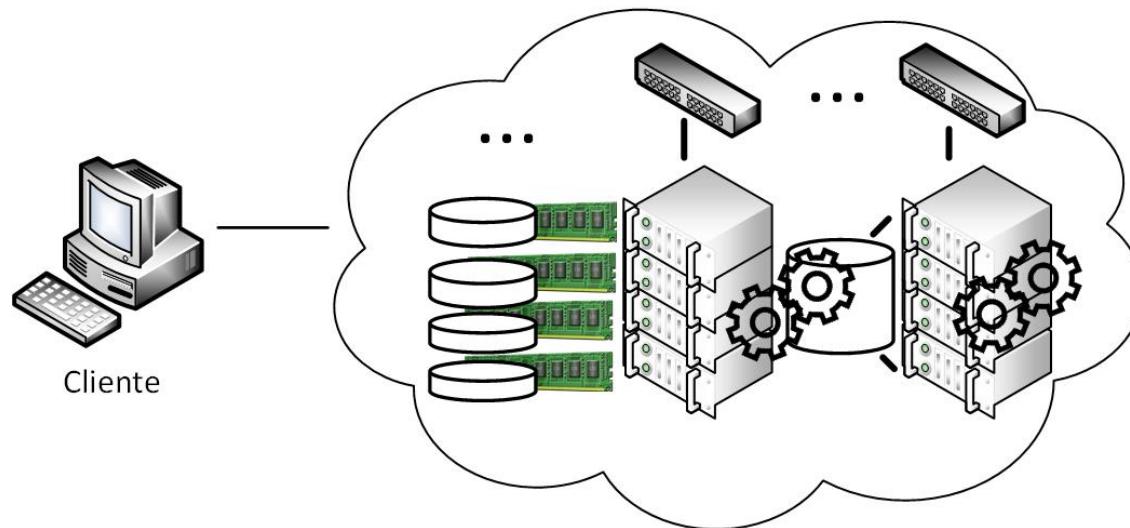
Grupo de Investigación en Ingeniería del Software

<http://giis.uniovi.es>

Universidad de Oviedo

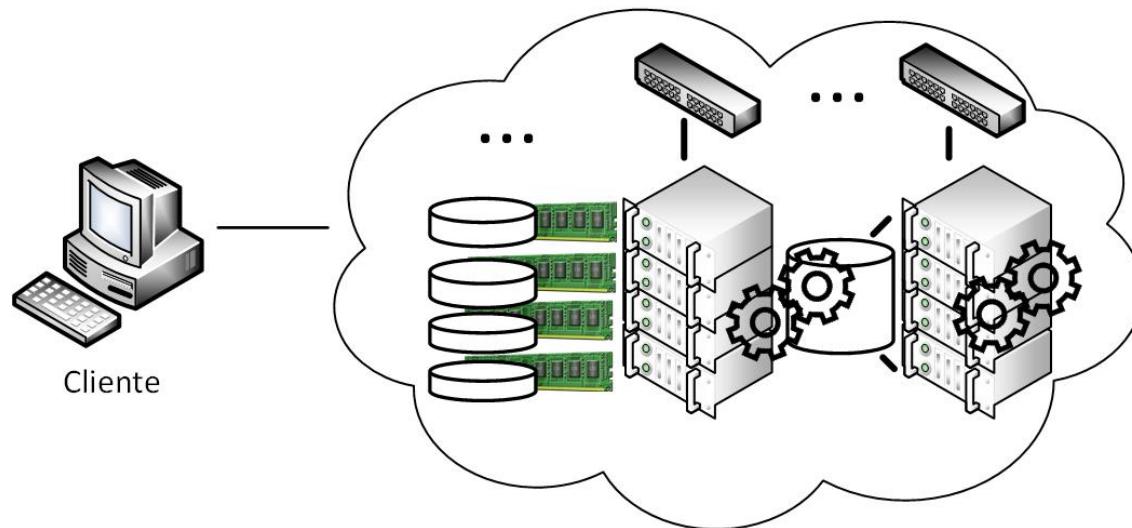


# Cloud Computing



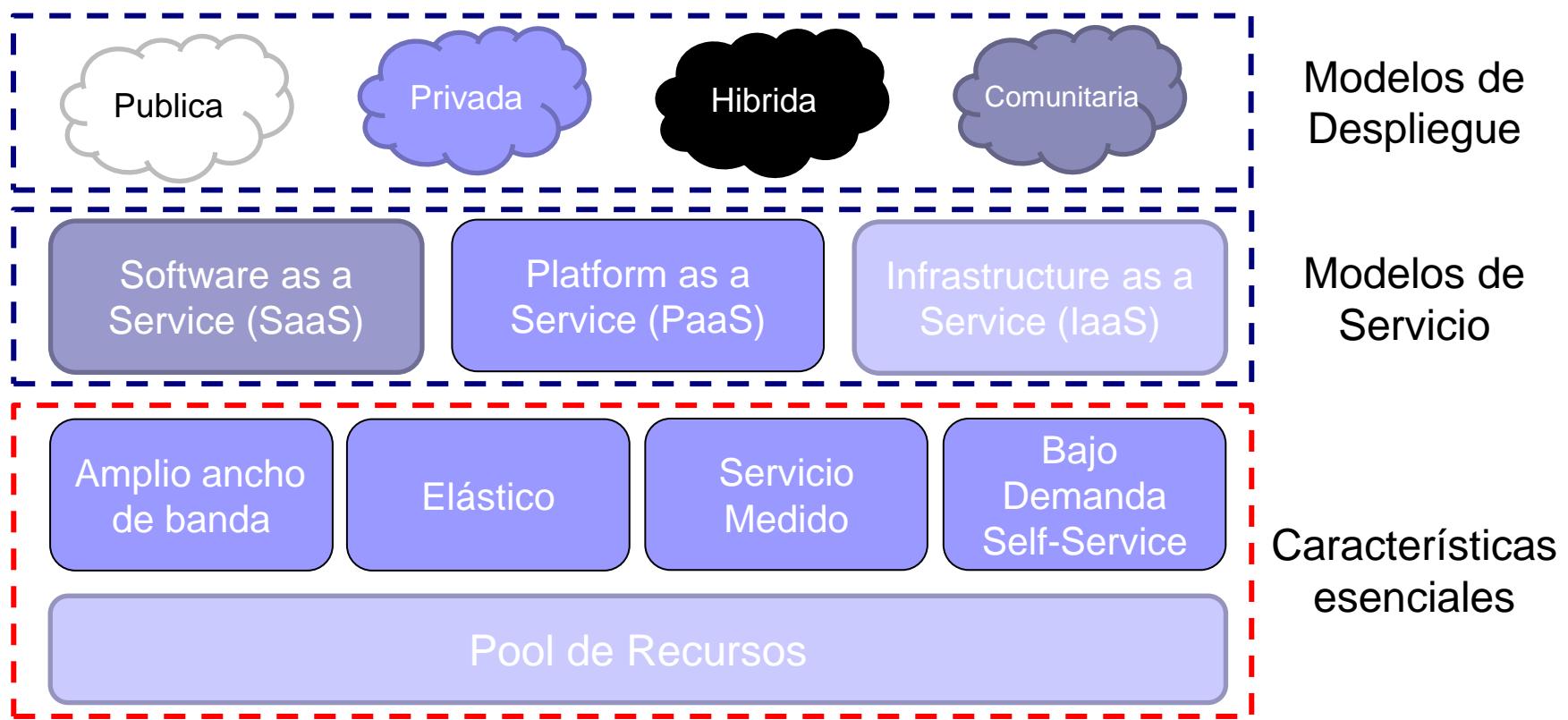
- Computación como servicio
- Externalización
- Economías de escala
- Abstraer parte de la infraestructura informática

# Cloud Computing

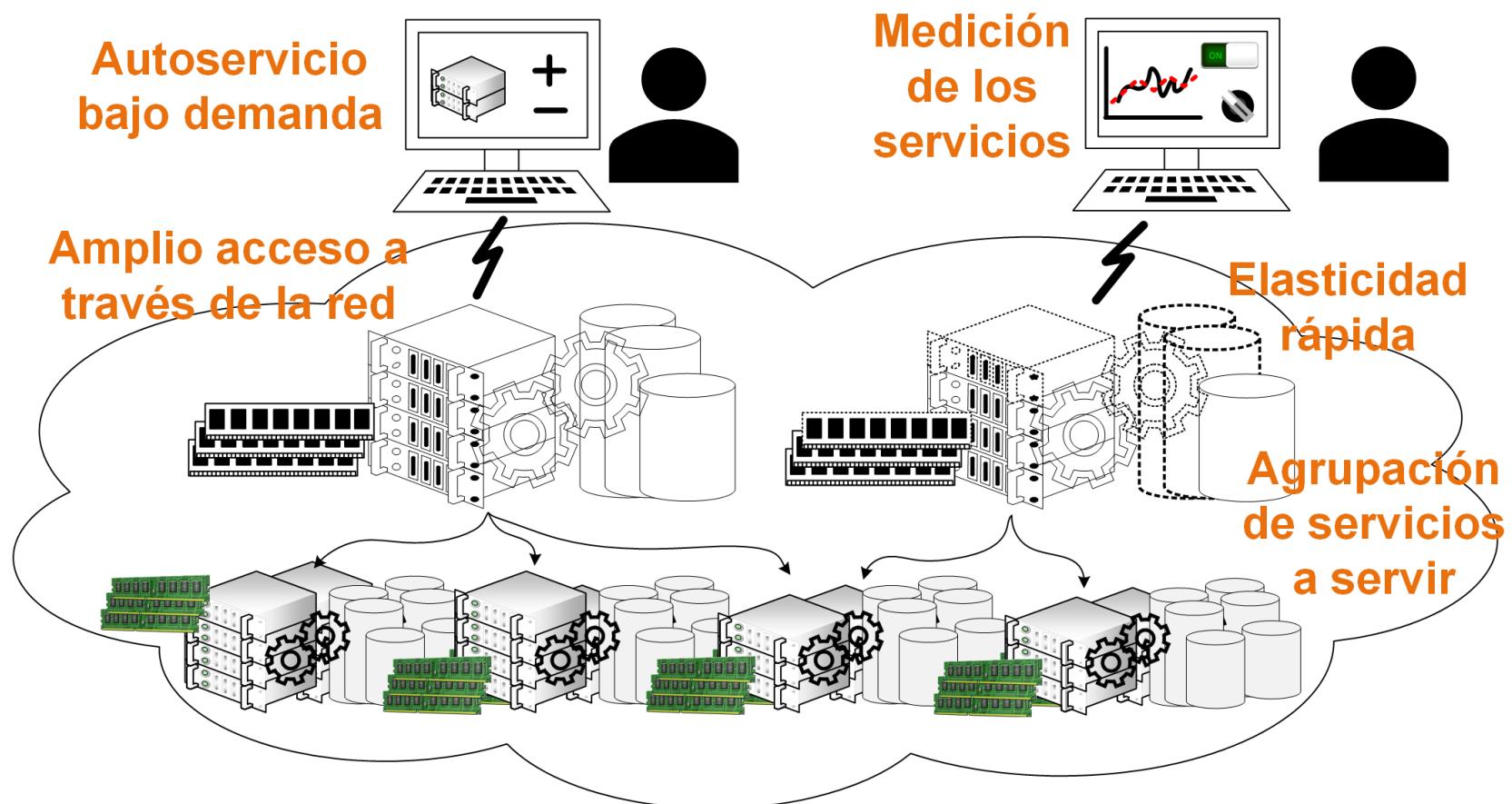


- NIST: “cloud computing is a model for enabling ubiquitous, convenient, on-demand network access to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction”

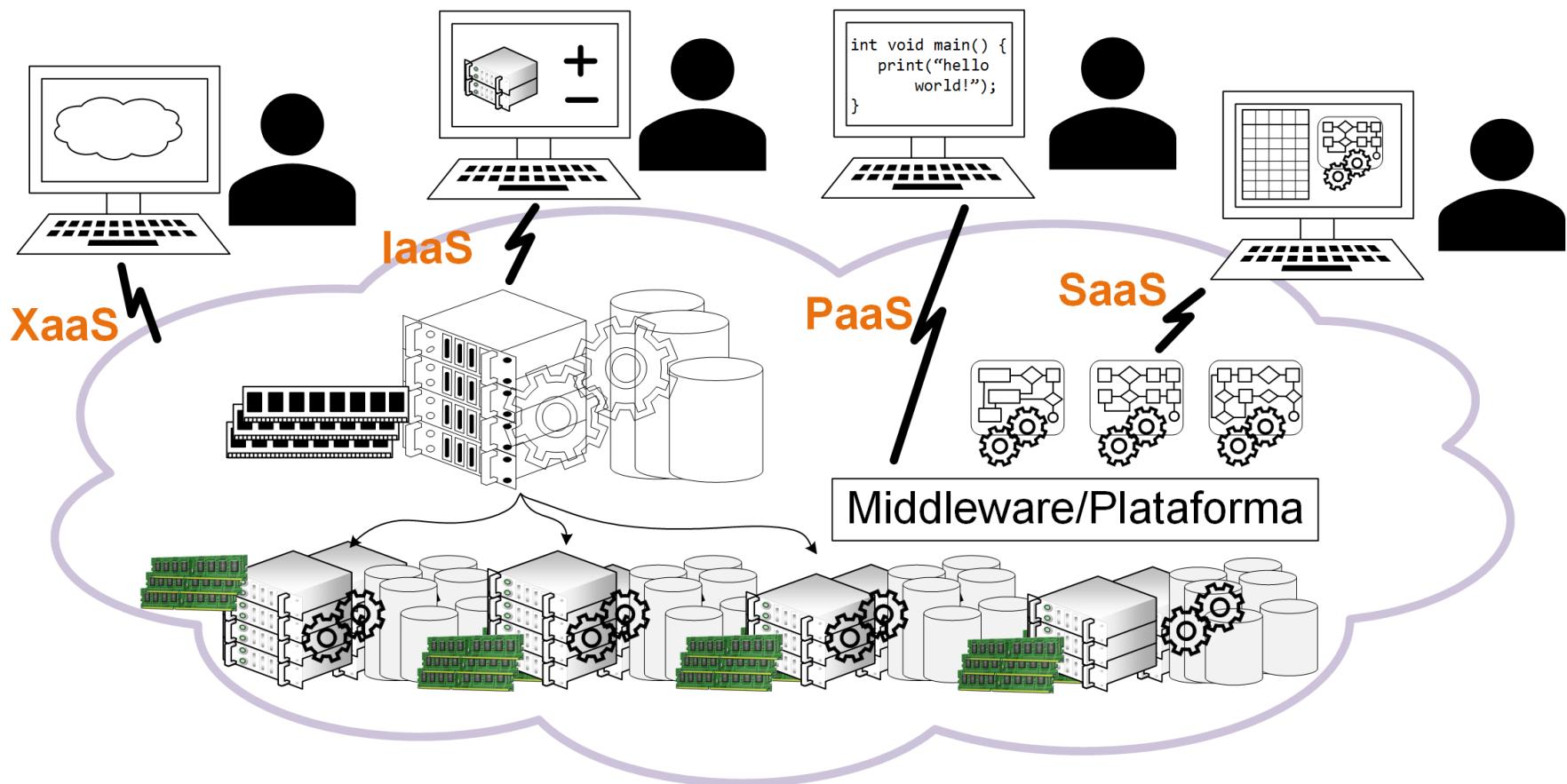
# Cloud Computing



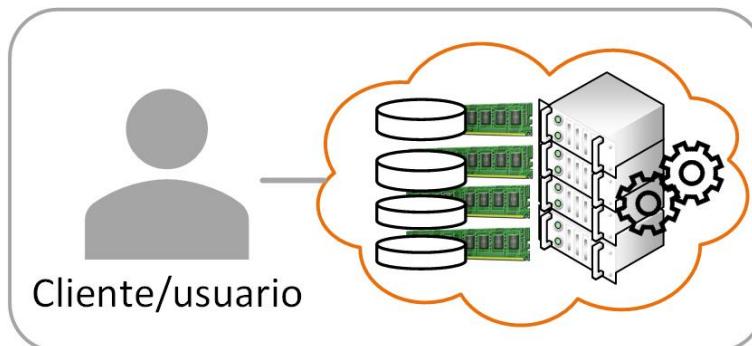
# Características de la nube



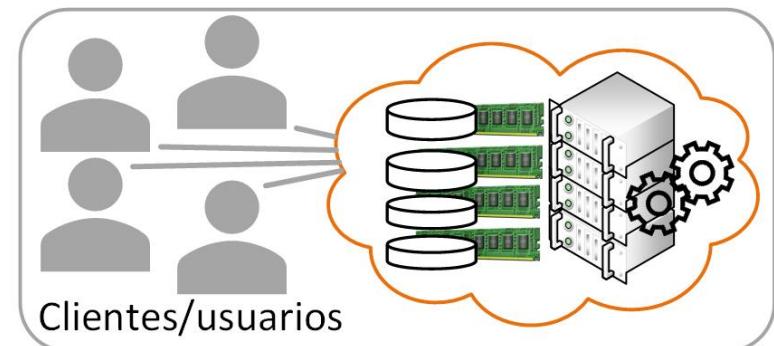
# Modelos de servicios



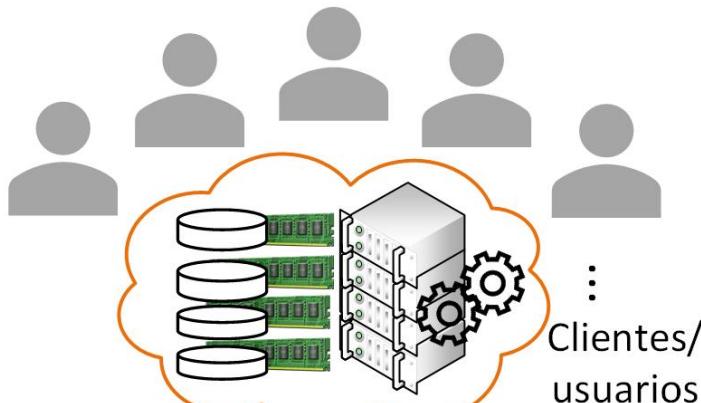
# Modelos de despliegue



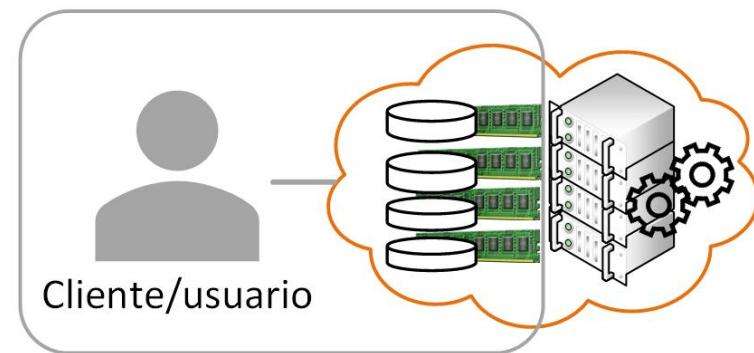
Nube privada



Nube comunitaria

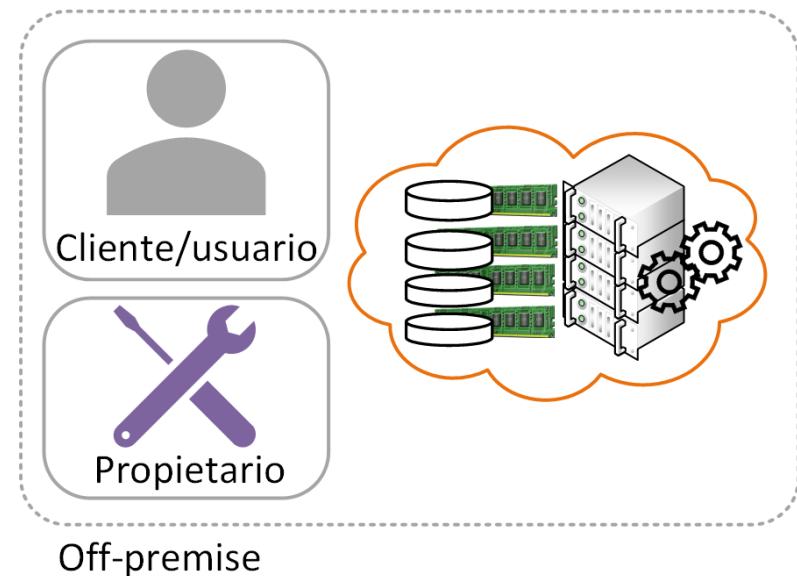
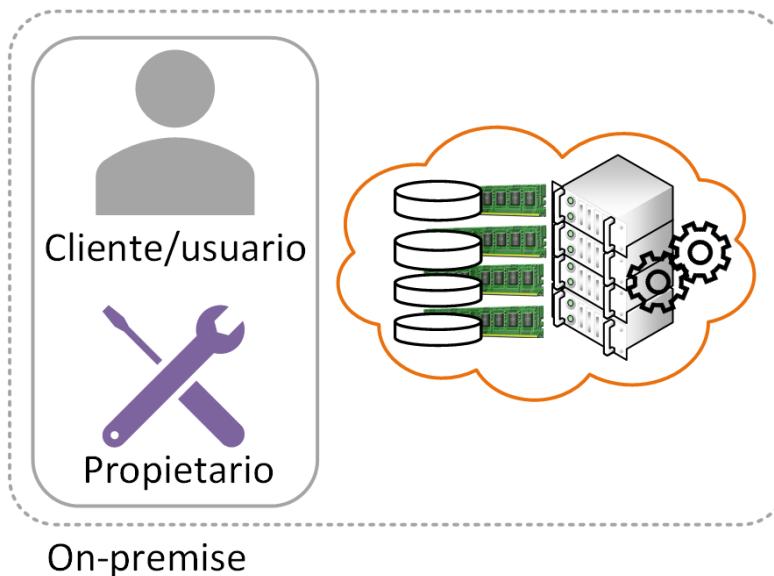


Nube pública



Nube híbrida

# Tipos de despliegue



# Proveedores cloud

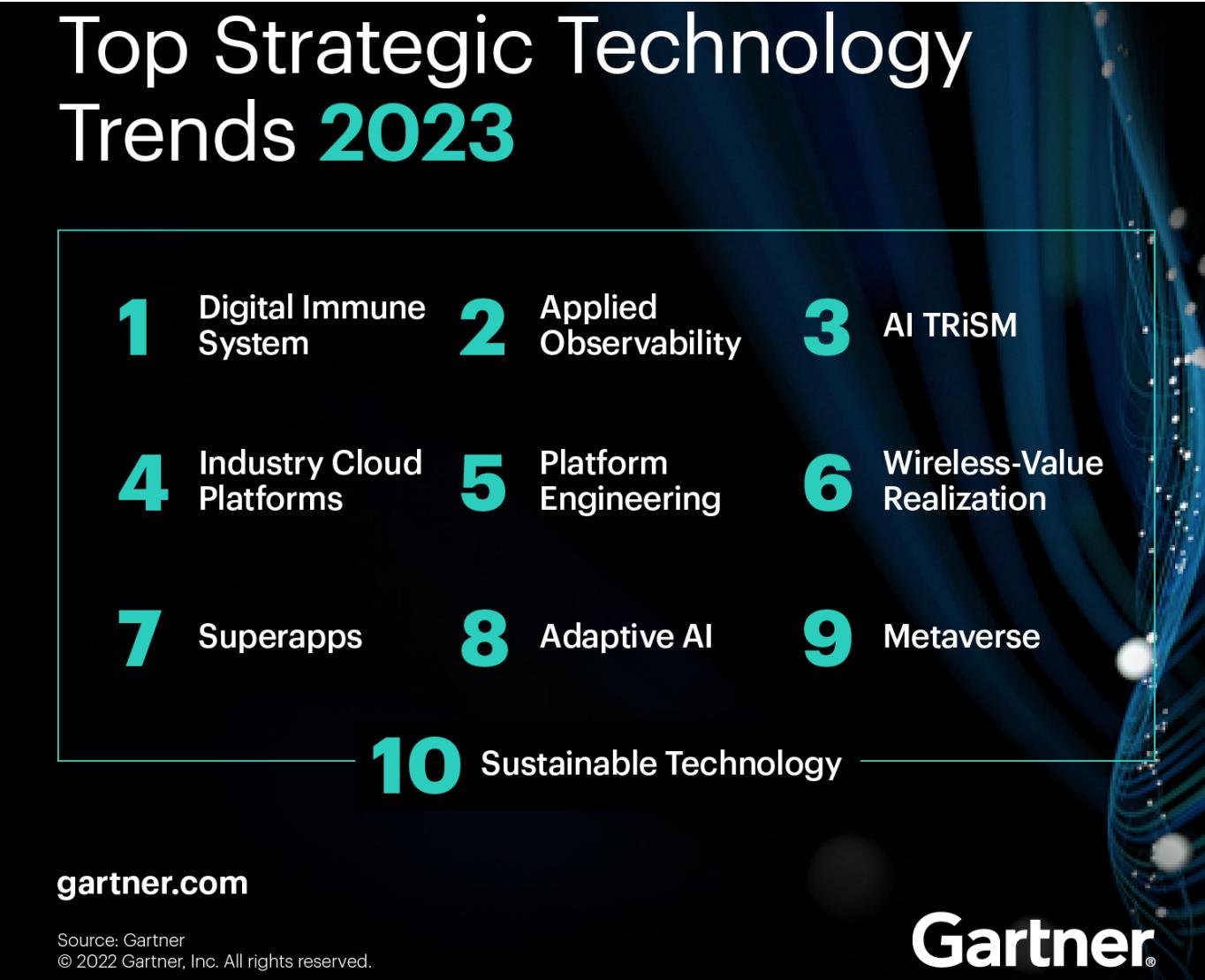


# Proveedores cloud



# Tendencias

## Top Strategic Technology Trends 2023

- 
- |    |                          |   |                       |   |                            |
|----|--------------------------|---|-----------------------|---|----------------------------|
| 1  | Digital Immune System    | 2 | Applied Observability | 3 | AI TRiSM                   |
| 4  | Industry Cloud Platforms | 5 | Platform Engineering  | 6 | Wireless-Value Realization |
| 7  | Superapps                | 8 | Adaptive AI           | 9 | Metaverse                  |
| 10 | Sustainable Technology   |   |                       |   |                            |

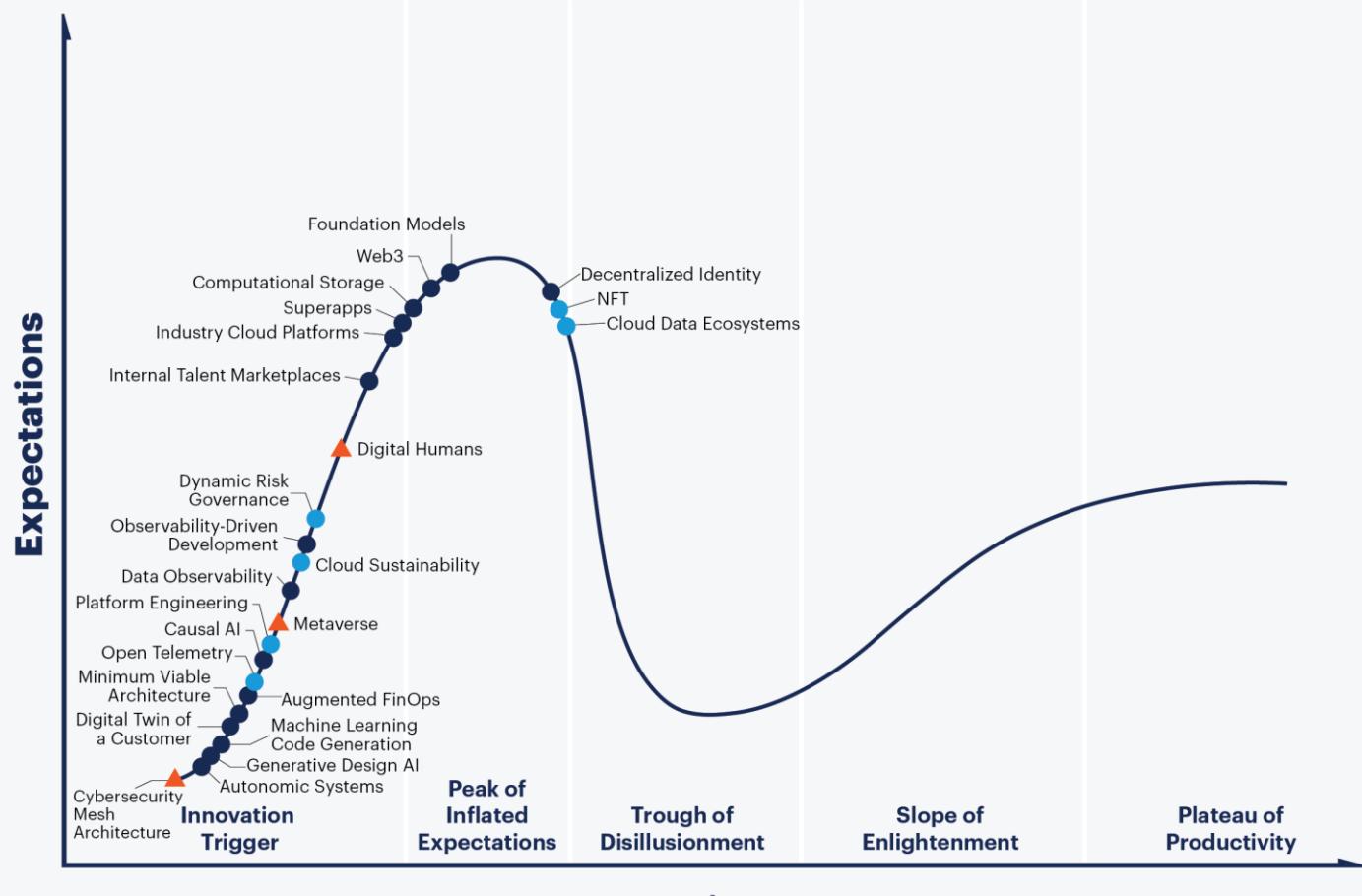
[gartner.com](https://gartner.com)

Source: Gartner  
© 2022 Gartner, Inc. All rights reserved.

Gartner®

# Hype

## Hype Cycle for Emerging Tech, 2022



Plateau will be reached:

○ less than 2 years

● 2 to 5 years

● 5 to 10 years

▲ More than 10 years

✖ Obsolete before plateau

As of August 2022

[gartner.com](https://gartner.com)

Source: Gartner

© 2022 Gartner, Inc. and/or its affiliates. All rights reserved. Gartner and Hype Cycle are registered trademarks of Gartner, Inc. and its affiliates in the U.S. 1893703

Gartner



## Conozca nuestros productos



Análisis



Integración de aplicaciones



Realidad aumentada y  
realidad virtual



Administración de costos de  
AWS



Cadena de bloques



Aplicaciones empresariales



Computación



Interacción con clientes



Base de datos



Herramientas para  
desarrolladores



Informática para usuarios  
finales



Game Tech



Internet de las cosas



Aprendizaje automático



Administración y control



Servicios multimedia



Migración y transferencia



Soluciones móviles



Redes y entrega de contenido



Robótica



Satélite



Seguridad, identidad y  
conformidad



Almacenamiento



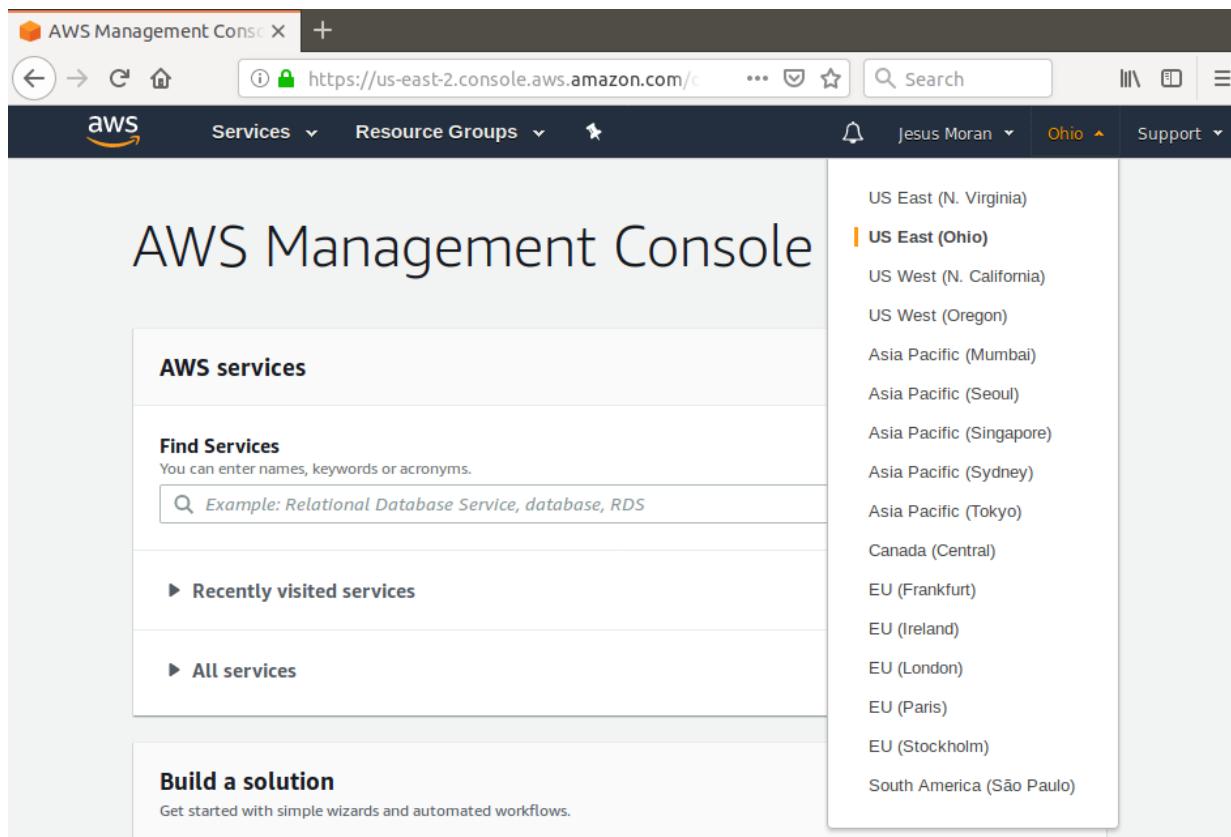
Ver todos los productos

# AWS

- Crear cuentas root y delegada -> IAM
- Crear servidor -> EC2
- Modificar almacenamiento de servidor -> EBS
- Añadir una NFS -> EFS
- Almacenamiento masivo de datos -> S3
- Crear cluster de computación Big Data -> EMR

# AWS: Crear cuentas (IAM)

## 1. Crear cuenta root



# AWS: Crear cuentas (IAM)

1. Crear cuenta root

## 2. Crear grupo y permisos (políticas)

Ej. Permitir al grupo acceso completo a EC2, EFS, EMR y S3

IAM Management Consol X +

https://console.aws.amazon.com/ 90% ... Search

aws Services Resource Groups Jesus Moran Global Support

Create New Group Wizard

Step 1 : Group Name

Step 2 : Attach Policy

Step 3 : Review

Review

Review the following information, then click **Create Group** to proceed.

Group Name	devgiis	Edit Group Name
Policies	arn:aws:iam::aws:policy/AmazonEC2FullAccess arn:aws:iam::aws:policy/AmazonElasticFileSystemFullAccess arn:aws:iam::aws:policy/AmazonElasticMapReduceFullAccess arn:aws:iam::aws:policy/AmazonS3FullAccess	Edit Policies

Cancel Previous Create Group

# AWS: Crear cuentas (IAM)

1. Crear cuenta root
2. Crear grupo y permisos (políticas)
3. **Crear usuario y asignarlo a grupo**

User name	jesus
AWS access type	Programmatic access and AWS Management Console access
Console password type	Custom
Require password reset	No
Permissions boundary	Permissions boundary is not set

Permissions summary

The user shown above will be added to the following groups.

Type	Name
Group	<a href="#">devgjiis</a>

Tags

The new user will receive the following tag

Key	Value
e-mail	<a href="mailto:moranjesus@uniovi.es">moranjesus@uniovi.es</a>

[Cancel](#) [Previous](#) [Create user](#)

# AWS: Crear cuentas (IAM)

1. Crear cuenta root
2. Crear grupo y permisos (políticas)
3. **Crear usuario y asignarlo a grupo**
  1. Se logea desde una URL específica con su usuario-contraseña
  2. Se puede logear desde CLI y API con Access.key.id (usuario) y secret.key (contraseña)

 Success

You successfully created the users shown below. You can view and download user security credentials. You can also email users instructions for signing in to the AWS Management Console. This is the last time these credentials will be available to download. However, you can create new credentials at any time.

Users with AWS Management Console access can sign-in at: [https://31\[REDACTED\]0.signin.aws.amazon.com/console](https://31[REDACTED]0.signin.aws.amazon.com/console)



	User	Access key ID	Secret access key	Email login instructions
	 jesus	AK[REDACTED]NI	***** Show	<a href="#">Send email</a> 

# AWS: Crear cuentas (IAM)

1. Crear cuenta root
2. Crear grupo y permisos (políticas)
3. Crear usuario y asignarlo a grupo
4. **Crear roles (permisos a los servicios)**

Ej. EMR\_DefaultRole para y EMR\_EC2\_DefaultRole para permitir al servicio EMR lanzar instancias EC2 y S3

Role name ▾	Description	Trusted entities
<input type="checkbox"/> <a href="#">AWSServiceRole...</a>	Enables resource access for AWS to ...	<b>AWS service:</b> support (Service-Linked role)
<input type="checkbox"/> <a href="#">AWSServiceRole...</a>	Access for the AWS Trusted Advisor ...	<b>AWS service:</b> trustedadvisor (Service-Linked...)
<input type="checkbox"/> <a href="#">EMR_DefaultRole</a>	Allows Elastic MapReduce to call AW...	<b>AWS service:</b> elasticmapreduce
<input type="checkbox"/> <a href="#">EMR_EC2_Def...</a>	Allows EC2 instances in an Elastic M...	<b>AWS service:</b> ec2

# AWS: Crear cuentas (IAM)

1. Crear cuenta root
2. Crear grupo y permisos (políticas)
3. Crear usuario y asignarlo a grupo
4. Crear roles (permisos a los servicios)
5. **Logearnos con el nuevo usuario**
  1. Entrar en la URL de login del usuario (no del root)
  2. Poner usuario-contraseña
  3. El usuario sólo tendrá acceso a los servicios que le permitió el usuario root (EC2, EFS, S3 y EMR)

# Crear un servidor (EC2)

## 1. Seleccionamos el AMI

“disco” + operativo + aplicaciones pre-determinadas

My AMIs

AWS Marketplace

Community AMIs

Free tier only (i)

AMI Name	Description	Root device type	Virtualization type	ENAv Enabled	Action
 Amazon Linux 2 AMI (HVM), SSD Volume Type - ami-02bcbb802e03574ba (64-bit x86) / ami-06a134062219ad132 (64-bit Arm)	Amazon Linux 2 comes with five years support. It provides Linux kernel 4.14 tuned for optimal performance on Amazon EC2, systemd 219, GCC 7.3, Glibc 2.26, Binutils 2.29.1, and the latest software packages through extras.	ebs	hvm	Yes	<span>Select</span> <input checked="" type="radio"/> 64-bit (x86) <input type="radio"/> 64-bit (Arm)
 Amazon Linux AMI 2018.03.0 (HVM), SSD Volume Type - ami-0cd3dfa4e37921605	The Amazon Linux AMI is an EBS-backed, AWS-supported image. The default image includes AWS command line tools, Python, Ruby, Perl, and Java. The repositories include Docker, PHP, MySQL, PostgreSQL, and other packages.	ebs	hvm	Yes	<span>Select</span> 64-bit (x86)
 Red Hat Enterprise Linux 7.6 (HVM), SSD Volume Type - ami-0b500ef59d8335eee (64-bit x86) / ami-0302c1ecc74930ba5 (64-bit Arm)	Red Hat Enterprise Linux version 7.6 (HVM), EBS General Purpose (SSD) Volume Type				<span>Select</span> <input checked="" type="radio"/> 64-bit (x86) <input type="radio"/> 64-bit (Arm)

# Crear un servidor (EC2)

1. Seleccionamos el AMI
2. **Elegimos el tipo de instancia**

Propósito general:

- T2, M2 y M5 (tienen sub-tipos)
  - T2.nano (1CPU, 0.5GB RAM 0.0058\$/hora)
  - ...
  - M5d.24xlarge (96 CPUs, 384GB RAM, 5.424\$)

Optimizadas para almacenamiento:

- H1 (> 0.468\$/hora), D2 (> 0.69\$/hora) e I3 (0.156\$/hora)

...

Precios en EEUU, en Irlanda son mayores

# Crear un servidor (EC2)

1. Seleccionamos el AMI
2. Elegimos el tipo de instancia

	Family	Type	vCPUs <small>i</small>	Memory (GiB)	Instance Storage (GB) <small>i</small>	EBS-Optimized Available <small>i</small>	Network Performance <small>i</small>	IPv6 Support <small>i</small>
<input type="checkbox"/>	General purpose	t3.nano	2	0.5	EBS only	Yes	Up to 5 Gigabit	Yes
<input checked="" type="checkbox"/>	General purpose	t3.micro	2	1	EBS only	Yes	Up to 5 Gigabit	Yes
<input type="checkbox"/>	General purpose	t3.small	2	2	EBS only	Yes	Up to 5 Gigabit	Yes
<input type="checkbox"/>	General purpose	t3.medium	2	4	EBS only	Yes	Up to 5 Gigabit	Yes

[Cancel](#) [Previous](#) [Review and Launch](#) [Next: Configure Instance Details](#)

# Crear un servidor (EC2)

1. Seleccionamos el AMI
2. Elegimos el tipo de instancia
3. **Configuramos la instancia(s)**
  - Número de instancias
  - Auto-escalado
  - Spot instances: máquinas por subasta
  - Asigar IP pública fija (hay que pagar)
  - Placement group: deplegar instancias cerca
  - Capacity reservation: reservar recursos para levantar instancias

# Crear un servidor (EC2)

1. Seleccionamos el AMI
2. Elegimos el tipo de instancia
3. **Configuramos la instancia(s)**
  - IAM role: permitir a la instancia levantar servicios
  - Comportamiento de apagado: apagar o eliminar
  - Proteger apagado de la máquina: evitar que se pueda apagar vía CLI o API
  - Monitorización: gratis cada 5 min, de pago cada min
  - Tenacidad: compartir o no anfitrión
  - T2/T3 unlimited: permite consumir más recursos de los disponibles en la instancia

# Crear un servidor (EC2)

1. Seleccionamos el AMI
2. Elegimos el tipo de instancia
3. Configuramos la instancia(s)
4. **Añadir almacenamiento**
  - Tamaño de disco
  - Tipo de disco: SSD, SSD IOPS (muchas I/O), HDD
    - IOPS: número de operaciones I/O soportadas
  - Permite que se elimine automáticamente al eliminar la instancia EC2
  - Se pueden añadir varios volúmenes (SSD > 0.10\$ GB/Mes, HDD > 0.025\$ GB/mes)

# Crear un servidor (EC2)

1. Seleccionamos el AMI
2. Elegimos el tipo de instancia
3. Configuramos la instancia(s)
4. Añadir almacenamiento

Volume Type	Device	Snapshot	Size (GiB)	Volume Type	IOPS	Throughput (MB/s)	Delete on Termination	Encrypted
Root	/dev/xvda	snap-0[REDACTED]6	8	General Purpose	100 / 3000	N/A	<input checked="" type="checkbox"/>	Not Encrypted

**Add New Volume**

**Cancel** **Previous** **Review and Launch** **Next: Add Tags**

# Crear un servidor (EC2)

1. Seleccionamos el AMI
2. Elegimos el tipo de instancia
3. Configuramos la instancia(s)
4. Añadir almacenamiento
5. **Asignamos grupo de seguridad (firewall)**

# Crear un servidor (EC2)

1. Seleccionamos el AMI
2. Elegimos el tipo de instancia
3. Configuramos la instancia(s)
4. Añadir almacenamiento
5. Asignamos grupo de seguridad (firewall)
6. **Seleccionamos/Creamos claves asimétricas para conectarnos**

# Crear un servidor (EC2)

Select an existing key pair or create a new key pair

X

1. A key pair consists of a **public key** that AWS stores, and a **private key file** that you store. Together, they allow you to connect to your instance securely. For Windows AMIs, the private key file is required to obtain the password used to log into your instance. For Linux AMIs, the private key file allows you to securely SSH into your instance.
2. Note: The selected key pair will be added to the set of keys authorized for this instance. Learn more about [removing existing key pairs from a public AMI](#).

3. Create a new key pair

4. Key pair name

5. giis1key

Download Key Pair



You have to download the **private key file (\*.pem file)** before you can continue.

**Store it in a secure and accessible location.** You will not be able to download the file again after it's created.

Cancel

Launch Instances

# Crear un servidor (EC2)

1. Seleccionamos el AMI
2. Elegimos el tipo de instancia
3. Configuramos la instancia(s)
4. Añadir almacenamiento
5. Asignamos grupo de seguridad (firewall)
6. Seleccionamos/Creamos claves asimétricas para conectarnos
7. **Guardamos en local la clave privada**

# Crear un servidor (EC2)

1. Seleccionamos el AMI
2. Elegimos el tipo de instancia
3. Configuramos la instancia(s)
4. Añadir almacenamiento
5. Asignamos grupo de seguridad (firewall)
6. Seleccionamos/Creamos claves asimétricas para conectarnos
7. Guardamos en local la clave privada
8. **Lanzamos la instancia**

# Crear un servidor (EC2)

The screenshot shows the AWS EC2 Instances page. At the top, there's a navigation bar with 'Resource Groups', a user profile 'jesus @ 31 [REDACTED]', and regions 'Ohio' and 'Support'. Below the navigation is a toolbar with 'Launch Instance', 'Connect', and 'Actions' dropdowns, along with various icons for monitoring, refresh, settings, and help.

The main content area displays a table of instances. A search bar at the top of the table allows filtering by tags and attributes or searching by keyword. The table columns include Name, Instance ID, Instance Type, Availability Zone, Instance State, Status Checks, Alarm Status, and Public DNS. One instance is listed:

Name	Instance ID	Instance Type	Availability Zone	Instance State	Status Checks	Alarm Status	Publ
[REDACTED]	i-0e [REDACTED]	t3.micro	us-east-2c	running	2/2 checks ...	None	ec2-3 [REDACTED]

Below the table, specific details for the selected instance (i-0e [REDACTED]) are shown. The Public DNS is ec2-3 [REDACTED]. The instance has three status tabs: 'Description' (selected), 'Status Checks', and 'Monitoring'. The 'Description' tab displays the following information:

Instance ID	Public DNS (IPv4)
i-0e [REDACTED]	ec2-3 [REDACTED] east-2.compute.amazonaws.com
Instance state	IPv4 Public IP
running	3.1 [REDACTED] [REDACTED]
Instance type	IPv6 IPs
t3.micro	-
Elastic IPs	Private DNS
	ip-172-3 [REDACTED] east-2.compute.internal [REDACTED]
Availability zone	Private IPs
us-east-2c	172.3 [REDACTED]
Security groups	Secondary private IPs
launch-wizard-1. view inbound rules . view outbound rules	

At the bottom right of the page, there are three small icons: a terminal, a cloud, and a network. The page footer says 'Cloud Computing' and '33'.

# Conectarse a un servidor EC2

1. Le damos permisos de lectura al propietario de la clave privada
2. Utilizamos la clave vía ssh contra el dns público que nos proporciona AWS

```
jesus@jesus-PC:~/Escritorio/introAWS$ chmod 400 giis1key.pem
jesus@jesus-PC:~/Escritorio/introAWS$ ssh -i "giis1key.pem" ec2-user@ec2-3-[REDACTED].us-east-2.compute.amazonaws.com
The authenticity of host 'ec2-3-[REDACTED].us-east-2.compute.amazonaws.com (3.1 [REDACTED])' can't be established.
ECDSA key fingerprint is SHA256:WHW-[REDACTED]E.
Are you sure you want to continue connecting (yes/no)? yes
Warning: Permanently added 'ec2-3-[REDACTED].us-east-2.compute.amazonaws.com,3.1 [REDACTED]' (ECDSA) to the list of known hosts.

[REDACTED]
[REDACTED] ( [REDACTED] / Amazon Linux 2 AMI
[REDACTED] \ [REDACTED]

https://aws.amazon.com/amazon-linux-2/
1 package(s) needed for security, out of 3 available
Run "sudo yum update" to apply all updates.
[ec2-user@ip-172-[REDACTED] ~]$
```

# Añadir disco al servidor (EBS)

- Elastic Block Service: discos SSD/HDD

## 1. Crear Volumen

Volume Type: Magnetic (standard) i

Size (GiB): 1 (Min: 1 GiB, Max: 1024 GiB) i

IOPS: Not applicable i

Availability Zone\*: us-east-2c i

Throughput (MB/s): Not applicable i

Snapshot ID: Select a snapshot C i

Encryption:  Encrypt this volume i

# Añadir disco al servidor (EBS)

- Elastic Block Service: discos SSD/HDD
  1. Crear Volumen
  2. Añadir volumen a instancia

The screenshot shows the AWS EBS console interface. On the left, there is a list of volumes with two items visible: 'giis1disk2' (selected) and 'giis1'. A context menu is open over 'giis1disk2', showing options: 'Modify Volume', 'Create Snapshot', 'Delete Volume', 'Attach Volume', 'Detach Volume', 'Force Detach Volume', 'Change Auto-Enable IO Setting', and 'Add/Edit Tags'. On the right, a 'Attach Volume' dialog is open, showing the selected volume 'vol-0a9' (giis1disk2) and instance 'i-0e6'. The device is set to '/dev/sdf'. Below the dialog, it says 'Linux Devices: /dev/sdf through /dev/sdp'.

# Añadir disco al servidor (EBS)

- Elastic Block Service: discos SSD/HDD
  1. Crear Volumen
  2. Añadir volumen a instancia
  3. **Creamos una partición**

# Añadir disco al servidor (EBS)

```
[ec2-user@ip-172-3 ~]$ sudo fdisk /dev/sdf
Welcome to fdisk (util-linux 2.30.2).
Changes will remain in memory only, until you decide to write them.
Be careful before using the write command.

1. Device does not contain a recognized partition table.
2. Created a new DOS disklabel with disk identifier 0x464a7e20.

3. Command (m for help): n
Partition type
      p   primary (0 primary, 0 extended, 4 free)
      e   extended (container for logical partitions)
Select (default p): p
Partition number (1-4, default 1): 1
First sector (2048-2097151, default 2048):
Last sector, +sectors or +size{K,M,G,T,P} (2048-2097151, default 2097151):

Created a new partition 1 of type 'Linux' and of size 1023 MiB.

Command (m for help): w
The partition table has been altered.
Calling ioctl() to re-read partition table.
Syncing disks.

[ec2-user@ip-172-3 ~]$
```

# Añadir disco al servidor (EBS)

- Elastic Block Service: discos SSD/HDD
  1. Crear Volumen
  2. Añadir volumen a instancia
  3. Creamos una partición
  4. **Creamos un sistema de archivos**

# Añadir disco al servidor (EBS)

```
[ec2-user@ip-172-3-14-12 ~]$ sudo mkfs -t ext4 /dev/sdf1
mke2fs 1.42.9 (28-Dec-2013)
Filesystem label=
OS type: Linux
1. Block size=4096 (log=2)
2. Fragment size=4096 (log=2)
3. Stride=0 blocks, Stripe width=0 blocks
4. 65536 inodes, 261888 blocks
5. 13094 blocks (5.00%) reserved for the super user
6. First data block=0
7. Maximum filesystem blocks=268435456
8. 8 block groups
9. 32768 blocks per group, 32768 fragments per group
10. 8192 inodes per group
11. Superblock backups stored on blocks:
    32768, 98304, 163840, 229376

Allocating group tables: done
Writing inode tables: done
Creating journal (4096 blocks): done
Writing superblocks and filesystem accounting information: done

[ec2-user@ip-172-3-14-12 ~]$
```

# Añadir disco al servidor (EBS)

- Elastic Block Service: discos SSD/HDD
  1. Crear Volumen
  2. Añadir volumen a instancia
  3. Creamos una partición
  4. Creamos un sistema de archivos
  5. **Montamos la partición**

```
[ec2-user@ip-172-31-39-176 ~]$ sudo mount /dev/sdf1 /mnt/  
[ec2-user@ip-172-31-39-176 ~]$ █
```

# Crear instancia desde CLI

## 1. Instalamos aws

pip install awscli --upgrade –user

Lo añadimos al path (o creamos una variable de entorno, enlace simbólico,...)

```
jesus@jesus-PC: ~/Escritorio/introAWS
jesus@jesus-PC:~/Escritorio/introAWS$ pip install awscli --upgrade --user
```

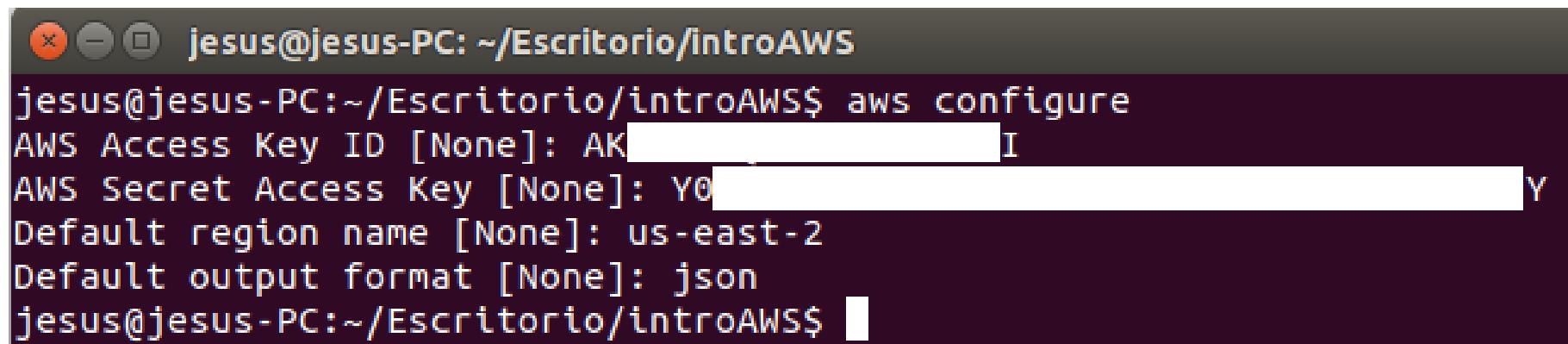
# Crear instancia desde CLI

1. Instalamos aws
2. **Configuramos nuestra cuenta delegada**

No es recomendable utilizar la cuenta root

aws configure

Si queremos varios usuarios: aws configure --profile jesus



The screenshot shows a terminal window with the following content:

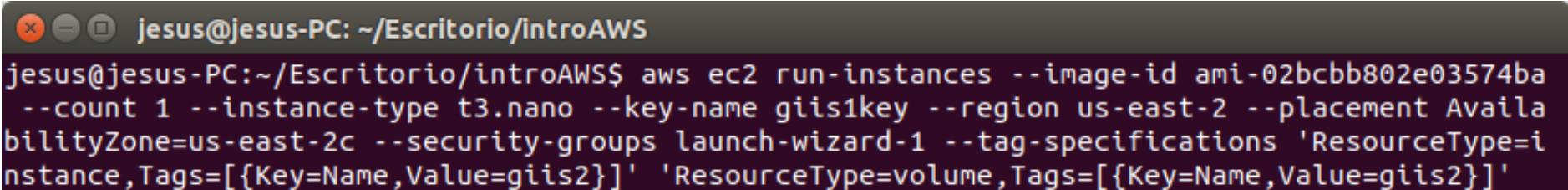
```
jesus@jesus-PC: ~/Escritorio/introAWS$ aws configure
AWS Access Key ID [None]: AK[REDACTED] I
AWS Secret Access Key [None]: Y0[REDACTED] Y
Default region name [None]: us-east-2
Default output format [None]: json
jesus@jesus-PC:~/Escritorio/introAWS$
```

The terminal window has a dark background and light-colored text. The command 'aws configure' is run, followed by prompts for AWS Access Key ID, AWS Secret Access Key, Default region name, and Default output format. The user inputs are partially redacted.

# Crear instancia desde CLI

1. Instalamos aws
2. Configuramos nuestra cuenta delegada
3. **Lanzamos una nueva instancia**

```
aws ec2 run-instances --image-id ami-02bcbb802e03574ba --count 1 --instance-type t3.nano --key-name giis1key --region TODO_MISMA_REGION --placement AvailabilityZone=TODO_MISMA_ZONA --security-groups TODO_GRUPO_DE_SEGURIDAD --tag-specifications 'ResourceType=instance,Tags=[{Key=Name,Value=giis2}]' 'ResourceType=volume,Tags=[{Key=Name,Value=giis2}]'
```



A screenshot of a terminal window titled "jesus@jesus-PC: ~/Escritorio/introAWS". The window shows the execution of an AWS CLI command to launch a new EC2 instance. The command is identical to the one shown above, using the same AWS parameters and tag specifications.

```
jesus@jesus-PC: ~/Escritorio/introAWS
jesus@jesus-PC:~/Escritorio/introAWS$ aws ec2 run-instances --image-id ami-02bcbb802e03574ba --count 1 --instance-type t3.nano --key-name giis1key --region us-east-2 --placement AvailabilityZone=us-east-2c --security-groups launch-wizard-1 --tag-specifications 'ResourceType=instance,Tags=[{Key=Name,Value=giis2}]' 'ResourceType=volume,Tags=[{Key=Name,Value=giis2}]'
```

# Crear instancia desde CLI

1. Iniciar sesión en AWS
2. Crear una instancia
3. Listar las instancias

```
aws ec2 run-instances --image-id ami-02bcbb802e03574ba --count 1 --instance-type t2.micro --key-name gisis1key --security-group-names launch-wizard-1 --region us-east-2
```

No nos indica la IP pública

1 --  
REGIÓN  
us-east-2

b802e03574ba  
ement Availa  
sourceType=i  
e=giis2}]'

# Crear instancia desde CLI

1. Instalamos aws
2. Configuramos nuestra cuenta delegada
3. Lanzamos una nueva instancia
4. **Obtenemos la IP pública**

```
aws ec2 describe-instances --instance-ids  
NÚMERO_DE_INSTANCIA
```

```
"PrivateIpAddresses": [  
    {  
        "PrivateDnsName": "ip-172-3[REDACTED].us-east-2.compute.internal",  
        "PrivateIpAddress": "172.3[REDACTED]",  
        "Primary": true,  
        "Association": {  
            "PublicIp": "3.1[REDACTED]",  
            "PublicDnsName": "ec2-3-1[REDACTED].us-east-2.compute.amazonaws.com",  
            "IpOwnerId": "amazon"  
        }  
    }  
],
```

# Crear instancia desde CLI

1. Instalamos aws
2. Configuramos nuestra cuenta delegada
3. Lanzamos una nueva instancia
4. Obtenemos la IP pública
5. **Accedemos a la máquina**

```
ssh -i CLAVE_PRIVADA NOMBRE_DNS_PÚBLICO
```

# Crear instancia desde CLI

## 1. Instalamos aws

## 2. Configuramos nuestra cuenta delegada

```
ec2-user@ip-172-3 [~]~  
jesus@jesus-PC:~/Escritorio/introAWS$ ssh -i "giis1key.pem" ec2-user@ec2-3-1 [REDACTED].us  
-east-2.compute.amazonaws.com  
The authenticity of host 'ec2-3-1 [REDACTED].us-east-2.compute.amazonaws.com (3.1 [REDACTED])'  
' can't be established.  
ECDSA key fingerprint is SHA256:[REDACTED]0.  
Are you sure you want to continue connecting (yes/no)? yes  
Warning: Permanently added 'ec2-3-1 [REDACTED].us-east-2.compute.amazonaws.com,3.1 [REDACTED]'  
(ECDSA) to the list of known hosts.  
  
_ _ | _ _ | _ )  
_ _ | ( _ _ / Amazon Linux 2 AMI  
_ _ | \ _ _ | _ |  
  
https://aws.amazon.com/amazon-linux-2/  
1 package(s) needed for security, out of 3 available  
Run "sudo yum update" to apply all updates.  
[ec2-user@ip-172-3 [REDACTED] ~]$ [REDACTED]
```

# Configuración de instancias

- Permitir total acceso entre nuestras instancias
  1. Añadimos una regla al grupo de seguridad (cortafuegos)

Edit inbound rules X

Type <span>i</span>	Protocol <span>i</span>	Port Range <span>i</span>	Source <span>i</span>	Description <span>i</span>
SSH	TCP	22	Custom 0.0.0.0/0	e.g. SSH for Admin Desktop
All traffic	All	0 - 65535	Custom sg-05 [REDACTED] 3	e.g. SSH for Admin Desktop

**Add Rule**

NOTE: Any edits made on existing rules will result in the edited rule being deleted and a new rule created with the new details. This will cause traffic that depends on that rule to be dropped for a very brief period of time until the new rule can be created.

[Cancel](#) Save

# Añadir NFS (EFS)

## 1. Configuramos el acceso

### Configure file system access

An Amazon EFS file system is accessed by EC2 instances running inside one of your VPCs. Instances connect to a file system by using a network interface called a mount target. Each mount target has an IP address, which we assign automatically or you can specify.

VPC vpc-e9█████ (default)

### Create mount targets

Instances connect to a file system by using mount targets you create. We recommend creating a mount target in each of your VPC's Availability Zones so that EC2 instances across your VPC can access the file system.

	Availability Zone	Subnet		IP address	Security groups
<input type="checkbox"/>	us-east-2a				
<input type="checkbox"/>	us-east-2b				
<input checked="" type="checkbox"/>	us-east-2c	subnet-3█████ (default)		Automatic	sg-0█████ - launch-wizard-1

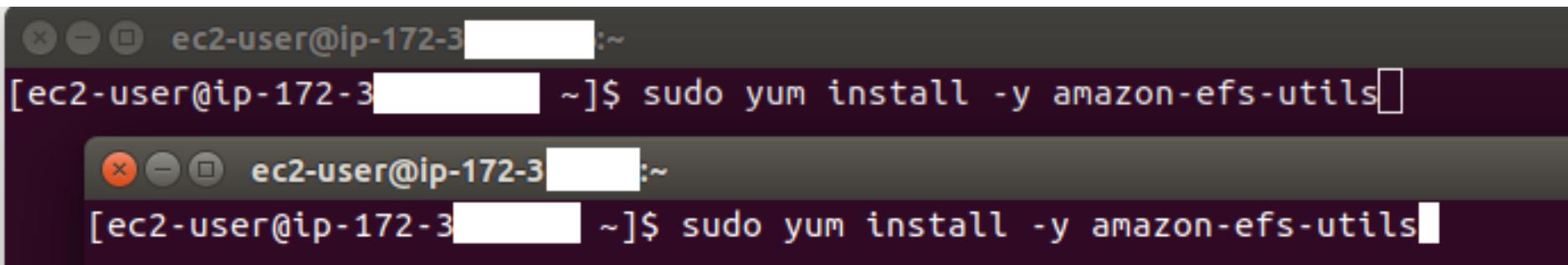
# Añadir NFS (EFS)

1. Configuramos el acceso
2. Creamos el sistema de archivos

	Name	File system ID	Metered size	Number of mount targets	Creation date			
●	giisEFS	fs-a[REDACTED]3	6.0 KiB	1	04/16/2019, 01:03:57 UTC			
Other details		Tags			<a href="#">Manage tags</a>			
Owner ID 3 [REDACTED]		 <a href="#">Name: giisEFS</a>						
File system state Available								
Performance mode General Purpose								
Throughput mode Bursting 								
Encrypted No								
Lifecycle policy None 								
File system access			<a href="#">Manage file system access</a>					
DNS name fs-a[REDACTED].efs.us-east-2.amazonaws.com 								
<a href="#">Amazon EC2 mount instructions (from local VPC)</a>								
<a href="#">Amazon EC2 mount instructions (across VPC peering connection)</a>								
<a href="#">On-premises mount instructions</a>								

# Añadir NFS (EFS)

1. Configuramos el acceso
2. Creamos el sistema de archivos
- 3. Instalamos en las instancias las utilidades EFS**



The image shows two terminal windows side-by-side. Both windows have a dark background and light-colored text. The top window has a title bar with three icons (close, minimize, maximize) and the text "ec2-user@ip-172-3 [REDACTED] :~". The bottom window also has a title bar with three icons and the same user and IP address. Both windows show the command "[ec2-user@ip-172-3 [REDACTED] ~]\$ sudo yum install -y amazon-efs-utils" followed by a cursor at the end of the line.

```
ec2-user@ip-172-3 [REDACTED] :~  
[ec2-user@ip-172-3 [REDACTED] ~]$ sudo yum install -y amazon-efs-utils  
  
ec2-user@ip-172-3 [REDACTED] :~  
[ec2-user@ip-172-3 [REDACTED] ~]$ sudo yum install -y amazon-efs-utils
```

# Añadir NFS (EFS)

1. Configuramos el acceso
2. Creamos el sistema de archivos
3. Instalamos en las instancias las utilidades EFS
4. **Montamos en las instancias EFS**

The image shows two terminal windows side-by-side. Both terminals have a dark background and light-colored text. The top terminal window has a title bar with three icons and the text "ec2-user@ip-172-3". The bottom terminal window also has a title bar with three icons and the same text "ec2-user@ip-172-3". Both windows show a command-line interface with the following sequence of commands:

```
[ec2-user@ip-172-3 ~]$ sudo mkdir efs  
[ec2-user@ip-172-3 ~]$ sudo mount -t efs fs-aa6414d3:/ efs  
[ec2-user@ip-172-3 ~]$ 
```

The command "sudo mkdir efs" creates a directory named "efs" in the current working directory (~). The command "sudo mount -t efs fs-aa6414d3:/ efs" mounts the EFS file system identified by the ID "fs-aa6414d3" at the path "/efs". The final command " [ec2-user@ip-172-3 ~]\$ " is a blank command prompt.

# Añadir NFS (EFS)

1. Configuramos el acceso
2. Creamos el sistema de archivos
3. Instalamos en las instancias las utilidades EFS
4. Montamos en las instancias EFS
5. Utilizamos EFS

```
ec2-user@ip-172-3 [6:~]
[ec2-user@ip-172-3 [6 ~]$ sudo touch efs/fileFromGiis1
[ec2-user@ip-172-3 [6 ~]$ ls -l efs/
total 4
-rw-r--r-- 1 root root 0 Apr 16 01:21 fileFromGiis1
[ec2-user@ip-172-3 [6 ~]$ ]
```

```
ec2-user@ip-172-3 [7:~]
[ec2-user@ip-172-3 [7 ~]$ ls -l efs/
total 4
-rw-r--r-- 1 root root 0 Apr 16 01:21 fileFromGiis1
[ec2-user@ip-172-3 [7 ~]$ ]
```

# Almacenamiento masivo de datos (S3)

## 1. Crear bucket

Hay que asignarle un nombre único (no pueden existir buckets de otros usuarios con ese nombre)

Indicamos si lo queremos privado, público, etc.

Permisos

The screenshot shows the AWS S3 console interface. At the top, there are buttons for 'Create bucket', 'Edit public access settings', 'Empty', and 'Delete'. It also displays '1 Regions' and a refresh icon. Below this, it says '1 Buckets'. A table lists the bucket details:

<input type="checkbox"/> Bucket name	Access	Region	Date created
<input type="checkbox"/> inhtest-giis-bucket-1	Bucket and objects not public	US East (Ohio)	Apr 17, 2019 5:24:56 PM GMT+0200

# Almacenamiento masivo de datos (S3)

1. Crear bucket
2. **Crear carpetas**

The screenshot shows a cloud storage interface with the following elements:

- Top navigation bar with buttons: Upload, Create folder, Download, Actions, US East (Ohio), and a refresh icon.
- Table view of bucket contents:

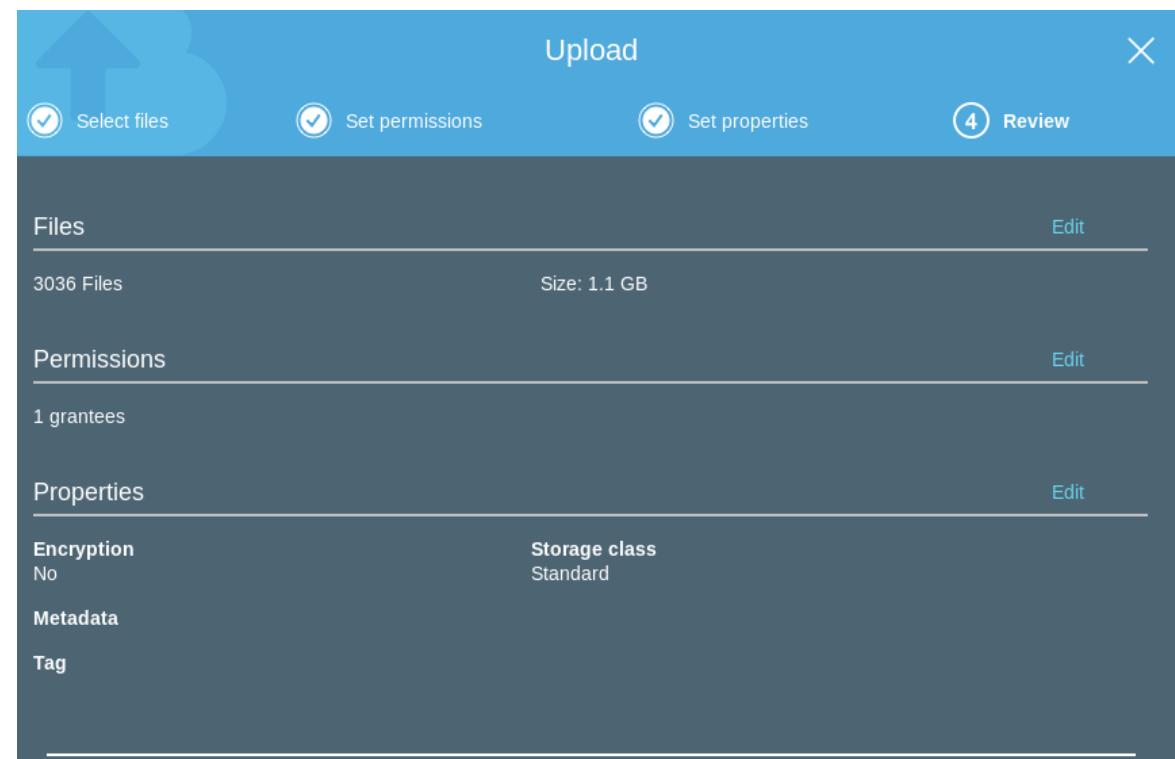
<input type="checkbox"/>	Name	Last modified	Size	Storage class
<input type="checkbox"/>	Data	--	--	--
<input type="checkbox"/>	Programs	--	--	--

- Pagination at the bottom: Viewing 1 to 2.

# Almacenamiento masivo de datos (S3)

1. Crear bucket
2. Crear carpetas
3. Añadir datos

Aunque en la imagen sólo se añada 1GB, se pueden añadir datos de forma masiva



# Crear cluster Big Data (EMR)

## 1. Crear cluster

### Hardware configuration

Instance type  The selected instance type adds 32 GiB of GP2 EBS storage per instance by default. [Learn more](#)

Number of instances  (1 master and 2 core nodes)

### Security and access

EC2 key pair  [Learn how to create an EC2 key pair.](#)

Permissions  Default  Custom

Use default IAM roles. If roles are not present, they will be automatically created for you with managed policies for automatic policy updates.

EMR role [EMR\\_DefaultRole](#) [i](#)

EC2 instance profile [EMR\\_EC2\\_DefaultRole](#) [i](#)

### General Configuration

Cluster name

Logging [i](#)

Launch mode  Cluster [i](#)  Step execution [i](#)

### Software configuration

Release

Applications

Core Hadoop: Hadoop 2.8.5 with Ganglia 3.7.2, Hive 2.3.4, Hue 4.3.0, Mahout 0.13.0, Pig 0.17.0, and Tez 0.9.1

HBase: HBase 1.4.9 with Ganglia 3.7.2, Hadoop 2.8.5, Hive 2.3.4, Hue 4.3.0, Phoenix 4.14.1, and ZooKeeper 3.4.13

Presto: Presto 0.214 with Hadoop 2.8.5 HDFS and Hive 2.3.4 Metastore

Spark: Spark 2.4.0 on Hadoop 2.8.5 YARN with Ganglia 3.7.2 and Zeppelin 0.8.1

Use AWS Glue Data Catalog for table metadata [i](#)

# Crear cluster Big Data (EMR)

## 1. Crear cluster

Crea automáticamente instancias EC2 y volúmenes

	Name	Instance ID	Instance Type	Availability Zone	Instance State	Status Checks	Alarm Status	Public IP
		i-04 [REDACTED]	m4.large	us-east-2c	running	2/2 checks ...	None	 ec2-18-2
		i-06 [REDACTED]	m4.large	us-east-2c	running	2/2 checks ...	None	 ec2-18-1
		i-08 [REDACTED]	m4.large	us-east-2c	running	2/2 checks ...	None	 ec2-3-14

Crea automáticamente grupos de seguridad

	Name	Group ID	Group Name	VPC ID	Owner	Description
		sg-075 [REDACTED]	ElasticMapReduce-master	vpc-e9 [REDACTED]	31 [REDACTED]	Master
		sg-08 [REDACTED]	ElasticMapReduce-slave	vpc-e9 [REDACTED]	31 [REDACTED]	Slave

(tienen distintas reglas de cortafuegos)

# Crear cluster Big Data (EMR)

1. Crear cluster
2. Ejecutamos programas (steps)

Add step X

Step type	Custom JAR
Name*	Wordcount in EMR
JAR location*	grams/hadoop-mapreduce-examples-2.4.0.jar <span style="color: red;">█</span>
Arguments	wordcount s3://inhtest-giis-bucket-1/Data/Books/ s3://inhtest-giis-bucket-1/OutputWc1
Action on failure	Continue

JAR location maybe a path into S3 or a fully qualified java class in the classpath.

These are passed to the main function in the JAR. If the JAR does not specify a main class in its manifest file you can specify another class name as the first argument.

What to do if the step fails.

Cancel Add

# Crear cluster Big Data (EMR)

1. Crear cluster
2. Ejecutamos programas (steps)
3. Esperamos hasta que finalice

The screenshot shows the AWS EMR Cluster Overview page. At the top, there's a navigation bar with 'Resource Groups', a user icon, 'jesus @ 3 [REDACTED]', 'Ohio', and 'Support'. Below the navigation bar are three buttons: 'Clone', 'Terminate', and 'AWS CLI export'. The main area displays a cluster named 'Cluster: inhtest\_gjis' with a status of 'Waiting'. A message indicates the cluster is ready after the last step completed. Below this, a horizontal menu bar includes 'Summary' (which is selected), 'Application history', 'Monitoring', 'Hardware', 'Configurations', 'Events', 'Steps', and 'Bootstrap actions'. A note states that Amazon EMR collects information from YARN applications and keeps historical information for up to seven days after applications have completed. It also mentions that detailed application history is only available for Spark and provides a 'Learn more' link. The 'YARN applications (1)' section shows a table with one row. The table has columns: Application ID, Type, Action, Status, Start time (UTC+2), and Duration. The single application listed is 'application\_1555511454980\_0001', which is a MapReduce job named 'word count' that succeeded on 2019-04-17 at 19:17 UTC+2, taking 1.1 hours.

Application ID	Type	Action	Status	Start time (UTC+2)	Duration
application_1555511454980_0001	MapReduce	word count	Succeeded	2019-04-17 19:17 (UTC+2)	1.1 h

# Crear cluster Big Data (EMR)

1. Crear cluster
2. Ejecutamos programas (steps)
3. Esperamos hasta que finalice
4. **Observamos el resultado almacenado en S3**

<input type="checkbox"/> Name ▾	Last modified ▾	Size ▾	Storage class ▾
<input type="checkbox"/> <a href="#">_SUCCESS</a>	Apr 17, 2019 8:26:26 PM GMT+0200	0 B	Standard
<input type="checkbox"/> <a href="#">part-r-00000</a>	Apr 17, 2019 8:26:11 PM GMT+0200	4.3 MB	Standard
<input type="checkbox"/> <a href="#">part-r-00001</a>	Apr 17, 2019 8:26:22 PM GMT+0200	4.3 MB	Standard
<input type="checkbox"/> <a href="#">part-r-00002</a>	Apr 17, 2019 8:26:25 PM GMT+0200	4.3 MB	Standard

Viewing 1 to 4 >

# Conectarse al cluster

## 1. Permitimos tráfico ssh entrante al maestro

Edit inbound rules

Type	Protocol	Port Range	Source	Description	X
All TCP	TCP	0 - 65535	Custom sg-07	Maestro 2 e.g. SSH for Admin Desktop	X
All TCP	TCP	0 - 65535	Custom sg-08	Esclavos e.g. SSH for Admin Desktop	X
Custom TCP	TCP	8443	Custom 52.	EMR e.g. SSH for Admin Desktop	X
All UDP	UDP	0 - 65535	Custom sg-07	Maestro 2 e.g. SSH for Admin Desktop	X
All UDP	UDP	0 - 65535	Custom sg-08	Esclavos e.g. SSH for Admin Desktop	X
All ICMP - IP	ICMP	0 - 65535	Custom sg-07	Maestro 2 e.g. SSH for Admin Desktop	X
All ICMP - IP	ICMP	0 - 65535	Custom sg-08	Esclavos e.g. SSH for Admin Desktop	X
SSH	TCP	22	Anywhere	0.0.0.0/0, ::/0 e.g. SSH for Admin Desktop	X

Add Rule

NOTE: Any edits made on existing rules will result in the edited rule being deleted and a new rule created with the new details. This will cause traffic that depends on that rule to be dropped for a very brief period of time until the new rule can be created.

Cancel Save

# Conectarse al cluster

1. Permitimos tráfico ssh entrante al maestro
2. **Conexión ssh con clave privada**

```
ssh -i CLAVE_PRIVADA NOMBRE_DNS_PÚBLICO
```

```
[hadoop@ip-172-3-15-14 ~]$ jesus@jesus-PC:~/Escritorio/introAWS$ ssh -i giis1key.pem hadoop@ec2-18-1[REDACTED].us-east-2.compute.amazonaws.com
The authenticity of host 'ec2-18-1[REDACTED].us-east-2.compute.amazonaws.com (18.1[REDACTED])' can't be established.
ECDSA key fingerprint is SHA256:[REDACTED]s.
Are you sure you want to continue connecting (yes/no)? yes
Warning: Permanently added 'ec2-18-1[REDACTED].us-east-2.compute.amazonaws.com,18.1[REDACTED]' (ECDSA) to the list of known hosts.
Last login: Wed Apr 17 17:35:44 2019

  _|_ _|_
 _|_| /   Amazon Linux AMI
 ___|\_\_|_|
https://aws.amazon.com/amazon-linux-ami/2018.03-release-notes/
7 package(s) needed for security, out of 12 available
Run "sudo yum update" to apply all updates.

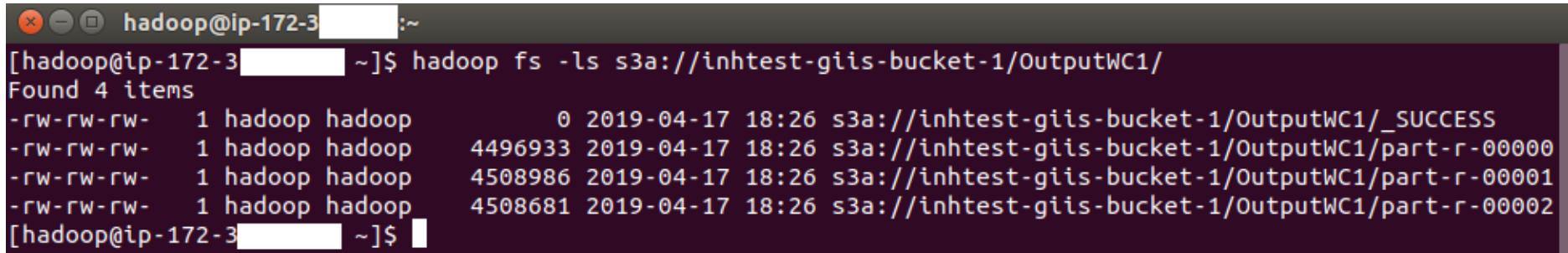
EEEEEEEEEEEEEEEEEE MMMMMMM    MMMMMMM RRRRRRRRRRRRRR
E:::::::::::::E M::::::M    M::::::M R:::::::::::::R
EE:::::EEEEEEEEE::::E M::::::M    M::::::M R:::::RRRRRR:::::R
 E::::E      EEEEE E M:::::::M    M:::::::M RR:::::R      R:::::R
 E::::E      M::::::M::::M    M:::M::::::M    R:::R      R:::::R
 E:::::EEEEEEEEE  M:::::M M:::M M:::M M:::::M    R:::::RRRRRR:::::R
 E:::::::::::E  M:::::M  M:::M::::M  M:::::M    R:::::::::::RR
 E:::::EEEEEEEEE  M:::::M  M::::M::::M  M:::::M    R:::::RRRRRR:::::R
 E:::::E      M:::::M  M:::M    M:::::M    R:::R      R:::::R
 E:::::E      EEEEE E M:::::M    MMM    M:::::M    R:::R      R:::::R
EE:::::EEEEEEEEE::::E M:::::M    M:::::M    R:::R      R:::::R
E:::::::::::E M:::::M    M::::M RR:::::R      R:::::R
EEEEEEEEEEEEEEEEEE MMMMMMM    MMMMMMM RRRRRRR    RRRRRR

[hadoop@ip-172-3-15-14 ~]$
```

# Conectarse al cluster

1. Permitimos tráfico ssh entrante al maestro
2. Conexión ssh con clave privada
3. **Observamos la salida del programa**

```
hadoop fs -ls s3a://inhtest-giis-bucket-1/OutputWC1/
```



```
[hadoop@ip-172-3 ~]$ hadoop fs -ls s3a://inhtest-giis-bucket-1/OutputWC1/
Found 4 items
-rw-rw-rw- 1 hadoop hadoop          0 2019-04-17 18:26 s3a://inhtest-giis-bucket-1/OutputWC1/_SUCCESS
-rw-rw-rw- 1 hadoop hadoop 4496933 2019-04-17 18:26 s3a://inhtest-giis-bucket-1/OutputWC1/part-r-00000
-rw-rw-rw- 1 hadoop hadoop 4508986 2019-04-17 18:26 s3a://inhtest-giis-bucket-1/OutputWC1/part-r-00001
-rw-rw-rw- 1 hadoop hadoop 4508681 2019-04-17 18:26 s3a://inhtest-giis-bucket-1/OutputWC1/part-r-00002
[hadoop@ip-172-3 ~]$
```

# Conectarse al cluster

1. Permitimos tráfico ssh entrante al maestro
2. Conexión ssh con clave privada
3. **Observamos la salida del programa**

```
hadoop fs -ls s3a://inhtest-giis-bucket-1/OutputWC1/
```

Hay comandos que nos requieren el access.key y secret.key

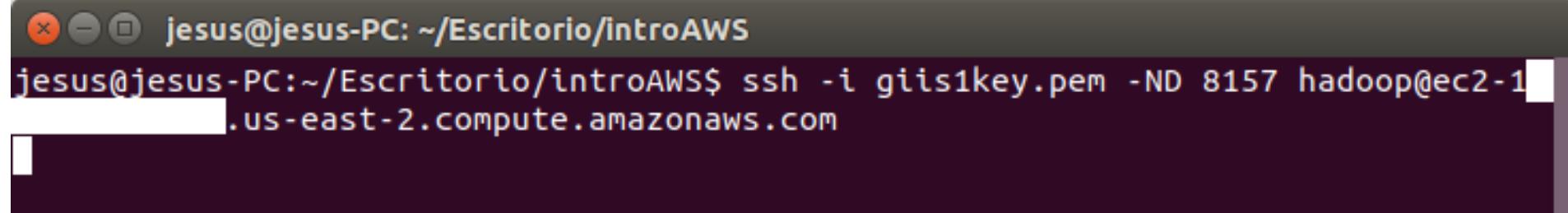
```
hadoop fs -  
Dfs.s3a.access.key=<NuevoAccessKey> -  
Dfs.s3a.secret.key=<NuevoSecret.Key> -ls  
s3a://inhtest-giis-bucket-1/OutputWC1/
```

# Configurar el cluster

- Habilitar servidores web del cluster

1. Crear tunnel ssh

```
ssh -i CLAVE_PRIVADA -ND PUERTO_LIBRE  
NOMBRE_MAESTRO_DNS_PÚBLICO
```



A screenshot of a terminal window titled "jesus@jesus-PC: ~/Escritorio/introAWS". The window contains the following command:

```
jesus@jesus-PC:~/Escritorio/introAWS$ ssh -i giis1key.pem -ND 8157 hadoop@ec2-1  
.us-east-2.compute.amazonaws.com
```

# Configurar el cluster

- Habilitar servidores web del cluster
  - 1. Crear tunnel ssh
  - 2. Instalar un proxy

The screenshot shows the Google Chrome browser interface. In the address bar, the text 'foxyproxy' is typed. Below the address bar, a sidebar on the left lists search results under the heading 'Funciones': 'foxyproxy', 'foxyproxybasic', 'foxyproxystandard', and 'remas'. The main content area is titled 'Extensiones' and displays a search result for 'FoxyProxy Standard'. It features a logo of a fox's head with the text 'FOXY PROXY' below it. To the right of the logo, the extension name 'FoxyProxy Standard' is displayed, followed by the text 'Ofrecido por: FoxyProxy'. Below this, a description reads 'FoxyProxy simplifies configuring browsers to access proxy-servers, or...'. A rating of '★★★★★ 717' and the category 'Herramientas para desarrolladores' are shown. At the bottom right of the card is a blue button labeled 'Añadir a Chrome'.

# Configurar el cluster

- Habilitar servidores web del cluster
  - 1. Crear tunnel ssh
  - 2. Instalar un proxy
  - 3. **Configurar el proxy**

# Configurar el cluster

```
<?xml version="1.0" encoding="UTF-8"?>
<foxyproxy>
  <proxies>
    <proxy name="emr-socks-proxy" id="2" notes="" fromSubscription="false" enabled="true"
mode="manual" selectedTabIndex="2" lastresort="false" animatedIcons="true" includeInCycle="true"
color="#0055E5" proxyDNS="true" noInternalIPs="false" autoconfMode="pac" clearCacheBeforeUse="false"
disableCache="false" clearCookiesBeforeUse="false" rejectCookies="false">
      <matches>
        <match enabled="true" name="*ec2*.amazonaws.com*" pattern="*ec2*.amazonaws.com*" isRegEx="false"
isBlackList="false" isMultiLine="false" caseSensitive="false" fromSubscription="false" />
        <match enabled="true" name="*ec2*.compute*" pattern="*ec2*.compute*" isRegEx="false"
isBlackList="false" isMultiLine="false" caseSensitive="false" fromSubscription="false" />
        <match enabled="true" name="10.*" pattern="http://10.*" isRegEx="false" isBlackList="false"
isMultiLine="false" caseSensitive="false" fromSubscription="false" />
        <match enabled="true" name="*10*.amazonaws.com*" pattern="*10*.amazonaws.com*" isRegEx="false"
isBlackList="false" isMultiLine="false" caseSensitive="false" fromSubscription="false" />
        <match enabled="true" name="*10*.compute*" pattern="*10*.compute*" isRegEx="false" isBlackList="false"
isMultiLine="false" caseSensitive="false" fromSubscription="false" />
        <match enabled="true" name="*.compute.internal*" pattern="*.compute.internal*" isRegEx="false"
isBlackList="false" isMultiLine="false" caseSensitive="false" fromSubscription="false" />
        <match enabled="true" name="*.ec2.internal*" pattern="*.ec2.internal*" isRegEx="false" isBlackList="false"
isMultiLine="false" caseSensitive="false" fromSubscription="false" />
      </matches>
      <manualconf host="localhost" port="8157" socksversion="5" isSocks="true" username="" password=""
domain="" />
    </proxy>
  </proxies>
</foxyproxy>
```

# Configurar el cluster

- Habilitar servidores web del cluster
  - 1. Crear tunnel ssh
  - 2. Instalar un proxy
  - 3. Configurar el proxy
  - 4. **Abrimos servidores web**

# Configurar el cluster

All Applications - Chromium

All Applications | Not secure | ec2-1-XXX-XXX-XXX.us-east-2.compute.amazonaws.com:8088/cluster

 All Applications

**Cluster Metrics**

Apps Submitted	Apps Pending	Apps Running	Apps Completed	Containers Running	Memory Used	Memory Total	Mem
1	0	0	1	0	0 B	12 GB	0 B

**Cluster Nodes Metrics**

Active Nodes	Decommissioning Nodes	Decommissioned Nodes	Lost Nodes	Unhealth
2	0	0	0	0

**Scheduler Metrics**

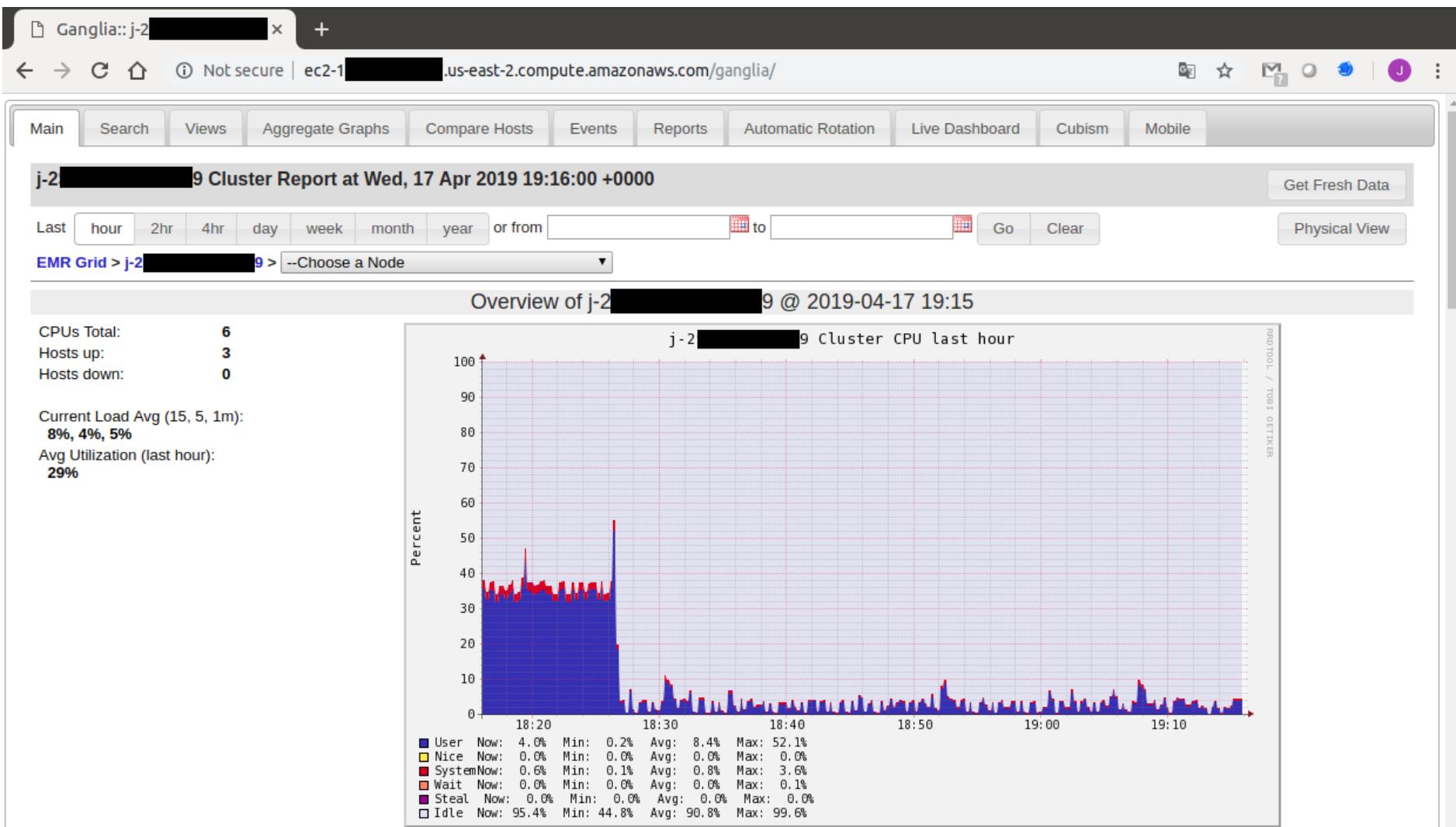
Scheduler Type	Scheduling Resource Type	Minimum Allocation	Maximum Allocat
Capacity Scheduler	[MEMORY]	<memory:32, vCores:1>	<memory:6144, vCores:4>

Show 20 ▾ entries

ID	User	Name	Application Type	Queue	Application Priority	StartTime	FinishTime	State	FinalStatus	Running Container
application_1555511454980_0001	hadoop	word count	MAPREDUCE	default	0	Wed Apr 17 19:17:37 +0200 2019	Wed Apr 17 20:26:25 +0200 2019	FINISHED	SUCCEEDED	N/A

Showing 1 to 1 of 1 entries

# Configurar el cluster



# Azure

- Servicios similares a AWS
- Los alumnos de Uniovi disponen de 100\$
  - <https://azure.microsoft.com/es-es/free/students/>

The screenshot shows the Microsoft Azure Sponsorships portal. The URL in the address bar is <https://www.microsoftazuresponsorships.com/Balance>. The interface includes a sidebar with 'Balance' and 'Usage' options. The main area displays a large green circle indicating 'TOTAL CREDIT 100 USD'. To the right, there are three sections: 'USED 0 USD', 'REMAINING 100 USD', and 'SUBSCRIPTIONS 1 ACTIVE'. A 'Subscription Usage' card shows a single active subscription for 'Azure para estudiantes'. The bottom of the page includes a note about the offer expiring in 365 days and usage details from May 24, 2021, to May 24, 2022.

SPONSORED

✓ Active - Offer expiring in 365 days

TOTAL CREDIT  
100 USD

USED  
0 USD

REMAINING  
100 USD

SUBSCRIPTIONS  
1 ACTIVE

Subscription Usage

e0c6ff58-af3d-4803-bd03-562a3bef59e8  
Azure para estudiantes

24 May 2021 - 24 May 2022 \*Based on usage through 5/24/2021

UO196538@uniovi.es

# Azure

## ■ Aplicaciones contenerizadas

### □ Entrar en “Instancias de contenedor”

The screenshot shows the Microsoft Azure portal interface for managing Container Instances. The title bar reads "Instancias de contenedor - Microsoft Azure". The address bar shows the URL: https://portal.azure.com/#blade/HubsExtension/BrowseResource/resourceType/Microsoft.ContainerInstance%2FcontainerGroup. The top navigation bar includes links for "Microsoft Azure", "Buscar recursos, servicios y documentos (G+)", and user information "UO196538@uniovi.es UNIVERSIDAD DE OVIEDO (UNIO...)".

The main content area is titled "Instancias de contenedor" and displays a message: "No hay instancias de contenedor para mostrar". Below this, there is descriptive text: "Use Azure Container Instances para crear y administrar contenedores de Docker en Azure sin necesidad de configurar máquinas virtuales ni de administrar infraestructura adicional. Para comenzar, cree un contenedor en Azure Container Instances." A "Más información" link is also present.

Filtering options at the top include "Filtrar por cualquier campo...", "Suscripción == todo", "Grupo de recursos == todo", "Ubicación == todo", and "Agregar filtro". Sorting and grouping options are available in the top right: "Sin agrupar" and "Vista de lista". The table header includes columns for "Nombre", "Grupo de recursos", "Ubicación", "Estado", "Tipo d...", "Total d...", and "Suscripción".

# Azure

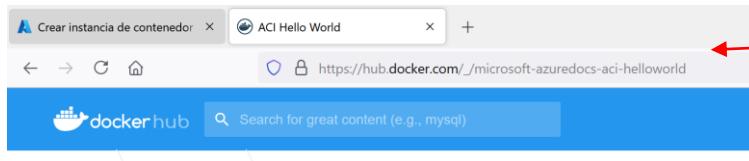
## ■ Aplicaciones contenidas

- Entrar en “Instancias”
- Crear una instancia

Conviene mirar cuál es la que interesa ej.  
poca latencia con clientes ej.

<https://azurespeedtest.azurewebsites.net/>

### Servidor web básico



ACI Hello World

By Microsoft

A simple Node.js web application used in Azure Container Instances for docs.microsoft.com.

“rg-” y “ci” son recomendados:

<https://docs.microsoft.com/es-es/azure/cloud-adoption-framework/ready/azure-best-practices/resource-abbreviations>

**Crear instancia de contenedor**

Selección de la suscripción para administrar recursos implementados y los costes. Use los grupos de recursos como carpetas para organizar y administrar todos los recursos.

Suscripción \* ⓘ

Azure para estudiantes

(Nuevo) rg-ejemploContenedor

Crear nuevo

ciejemplo

Grupo de recursos \* ⓘ

Detalle del contenedor

Nombre del contenedor \* ⓘ

ciejemplo

Región \* ⓘ

(US) Centro-Sur de EE. UU.

Origen de imagen \* ⓘ

Imágenes de inicio rápido

Azure Container Registry

Docker Hub u otro registro

Público  Privado

Imagen \* ⓘ

microsoft/aci-helloworld

Si no se especifica, se usará Docker Hub para el registro de contenedor y se extraerá la versión más reciente de la imagen.

Tipo de SO \*

Linux  Windows

Esta selección debe coincidir con el SO de la imagen elegida anteriormente.

Tamaño \* ⓘ

1 vcpu, 1.5 GiB de memoria, 0 gpu

Cambiar el tamaño

Revisar y crear

< Anterior

Siguiente: Redes >

Servicio de Azure para guardar imágenes

Otros repositorios públicos o privados

# Azure

## ■ Aplicaciones contenerizadas

- Entrar en “Instancias de contenedor”
- **Crear una instancia**

Pública: el contenedor tendrá una IP pública en la que podrá dar servicio. También permite establecer un nombre DNS para tener una URL a la que acceder al servicio

Privada: el contenedor tendrá una IP privada de alguna de nuestras redes virtuales

El contenedor dará servicio en:  
ciejemplo01.southcentralus.azurecontainer.io  
(nombre único a nivel mundial)

Puerto en el que se da el servicio

Crear instancia de contenedor ...

Datos básicos Redes Opciones avanzadas Etiquetas Revisar y crear

Elija entre tres opciones de redes para la instancia del contenedor:

- "Pública" creará una dirección IP pública para la instancia de contenedor.
- "Privada" le permitirá elegir una red virtual nueva o existente para la instancia del contenedor. Aún no está disponible para contenedores de Windows.
- "Ninguna" no creará ni una red virtual ni una IP pública. Podrá acceder igualmente a los registros de contenedor con la línea de comandos.

Tipo de red  Público  Privado  Ninguno

Etiqueta de nombre DNS  .southcentralus.azurecontainer.io

Puertos  Protocolo de puertos

80	TCP
----	-----

# Azure

## ■ Aplicaciones contenerizadas

- Entrar en “Instancias de contenedor”
- **Crear una instancia**

Mismas directivas que Docker

Variables de entorno para pasarle al contenedor.

- Marcar como seguro: Si significa que no se pueden ver desde las propiedades del contenedor (pero se puede ver desde dentro del contenedor)

The screenshot shows the 'Create container instance' wizard in the Azure portal. The current step is 'Advanced options'. The interface includes tabs for 'Basic information', 'Networks', 'Advanced options' (which is selected), 'Labels', and 'Review + Create'. A note below says 'Configure additional container variables and properties.' The 'Advanced options' section contains fields for 'Restart policy' (set to 'On failure'), 'Environment variables' (with a 'Mark as secure' dropdown set to 'No'), and 'Command invalidation' (with a text input field containing '[]'). A note at the bottom right says 'Example: [ "/bin/bash", "-c", "echo hello; sleep 100000" ]'. Navigation buttons at the bottom are 'Review + create', '< Previous', and 'Next: Labels >'.

Crear instancia de contenedor

Datos básicos Redes Opciones avanzadas Etiquetas Revisar y crear

Configura variables y propiedades del contenedor adicionales.

Directiva de reinicio ⓘ En caso de error

Variables de entorno

Marcar como seguro	Clave	Valor
No		

Invalidación de comando ⓘ [] Ejemplo: [ "/bin/bash", "-c", "echo hello; sleep 100000" ]

Revisar y crear < Anterior Siguiente: Etiquetas >

Por si queremos sustituir el entrypoint del contenedor

# Azure

## ■ Aplicaciones contenerizadas

- Entrar en “Instancias de contenedor”
- Crear una instancia
- **Entramos en el contenedor**

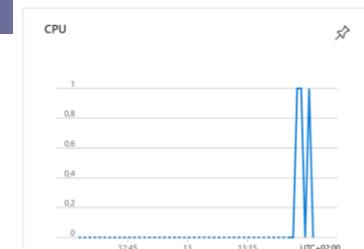
Para poder ver el servicio

The screenshot shows the Microsoft Azure portal interface. The user is in the 'Container Instances' blade under the 'ciejemplo' resource group. The instance 'ciejemplo' is selected. The 'Información general' tab is active. Two red arrows point from the text 'Para poder ver el servicio' to the 'Dirección IP (Public)' and 'FQDN' fields in the 'Información esencial' section.

Información esencial	Datos
Grupo de recursos (cambiar)	rg-ejemploContenedor
Estado	En ejecución
Ubicación	Centro-Sur de EE. UU.
Suscripción (cambiar)	Azure para estudiantes
Id. de suscripción	e0c6ff58-afd3-4803-bd03-562a3bef59e8
Etiquetas (cambiar)	Haga clic aquí para agregar etiquetas.
Vista JSON	

# Azure

Eventos Propiedades Registros Conectar



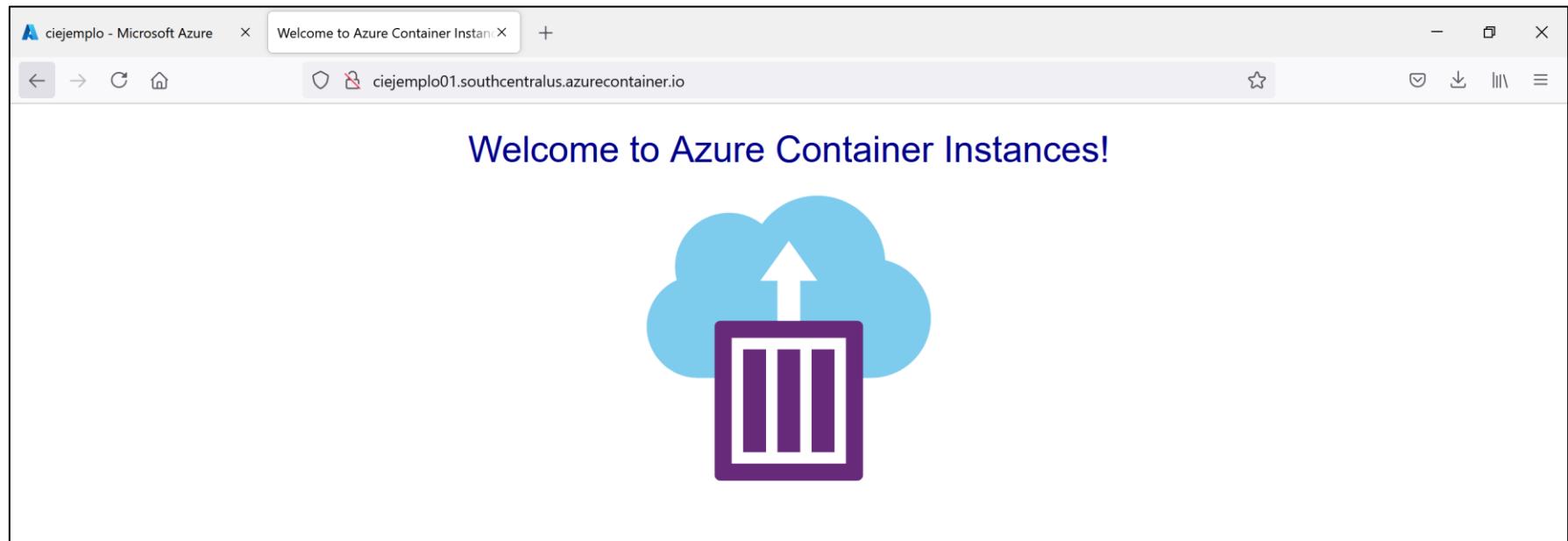
```
listening on port 80
::ffff:10.92.0.4 - - [05/Jul/2021:11:27:17 +0000] "GET / HTTP/1.1" 200 1663 "-" "Mozilla/5.0 (Windows NT 10.0; Win64; x64; rv:89.0) Gecko/20100101 Firefox/89.0"
::ffff:10.92.0.5 - - [05/Jul/2021:11:27:18 +0000] "GET /favicon.ico HTTP/1.1" 404 150 "http://ciejemplo01.southcentralus.azurecontainer.io/" "Mozilla/5.0 (Windows NT 10.0; Win64; x64; rv:89.0) Gecko/20100101 Firefox/89.0"
::ffff:10.92.0.5 - - [05/Jul/2021:11:29:44 +0000] "GET / HTTP/1.1" 200 1663 "-" "Mozilla/5.0 (Windows NT 10.0; Win64; x64; rv:89.0) Gecko/20100101 Firefox/89.0"
::ffff:10.92.0.4 - - [05/Jul/2021:11:29:44 +0000] "GET /favicon.ico HTTP/1.1" 404 150 "http://52.152.9.215/" "Mozilla/5.0 (Windows NT 10.0; Win64; x64; rv:89.0) Gecko/20100101 Firefox/89.0"
```

Logs

## ■ Aplicaciones contenerizadas

- Entrar en “Instancias de contenedor”
- Crear una instancia
- Entramos en el contenedor**

Servicio web que está dando el contenedor



# Azure

```
total 32
-rw-rw-r--    1 root      root        1664 Jul  5 11:46 index.html
-rw-rw-r--    1 root      root        331 Nov 29 2017 index.js
drwxr-xr-x  53 root      root      4096 Nov 29 2017 node_modules
-rw-r--r--   1 root      root     13276 Nov 29 2017 package-lock.json
-rw-rw-r--    1 root      root        211 Nov 29 2017 package.json
/usr/src/app #
```

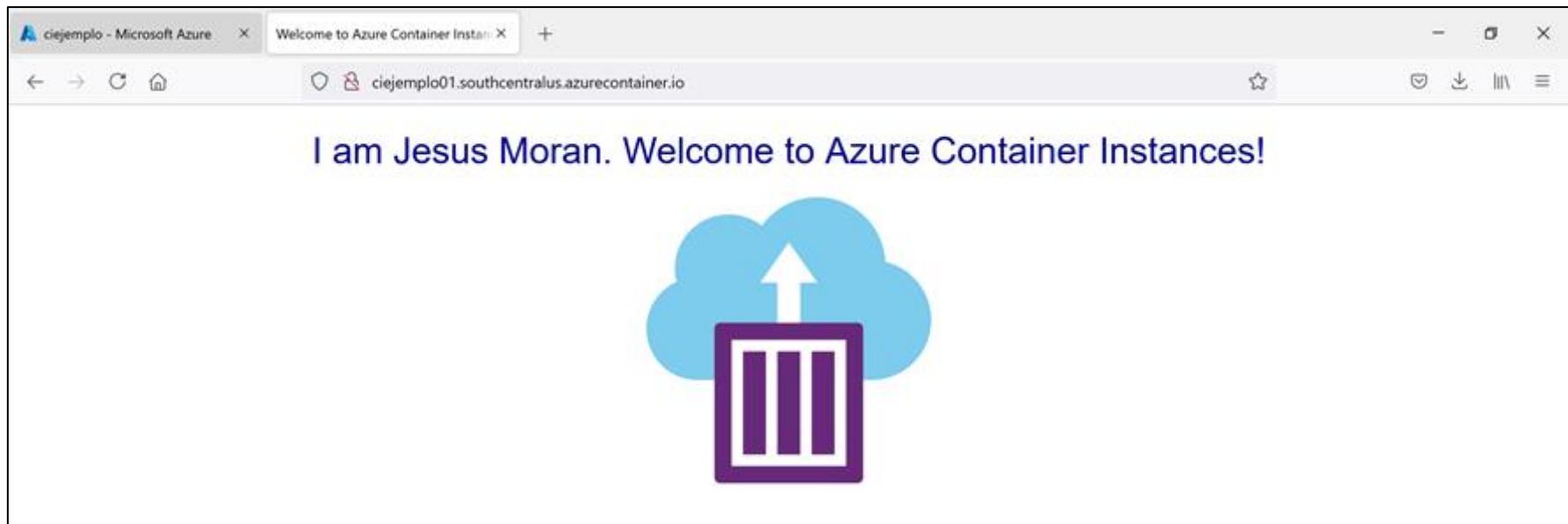
Nos podemos conectar al contenedor y por ejemplo modificarlo

## ■ Aplicaciones contenerizadas

- Entrar en “Instancias de contenedor”
- Crear una instancia
- **Entramos en el contenedor**

NO es recomendable modificar el contenedor, sino que habría que modificar la imagen y luego generar una nueva instancia

Servicio web que está dando el contenedor tras modificación



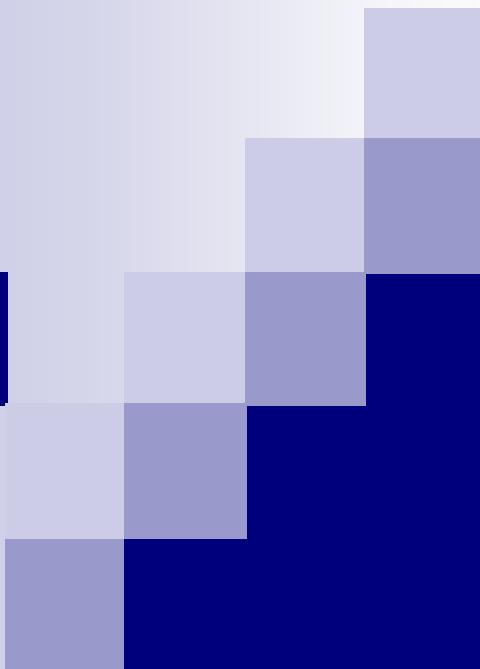
# Azure

## ■ Aplicaciones contenerizadas

- Entrar en “Instancias de contenedor”
- Crear una instancia
- Entramos en el contenedor
- Algo similar se puede hacer con App Services
  - Crear aplicaciones web o móviles:
    - Java (ej. spring boot sobre tomcat o embebido)
    - Php
    - Docker
    - ...
- Se pueden integrar con Github Actions

# Referencias para estudiantes

- [Amazon AWS for education](#)
- [Alibaba Cloud Student Discount](#)
- [Google Education Program](#)
- [Azure Education Program](#)



Jesús Morán y Cristian Augusto

**Grupo de Investigación en Ingeniería del Software**

<http://giis.uniovi.es>

**Universidad de Oviedo**

