

## P4 - Computación en la nube con AWS – Servicio EC2

En esta práctica se pretende que el alumno se familiarice con el entorno de trabajo propio de un sistema de computación en la nube pública. Se utilizará Amazon Web Services, AWS (<http://aws.amazon.com>), el sistema más popular actualmente. Primero el alumno aprenderá cómo crear una cuenta en AWS, explorará su plataforma de servicios y creará una alarma de facturación para asegurarse de no incurrir en cargos no deseados.

El trabajo de esta práctica utilizará servicios de la capa gratuita de AWS. A continuación, el alumno aprenderá cómo desplegar instancias desde las que ofrecer servicios web y cómo monitorizar las instancias que tiene activas. Luego, aprenderá cómo crear un balanceador de carga que reparta las peticiones de los usuarios entre distintas instancias. Finalmente, el alumno aprenderá cómo detener y eliminar las instancias que ha creado.

### SERVICIO EC2:

Brevemente, Amazon Elastic Compute Cloud (Amazon EC2) es uno de los principales servicios de computación en la nube proporcionado por Amazon Web Services (AWS). EC2 permite a los usuarios “alquilar máquinas virtuales” (instancias) en la nube, gestionarlas, utilizarlas y ejecutar aplicaciones en ellas.

### REALIZACIÓN DE LA PRÁCTICA:

1. Crear una cuenta personal en AWS (<http://aws.amazon.com>). Será necesario indicar una dirección de e-mail a la que el sistema dirigirá cualquier aviso sobre el uso, así como incluir un número de tarjeta de crédito sobre la cual el sistema cargará cualquier uso de servicios que vayan más allá de los ofrecidos en la “capa gratuita” de AWS. Estudiar los servicios ofrecidos en la capa gratuita de AWS y las condiciones de los mismos en la documentación (<http://aws.amazon.com/es/free>).

1. Estudiar los servicios ofrecidos en la capa gratuita de AWS y las condiciones de los mismos en la documentación:

Enlace para ver servicios de la capa gratuita: [https://aws.amazon.com/es/free/?all-free-tier.sort-by=item.additionalFields.SortRank&all-free-tier.sort-order=asc&awsf.Free%20Tier%20Types=\\*all&awsf.Free%20Tier%20Categories=\\*all](https://aws.amazon.com/es/free/?all-free-tier.sort-by=item.additionalFields.SortRank&all-free-tier.sort-order=asc&awsf.Free%20Tier%20Types=*all&awsf.Free%20Tier%20Categories=*all)

The screenshot shows the AWS Free Tier landing page. At the top, there are links for 'Contacte con nosotros', 'Soporte', 'Español', 'Mi cuenta', and 'Inicie sesión en la consola'. Below this, there's a navigation bar with links for 'Productos', 'Soluciones', 'Precios', 'Documentación', 'Aprender', 'Red de socios', 'AWS Marketplace', 'Habilitación para clientes', 'Eventos', 'Explorar más', and a search icon. A banner at the top says 'Nivel gratuito de AWS' with links for 'Información general', 'Categorías de nivel gratuito', '¿Cómo crear una cuenta?', 'Ofertas destacadas para empresas', 'Preguntas frecuentes', and 'Términos y condiciones'. The main content area is titled 'Explorar las categorías de productos principales' and shows icons for 'Computación', 'Base de datos', 'Almacenamiento', 'Contenedores', 'Aplicaciones web y móviles', 'Tecnología sin servidor', and 'Machine learning'. Below this, a section titled 'Detalles del nivel gratuito' provides specific information for each service:

Computación	Almacenamiento	Base de datos
Nivel gratuito 12 MESES GRATIS Amazon EC2 <b>750 horas</b> al mes	Nivel gratuito 12 MESES GRATIS Amazon S3 <b>5 GB</b> de almacenamiento estándar	Nivel gratuito 12 MESES DE USO GRATUITO Amazon RDS <b>750 horas</b> al mes de uso de la base de datos (se aplica a motores de bases de datos)

2. Entrar en su cuenta de AWS y estudiar el contenido de la consola de AWS. Crear una alarma de facturación (“billing alarm”) para que el sistema le envíe un e-mail de notificación si su uso de servicios excede de los ofrecidos en la capa gratuita de AWS. Aún así es imprescindible tener cuidado con no usar más servicios de los ofrecidos en la capa gratuita (no solicitar instancias no disponibles en dicha capa, no usar las instancias durante más tiempo del ofrecido en dicha capa, desactivar las instancias cuando deje de utilizarlas, etc). Para crear una alarma de facturación, seguir las instrucciones contenidas en la documentación de AWS, en:

## 2. Estudiar el contenido de la consola de AWS

The screenshot shows the AWS CloudWatch Metrics dashboard. At the top, there are links for 'Servicios', 'Buscar', and a search bar. Below this, there's a 'Página de inicio de la Consola' with sections for 'Visitados recientemente' (CloudWatch), 'Aplicaciones (0)', 'Le damos la bienvenida a AWS', 'AWS Health', and 'Costo y uso'. The 'Aplicaciones (0)' section shows a table with columns for 'Nombre', 'Descripción', 'Región', and 'Cuenta originaria'. A note says 'No hay aplicaciones. Comience creando una aplicación.' with a 'Crear aplicación' button. The 'Costo y uso' section shows a note 'Problemas abiertos 0'.

### 2. Crear alarma de facturación:

[https://docs.aws.amazon.com/es\\_es/AmazonCloudWatch/latest/monitoring/monitor\\_estimated\\_charges\\_with\\_cloudwatch.html#creating\\_billing\\_alarm\\_with\\_wizard](https://docs.aws.amazon.com/es_es/AmazonCloudWatch/latest/monitoring/monitor_estimated_charges_with_cloudwatch.html#creating_billing_alarm_with_wizard)

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Hay que seguir las instrucciones de este enlace:

[https://docs.aws.amazon.com/es\\_es/AmazonCloudWatch/latest/monitoring/monitor\\_estimated\\_charges\\_with\\_cloudwatch.html#creating\\_billing\\_alarm\\_with\\_wizard](https://docs.aws.amazon.com/es_es/AmazonCloudWatch/latest/monitoring/monitor_estimated_charges_with_cloudwatch.html#creating_billing_alarm_with_wizard)

The screenshot shows a web browser displaying the AWS CloudWatch documentation. The URL in the address bar is [https://docs.aws.amazon.com/es\\_es/AmazonCloudWatch/latest/monitoring/monitor\\_estimated\\_charges\\_with\\_cloudwatch.html#creating\\_billing\\_alarm\\_with\\_wizard](https://docs.aws.amazon.com/es_es/AmazonCloudWatch/latest/monitoring/monitor_estimated_charges_with_cloudwatch.html#creating_billing_alarm_with_wizard). The page title is "Crear una alarma de facturación para monitorizar los cargos estimados de AWS". The left sidebar contains a navigation menu for CloudWatch, including sections like "¿Qué es Amazon CloudWatch?", "Configuración inicial", "Introducción", "Facturación y costo de CloudWatch", "Panels", "Métricas", and "Alarms". The main content area describes the process of monitoring estimated charges using CloudWatch Metrics. It includes a note about CloudWatch Metrics being stored in the US East (N. Virginia) region and a note about the alarm activating when current charges exceed the threshold. A "nota" box provides information on analyzing CloudWatch Metrics charges. On the right side, there is a sidebar titled "En esta página" with links to related topics: "Habilitación de alertas de facturación", "Crear una alarma de facturación", and "Eliminación de una alarma de facturación".

## 2.1 Habilitar alarma de facturación

Hay que seguir los pasos de este enlace:

[https://docs.aws.amazon.com/es\\_es/AmazonCloudWatch/latest/monitoring/monitor\\_estimated\\_charges\\_with\\_cloudwatch.html#turning\\_on\\_billing\\_metrics](https://docs.aws.amazon.com/es_es/AmazonCloudWatch/latest/monitoring/monitor_estimated_charges_with_cloudwatch.html#turning_on_billing_metrics)

The screenshot shows a web browser displaying the AWS CloudWatch documentation. The URL in the address bar is [https://docs.aws.amazon.com/es\\_es/AmazonCloudWatch/latest/monitoring/monitor\\_estimated\\_charges\\_with\\_cloudwatch.html#turning\\_on\\_billing\\_metrics](https://docs.aws.amazon.com/es_es/AmazonCloudWatch/latest/monitoring/monitor_estimated_charges_with_cloudwatch.html#turning_on_billing_metrics). The page title is "Habilitación de alertas de facturación". The left sidebar contains a navigation menu for CloudWatch, including sections like "Recopile las métricas, registros y trazas con el agente de CloudWatch", "Incrustar métricas en los registros", "Servicios que publican métricas de CloudWatch", "Métricas de uso de AWS", "Tutorial de CloudWatch", "Uso de los AWS SDK", "Ejemplos de código", "Seguridad", "Registrar llamadas a la API con AWS CloudTrail", "Etiquetado de los recursos de CloudWatch", "Integración de Grafana", "Consola de CloudWatch para cuentas y Regiones cruzadas", "Service Quotas", and "Historial de documentos". The main content area describes the process of enabling billing metrics collection. It states that before creating an alarm for estimated charges, you must enable billing metrics alerts. It explains that after enabling billing metrics alerts, it takes 15 minutes for the data to appear in the CloudWatch Metrics console. A "Requisitos" section lists several requirements, including having an IAM user with permission to view billing information and enabling the "Receive billing metrics alerts" preference for the payer account. On the right side, there is a sidebar titled "En esta página" with links to related topics: "Habilitación de alertas de facturación", "Crear una alarma de facturación", and "Eliminación de una alarma de facturación".

Abra la consola de la página principal de facturación -> Preferencia de facturación ->  
Añadir datos

Enlace de página principal de facturación: <https://us-east-1.console.aws.amazon.com/billing/home#/>

The screenshot shows the AWS Billing Home page. On the left, there's a sidebar with navigation links like 'Savings Plans', 'Reservas', 'Preferencias y ajustes' (with 'Preferencias de pago', 'Preferencias de facturación', 'Preferencias de administración de costos', and 'Configuración de impuestos'), and 'Páginas heredadas' (with 'Página principal de facturación' highlighted in red). The main content area has three sections: 'Detección de anomalías de AWS', 'Administración de costos de AWS', and 'AWS Organizations'. A red arrow points to the 'Página principal de facturación' link in the sidebar.

The screenshot shows the 'Billing Preferences' page. It has two main sections: 'Preferencias de entrega de facturas' (with 'Entrega de facturas en PDF por correo electrónico' set to 'Desactivado') and 'Preferencias de las alertas' (with 'Recibir alertas del nivel gratuito de AWS' checked and 'aleingmar@gmail.com' entered as the email address). There are 'Actualizar' and 'Cancelar' buttons at the bottom.

## 2.2 Crear una alarma de facturación

Seguir los pasos de este enlace:

[https://docs.aws.amazon.com/es\\_es/AmazonCloudWatch/latest/monitoring/monitor\\_estimated\\_charges\\_with\\_cloudwatch.html#turning\\_on\\_billing\\_metrics](https://docs.aws.amazon.com/es_es/AmazonCloudWatch/latest/monitoring/monitor_estimated_charges_with_cloudwatch.html#turning_on_billing_metrics)

The screenshot shows a browser window with the URL [docs.aws.amazon.com/es\\_es/AmazonCloudWatch/latest/monitoring/monitor\\_estimated\\_charges\\_with\\_cloudwatch.html#turning\\_on\\_billing\\_metrics](https://docs.aws.amazon.com/es_es/AmazonCloudWatch/latest/monitoring/monitor_estimated_charges_with_cloudwatch.html#turning_on_billing_metrics). The page is titled "Crear una alarma de facturación". It includes a note section with important information about setting up the alarm in the US East region and enabling billing metrics. Below this, there's a step-by-step guide for creating the alarm via the CloudWatch console.

## Resumen de las características de la alarma creada:

The screenshot shows the "Seleccionar una métrica" (Select a metric) dialog box. Under the "Métricas (1)" tab, it lists "Divisa (Currency) 1/1" with "USD" selected. The "Nombre de métrica" (Metric name) is "EstimatedCharges" and the "Alarms" status is "Sin alarmas" (No alarms). The "Seleccionar una métrica" button is at the bottom right.

The screenshot shows the "Crear alarma" (Create alarm) wizard in the CloudWatch Metrics console. It is on the "Ver la vista previa y crear" (Preview and create) step. The "Paso 1: especifique la métrica y las condiciones" (Step 1: specify the metric and conditions) section is visible, showing a line graph with a blue line above a red line, indicating an alarm trigger condition. The "Paso 2: Configurar las acciones" (Step 2: Configure actions) and "Paso 3: Agregar nombre y descripción" (Step 3: Add name and description) steps are also shown on the left.

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The image consists of three vertically stacked screenshots of the AWS CloudWatch Metrics Alarm creation interface.

**Screenshot 1: Condition Configuration**

This step shows the configuration of alarm conditions. The condition is set to "EstimatedCharges" with a static threshold of 0.5. The metric is checked for being greater than or equal to 0.5 for the last 6 hours.

**Screenshot 2: Action Configuration**

This step shows the configuration of actions. A notification action is defined, which sends a message to the user "Me\_estan\_cobrando" whenever the alarm triggers.

**Screenshot 3: Summary and Confirmation**

This step summarizes the alarm details: Name - AWS-P4-ASSB-ME\_COBRAN, Description - CORREEEEE. It also displays a confirmation message stating that the alarm has been created successfully and some subscriptions are pending confirmation.

3. En la consola general de AWS, seleccionar el servicio EC2 para abrir la consola de Amazon EC2 y estudiar su contenido:

The screenshot shows the AWS Management Console with the following details:

- Top Navigation:** Shows the AWS logo, 'Servicios' (Services), and a search bar.
- Main Page:** 'Página de inicio de la Consola' (Console Home Page) > 'Todos los servicios' (All Services).
- Service Catalog:** 'Servicios por categoría' (Services by category) section listing various AWS services like Informática, Quantum Technologies, and Seguridad, identidad y conformidad.
- EC2 Service Dashboard:**
  - Region Selection:** 'Region' dropdown set to 'Estocolmo' (Stockholm), circled with a red arrow labeled '4'.
  - Resources:** Summary of resources in the region (0 instances, 0 load balancers, 0 elastic IP addresses, etc.).
  - Lanzar la instancia (Launch Instance):** A prominent orange button with a red arrow labeled '5' pointing to it.
  - Estado del servicio (Service Status):** Shows 'Panel de AWS Health'.
  - Zonas (Availability Zones):** Lists 'eu-north-1a' and 'eu-north-1b'.
  - Atributos de la cuenta (Account Attributes):** Shows 'VPC predeterminada' (Default VPC) set to 'vpc-0d1e06d932d57ac9e'.

4. Seleccionar como región EU (Ireland).

②

CREACIÓN DE INSTANCIAS DE AWS con EC2

5. Pulsar el botón “Launch Instance”

The screenshot shows the AWS EC2 'Launch an instance' wizard. The first step, 'Name and tags', has a text input field containing 'e.g. My Web Server'. The second step, 'Application and OS Images (Amazon Machine Image)', lists various operating systems. The 'Ubuntu' option is highlighted with a red arrow. Other options shown include Amazon Linux, macOS, Windows, Red Hat, and SUSE Linux. The right panel displays summary information: 1 instance, Software Image (AMI) set to 'Amazon Linux 2023.2.2...', Virtual server type set to 't2.micro', Firewall set to 'New security group', and Storage set to '1 volume(s) - 8 GiB'. A tooltip for the 'Free tier' is visible.

## 6. Seleccione una AMI (Amazon Machine Image) correspondiente a un servidor Ubuntu con tipo de virtualización “hvm”

The screenshot shows the 'Amazon Machine Image (AMI)' selection step. The 'Ubuntu' AMI is selected, indicated by a red arrow. The details for the selected AMI are shown: 'Ubuntu Server 22.04 LTS (HVM), SSD Volume Type', 'ami-0694d931cee176e7d', '64-bit (x86)', and 'Verified provider'. The right panel shows the same summary information as the previous screenshot, including the 'Free tier' tooltip.

## 7. Seleccione el tipo de instancia t2.micro.

Proceda con el asistente de creación de instancia seleccionando los ajustes por defecto.

En la página de creación de un par de claves (“key-pair”), cree un nuevo par de claves. Ello creará una clave pública y otra privada para conectarse de forma encriptada mediante SSH con el servidor.

The screenshot shows two overlapping AWS interface windows. The top window is titled 'Create key pair' and contains fields for 'Key pair name' (p4-assb), 'Key pair type' (RSA selected), 'Private key file format' (.pem selected), and a note about storing the private key securely. The bottom window is titled 'Summary' and shows the configuration for launching an instance, including the selected 'Key pair (login)' (p4-assb) and the 'Launch instance' button.

**Create key pair**

Key pair name  
Key pairs allow you to connect to your instance securely.  
 The name can include up to 255 ASCII characters. It can't include leading or trailing spaces.

Key pair type  
 RSA RSA encrypted private and public key pair  
 ED25519 ED25519 encrypted private and public key pair

Private key file format  
 .pem For use with OpenSSH  
 .ppk For use with PuTTY

⚠ When prompted, store the private key in a secure and accessible location on your computer. You will need it later to connect to your instance. [Learn more](#)

Cancel **Create key pair**

**Summary**

Number of instances [Info](#)  
1

Software Image (AMI)  
Canonical, Ubuntu, 22.04 LTS, ...[read more](#)  
ami-0694d931ceef76e7d

Virtual server type (instance type)  
t2.micro

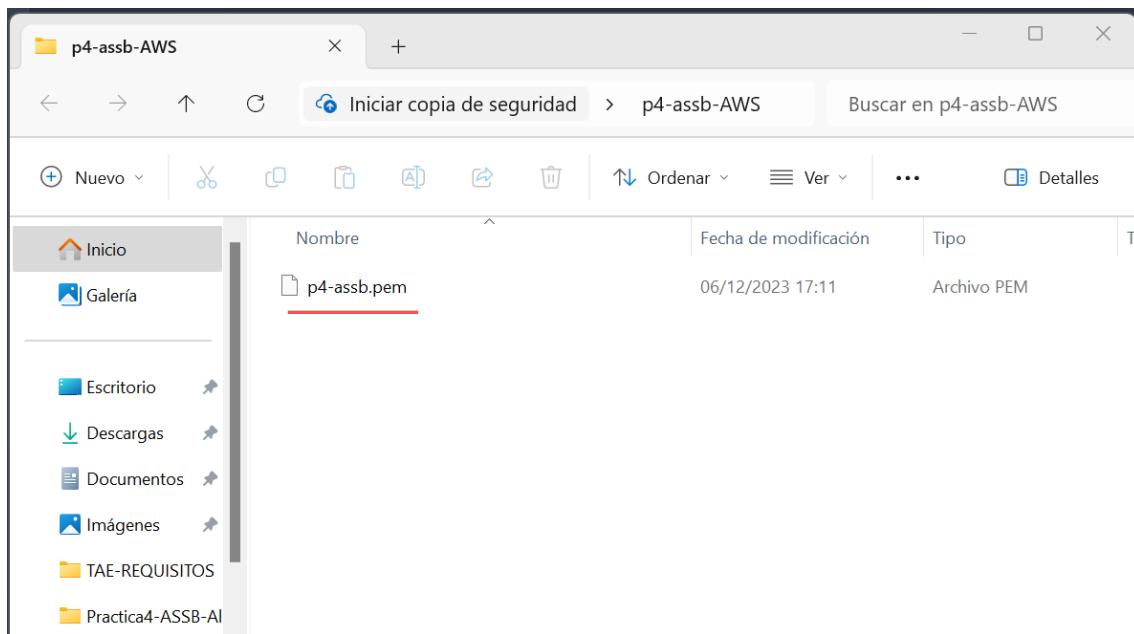
Firewall (security group)  
New security group

Storage (volumes)  
1 volume(s) - 8 GiB

Free tier: In your first year includes 750 hours of t2.micro (or t3.micro in the Regions in which t2.micro is unavailable) instance

Cancel **Launch instance**

Guarde el archivo con su clave privada en su directorio de trabajo. Lo necesitará siempre que quiera conectarse a las instancias que despliegue en AWS.



En la página de grupos de seguridad, cree un nuevo grupo de seguridad. Contendrá un conjunto de ajustes de seguridad que podrá aplicar a distintas instancias. Por defecto tendrá una regla para permitir conectarse por SSH al servidor, a través del puerto 22, desde cualquier IP.

Ajustes de regla por defecto:

Network settings	Summary
Network: vpc-092277074bc178240 Subnet: No preference (Default subnet in any availability zone) Auto-assign public IP: Enable Firewall (security groups): Create security group (highlighted by a red arrow)	Number of instances: 1 Software Image (AMI): Canonical, Ubuntu, 22.04 LTS Virtual server type (instance type): t2.micro Storage (volumes): 1 volume(s) - 8 GiB

Añada una nueva regla “Custom TCP rule” para permitir acceso TCP al puerto 80 del servidor (http) desde cualquier IP.

Darle a Edit -> Añadir un grupo de seguridad de red con 2 reglas, la regla por defecto y la regla descrita anteriormente en el enunciado

**Network settings**

VPC - required: **vpc-092277074bc178240** (default)

Subnet: **No preference**

Auto-assign public IP: **Enable**

Firewall (security groups): **Create security group**

Security group name - required: **Grupo reglas de seguridad-ASSB-P4**

Description - required: **Regla por defecto y otra para permitir acceso TCP al puerto 80 del servidor (http) de**

Inbound Security Group Rules

Security group rule 1 (TCP, 22, 0.0.0.0/0, Por defecto)

**ASSB-P4**

Grupo reglas de seguridad-ASSB-P4

This security group will be added to all network interfaces. The name can't be edited after the security group is created. Max length is 255 characters. Valid characters: a-z, A-Z, 0-9, spaces, and \_-./()#,@[]+=&;\$^\*

Description - required: **Regla por defecto y otra para permitir acceso TCP al puerto 80 del servidor (http) de**

Inbound Security Group Rules

Security group rule 1 (TCP, 22, 0.0.0.0/0, Por defecto)

Type: **ssh**, Protocol: **TCP**, Port range: **22**

Source type: **Anywhere**

Description - optional: **Por defecto**

Security group rule 2 (TCP, 80, 0.0.0.0/0, Custom TCP rule)

Type: **Custom TCP**, Protocol: **TCP**, Port range: **80**

Source type: **Anywhere**

Description - optional: **Custom TCP rule**

**Summary**

Number of instances: **1**

Firewall (security group): **New security group**

Storage (volumes): **1 volume(s) - 8 GiB**

**Free tier:** In your first year includes 750 hours of t2.micro (or t3.micro in the Regions in which t2.micro is unavailable) instance usage on free tier AMIs per month, 30 GiB of EBS storage, 2 million IOs, 1 GB of snapshots, and 100 GB of bandwidth to the internet.

**Launch instance**

**Summary**

Number of instances: **1**

Firewall (security group): **New security group**

Storage (volumes): **1 volume(s) - 8 GiB**

**Free tier:** In your first year includes 750 hours of t2.micro (or t3.micro in the Regions in which t2.micro is unavailable) instance usage on free tier AMIs per month, 30 GiB of EBS storage, 2 million IOs, 1 GB of snapshots, and 100 GB of bandwidth to the internet.

**Launch instance**

Auto-assign public IP [Info](#)

Enable

Firewall (security groups) [Info](#)  
A security group is a set of firewall rules that control the traffic for your instance. Add rules to allow specific traffic to reach your instance.

Create security group  Select existing security group

Security group name - required  
**Grupo reglas de seguridad-ASSB-P4**

This security group will be added to all network interfaces. The name can't be edited after the security group is created. Max length is 255 characters. Valid characters: a-z, A-Z, 0-9, spaces, and \_-:/()#@[]+=&;{}!\$^

Description - required [Info](#)  
Regla por defecto y otra para permitir acceso TCP al puerto 80 del servidor (http) de

Inbound Security Group Rules

- ▶ Security group rule 1 (TCP, 22, 0.0.0.0/0, Por defecto)  Remove
- ▶ Security group rule 2 (TCP, 80, 0.0.0.0/0, Custom TCP rule)  Remove

**⚠️** Rules with source of 0.0.0.0/0 allow all IP addresses to access your instance. We recommend setting security group rules to allow access from known IP addresses only.

Add security group rule

- Importante: La configuración anterior es muy insegura y no se recomienda para ninguna instancia permanente. La utilizaremos por sencillez para realizar esta práctica. En su lugar, para un servicio permanente se recomienda permitir sólo el acceso mediante SSH a una única IP conocida.

Proceda con el asistente y lance la instancia.

Add security group rule

Configure storage [Info](#)

Advanced

1x 8 GiB gp2 Root volume (Not encrypted)

Free tier eligible customers can get up to 30 GB of EBS General Purpose (SSD) or Magnetic storage

Add new volume

The selected AMI contains more instance store volumes than the instance allows. Only the first 0 instance store volumes from the AMI will be accessible from the instance

Click refresh to view backup information   
The tags that you assign determine whether the instance will be backed up by any Data Lifecycle Manager policies.

0 x File systems  Edit

Advanced details [Info](#)

Summary

Number of instances [Info](#)  
1

Software Image (AMI)  
Canonical, Ubuntu, 22.04 LTS, ... [read more](#)  
ami-0694d951ceef176e7d

Virtual server type (instance type)  
t2.micro

Firewall (security group)  
New security group

Storage (volumes)  
1 volume(s) - 8 GiB

Free tier: In your first year includes 750 hours of t2.micro (or t3.micro in the Regions in which t2.micro is unavailable) instance

Cancel  Launch instance  Review commands

**Success**  
Successfully initiated launch of instance (i-01e7ecd91c23b6d72)

Launch log

Initializing requests	Succeeded
Creating security groups	Succeeded
Creating security group rules	Succeeded
Launch initiation	Succeeded

**Next Steps**

What would you like to do next with this instance, for example "create alarm" or "create backup"

- Create billing and free tier usage alerts
- Connect to your instance
- Connect an RDS database
- Create EBS snapshot policy

8. Observe el estado de la instancia en la consola y espere hasta que esté ejecutándose (running). Luego tome nota del nombre público DNS de la instancia, que aparece en la consola.

El nombre público DNS de la instancia es: **ec2-34-249-17-67.eu-west1.compute.amazonaws.com**

Instances (1/1) Info

Name	Instance ID	Instance state	Instance type	Status check	Alarm status	Availability Zone	Public IPv4 DNS
i-01e7ecd91c23b6d72	i-01e7ecd91c23b6d72	Running	t2.micro	Initializing		eu-west-1b	ec2-34-249-17-67

**Instance: i-01e7ecd91c23b6d72**

Details Status and alarms New Monitoring Security Networking Storage Tags

Instance summary Info

Instance ID: i-01e7ecd91c23b6d72	Public IPv4 address: 34.249.17.67 [Open address]	Private IPv4 addresses: 172.31.19.10
IPv6 address: -	Instance state: Running	Public IPv4 DNS: ec2-34-249-17-67.eu-west-1.compute.amazonaws.com [Open address]
Hostname type: IP name: ip-172-31-19-10.eu-west-1.compute.internal	Private IP DNS name (IPv4 only): ip-172-31-19-10.eu-west-1.compute.internal	Elastic IP addresses: -
Answer private resource DNS name: IPv4 (A)	Instance type: t2.micro	



### CONEXIÓN A INSTANCIAS POR SSH (EC2)

9. Conéctese a la instancia mediante SSH. Para ello, haga click con el botón derecho del ratón sobre el campo “Instance State” de la instancia en la consola de EC2 (página “Instances”) y seleccione “Connect”.

Instance: i-01e7ecd91c23b6d72

Hostname type  
IP name: ip-172-31-19-10.eu-west-1.compute.internal

Answer private resource DNS name  
IPv4 (A)

Auto-assigned IP address  
34.249.17.67 [Public IP]

IAM Role  
-

IMDSv2  
Required

Priv  
Inst  
VPC

Launch instances  
Launch instance from template  
Migrate a server  
**Connect**  
Stop instance  
Start instance  
Reboot instance  
Hibernate instance  
Terminate instance  
Instance settings  
Networking  
Security  
Image and templates  
Monitor and troubleshoot

Elastic IP addresses  
AWS Compute Optimizer finding  
Opt-in to AWS Compute Optimizer for recomme  
Learn more

Open address

Le aparecerá una ventana que le explicará cómo conectarse a la instancia mediante un cliente de SSH externo (por ejemplo, mediante un comando como el siguiente en un terminal de Linux: `ssh -i /ruta/a/mi/clavepublica.pem ubuntu@publicDNS`; puede investigar más detalles si es necesario en la documentación de AWS), o bien podrá seleccionar conectarse mediante un cliente SSH Java directamente a través del navegador.

Si elige esta última opción, tendrá que introducir el nombre de archivo (con su ruta completa) de la clave privada que creó previamente y a continuación lanzar el cliente SSH

①

**Conectarse a la instancia desde el navegador -> darle al botón naranja que pone Conect**

aws Services Search [Alt+S]

≡ Connect to instance [Info](#)

Connect to your instance i-01e7ecd91c23b6d72 using any of these options

EC2 Instance Connect Session Manager SSH client EC2 serial console

Instance ID: i-01e7ecd91c23b6d72

Connection Type:

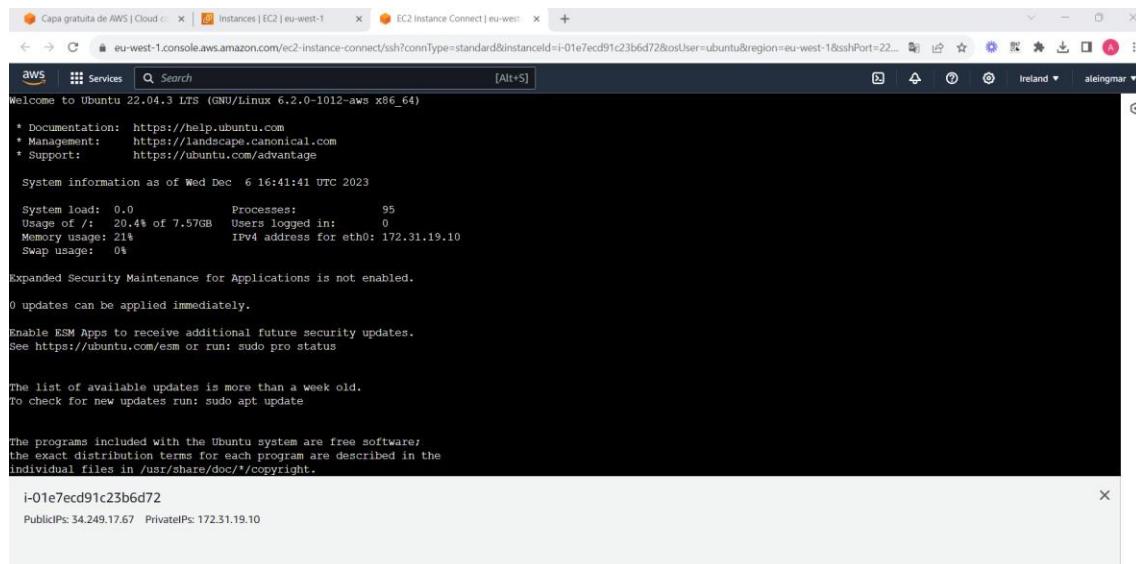
- Connect using EC2 Instance Connect  
Connect using the EC2 Instance Connect browser-based client, with a public IPv4 address.
- Connect using EC2 Instance Connect Endpoint  
Connect using the EC2 Instance Connect browser-based client, with a private IPv4 address and a VPC endpoint.

Public IP address: 34.249.17.67

User name: ubuntu

Note: In most cases, the default user name, ubuntu, is correct. However, read your AMI usage instructions to check if the AMI owner has changed the default AMI user name.

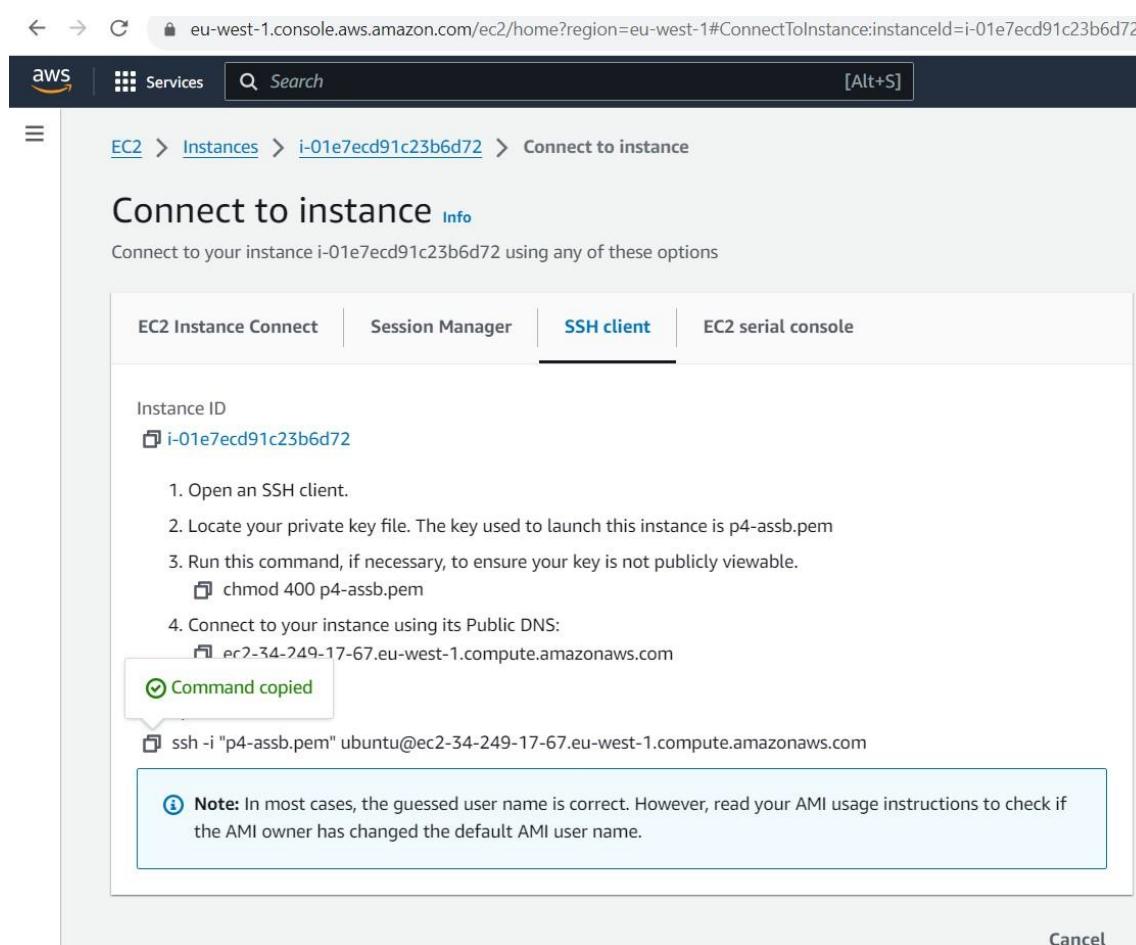
Cancel **Connect**



The screenshot shows a terminal window titled "Capa gratuita de AWS | Cloud" with three tabs: "Instances | EC2 | eu-west-1", "EC2 Instance Connect | eu-west-1", and the current tab, "eu-west-1.console.aws.amazon.com/ec2-instance-connect/ssh?connType=standard&instanceId=i-01e7ecd91c23b6d72&osUser=ubuntu&region=eu-west-1&sshPort=22...". The window title is "[Alt+S]". The terminal displays system information for Wednesday, December 6, 2023, at 16:41:41 UTC. It includes details like system load (0.0), memory usage (20.4% of 7.57GB), swap usage (0%), and network information (IPv4 address 172.31.19.10). It also mentions ESM Apps and available updates. At the bottom, it shows the instance ID (i-01e7ecd91c23b6d72) and public/private IP addresses.

②

## Conectarse a la instancia AWS a través de la terminal Linux local.



The screenshot shows the "Connect to instance" page for the instance i-01e7ecd91c23b6d72. The "SSH client" tab is selected. It provides instructions for connecting using an SSH client, including the instance ID (i-01e7ecd91c23b6d72) and a command to copy. A green message box indicates the command has been copied. A note at the bottom states: "Note: In most cases, the guessed user name is correct. However, read your AMI usage instructions to check if the AMI owner has changed the default AMI user name." A "Cancel" button is visible at the bottom right.

## Alejandro Inglés Martínez – Práctica 3 – Computación en la nube con AWS

```
aleingmar@DESKTOP-2IE63G4:~/CARRERA/ASSB/p4-assb-AWS$ ssh -i "p4-assb.pem" ubuntu@ec2-34-242-66-238.eu-west-1.compute.amazonaws.com
The authenticity of host 'ec2-34-242-66-238.eu-west-1.compute.amazonaws.com (34.242.66.238)' can't be established.
ECDSA key fingerprint is SHA256:Flyr4eCybTVrbnuQyGZuB5Qg1C2jlf5JrRHrgz2tvMo.
Are you sure you want to continue connecting (yes/no/[fingerprint])? yes
Warning: Permanently added 'ec2-34-242-66-238.eu-west-1.compute.amazonaws.com,34.242.66.238' (ECDSA) to the list of known hosts.
Welcome to Ubuntu 22.04.3 LTS (GNU/Linux 6.2.0-1012-aws x86_64)

 * Documentation: https://help.ubuntu.com
 * Management: https://landscape.canonical.com
 * Support: https://ubuntu.com/advantage

 System information as of Wed Dec 6 18:18:46 UTC 2023

 System load: 0.53369140625   Processes:          104
 Usage of /: 20.5% of 7.57GB  Users logged in:      0
 Memory usage: 22%           IPv4 address for eth0: 172.31.19.245
 Swap usage:  0%

Expanded Security Maintenance for Applications is not enabled.

0 updates can be applied immediately.

Enable ESM Apps to receive additional future security updates.
See https://ubuntu.com/esm or run: sudo pro status
```

```
ubuntu@ip-172-31-19-245:~:~$ root@DESKTOP-2IE63G4:/home/ubuntu:~:~$ +:~$ 
System load: 0.53369140625   Processes:          104
Usage of /: 20.5% of 7.57GB  Users logged in:      0
Memory usage: 22%           IPv4 address for eth0: 172.31.19.245
Swap usage:  0%

Expanded Security Maintenance for Applications is not enabled.

0 updates can be applied immediately.

Enable ESM Apps to receive additional future security updates.
See https://ubuntu.com/esm or run: sudo pro status

The list of available updates is more than a week old.
To check for new updates run: sudo apt update

The programs included with the Ubuntu system are free software;
the exact distribution terms for each program are described in the
individual files in /usr/share/doc/*/*copyright.

Ubuntu comes with ABSOLUTELY NO WARRANTY, to the extent permitted by
applicable law.

To run a command as administrator (user "root"), use "sudo <command>".
See "man sudo_root" for details.

ubuntu@ip-172-31-19-245:~$ ls
ubuntu@ip-172-31-19-245:~$ cd
ubuntu@ip-172-31-19-245:~$ sudo apt-get install apache2
Reading package lists... Done
Building dependency tree... Done
```

10. Una vez conectado a la instancia EC2, verifique que se encuentra en una máquina virtual con sistema operativo linux e investigue las características del hardware de la máquina y su estado actual (comandos útiles: uname -a, top, w, dmesg, lshw, less /proc/cpuinfo).

**less /proc/cpuinfo -> para salir presionar la tecla q**

```

processor : 0
vendor_id : GenuineIntel
cpu family : 6
model : 79
model name : Intel(R) Xeon(R) CPU E5-2686 v4 @ 2.30GHz
stepping : 1
microcode : 0xb000040
cpu MHz : 2300.070
cache size : 46080 KB
physical id : 0
siblings : 1
core id : 0
cpu cores : 1
apicid : 0
initial apicid : 0
fpu : yes
fpu exception : yes
cpuid level : 13
wp : yes
flags : fpu vme de pse tsc msr pae mce cx8 apic sep mtrr pge mca cmov pat pse36 clflush mmx fxsr sse sse2 ht syscall nx rdtscp lm constant_tsc rep_good nopl xt
pology cpuid tsc_known_freq pni pclmulqdq ssse3 fma cx16 pcid sse4_1 sse4_2 x2apic movebe popcnt tsc_deadline_timer aes xsave avx f16c rdrand hypervisor lahf_lm abm cpuid_
fault invpcid_single pti fsgsbase bmi1 avx2 smep bmi2 erms invpcid xsaveopt
bugs : cpu_meltdown spectre_v1 spectre_v2 spec_store_bypass lltf mds swapgs itlb_multihit mmio_stale_data
bogomips : 4600.02
clflush size : 64
cache_alignment : 64
address sizes : 46 bits physical, 48 bits virtual
[]

i-01e7ecd91c23b6d72
PublicIPs: 34.249.17.67 PrivateIPs: 172.31.19.10

```

**top**

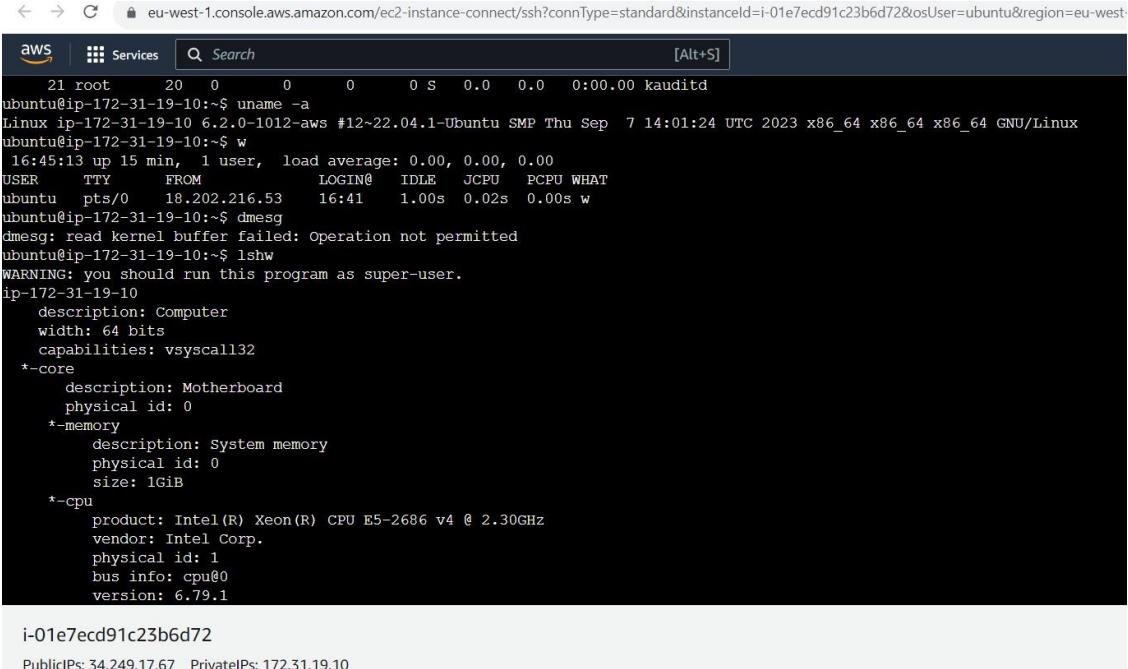
PID	USER	PR	NI	VIRT	RES	SHR	S	%CPU	%MEM	TIME+	COMMAND
1576	ubuntu	20	0	17296	7788	5504	S	0.3	0.8	0:00.01	sshd
<b>1598</b>	<b>ubuntu</b>	<b>20</b>	<b>0</b>	<b>10876</b>	<b>3840</b>	<b>3200</b>	<b>R</b>	<b>0.3</b>	<b>0.4</b>	<b>0:00.01</b>	<b>top</b>
1	root	20	0	167432	12616	8264	S	0.0	1.3	0:05.47	systemd
2	root	20	0	0	0	0	S	0.0	0.0	0:00.00	kthreadd
3	root	0	-20	0	0	0	I	0.0	0.0	0:00.00	rcu_gp
4	root	0	-20	0	0	0	I	0.0	0.0	0:00.00	rcu_par_gp
5	root	0	-20	0	0	0	I	0.0	0.0	0:00.00	slub_flushwq
6	root	0	-20	0	0	0	I	0.0	0.0	0:00.00	netns
8	root	0	-20	0	0	0	I	0.0	0.0	0:00.00	kworker/0:0H-events_highpri
10	root	0	-20	0	0	0	I	0.0	0.0	0:00.00	mm_percpu_wq
11	root	20	0	0	0	0	I	0.0	0.0	0:00.00	rcu_tasks_rude_kthread
12	root	20	0	0	0	0	I	0.0	0.0	0:00.00	rcu_tasks_trace_kthread
13	root	20	0	0	0	0	S	0.0	0.0	0:00.07	ksoftirqd/0
14	root	20	0	0	0	0	I	0.0	0.0	0:00.45	rcu_sched
15	root	rt	0	0	0	0	S	0.0	0.0	0:00.00	migration/0
16	root	-51	0	0	0	0	S	0.0	0.0	0:00.00	idle_inject/0
17	root	20	0	0	0	0	I	0.0	0.0	0:00.10	kworker/0:1-cgroup_destroy
18	root	20	0	0	0	0	S	0.0	0.0	0:00.00	cpuhp/0
19	root	20	0	0	0	0	S	0.0	0.0	0:00.00	kdevtmpfs
20	root	0	-20	0	0	0	I	0.0	0.0	0:00.00	inet_frag_wq
21	root	20	0	0	0	0	S	0.0	0.0	0:00.00	kauditd

**uname -a**

**w**

**dmesg**

**lshw**

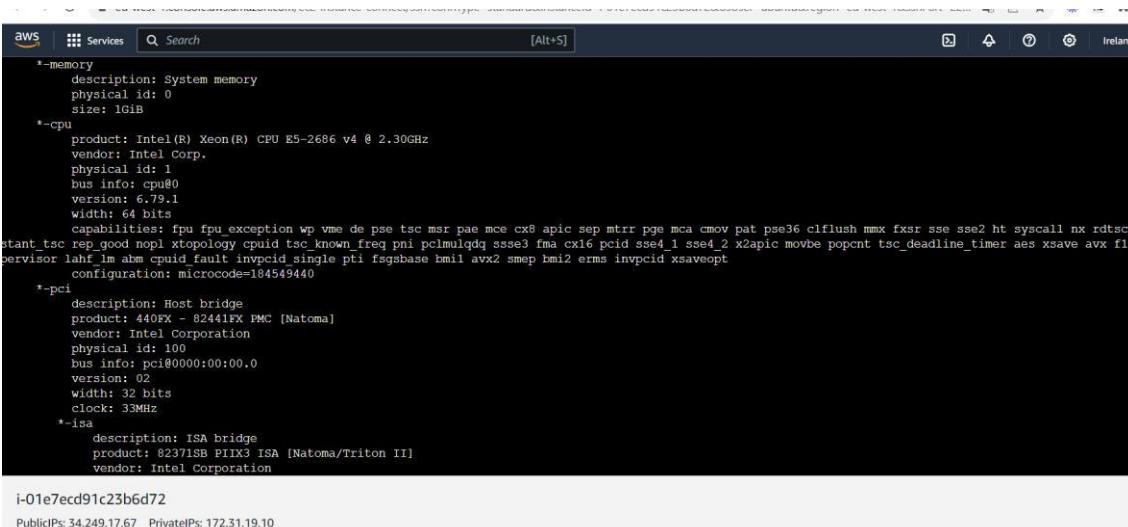


```

21 root 20 0 0 0 S 0.0 0.0 0:00.00 kaudited
ubuntu@ip-172-31-19-10:~$ uname -a
Linux ip-172-31-19-10 6.2.0-1012-aws #12~22.04.1-Ubuntu SMP Thu Sep 7 14:01:24 UTC 2023 x86_64 x86_64 x86_64 GNU/Linux
ubuntu@ip-172-31-19-10:~$ w
16:45:13 up 15 min, 1 user, load average: 0.00, 0.00, 0.00
USER    TTY      FROM             LOGIN@   IDLE   JCPU   PCPU WHAT
ubuntu  pts/0   18.202.216.53   16:41    1.00s  0.02s  0.00s w
ubuntu@ip-172-31-19-10:~$ dmesg
dmesg: read kernel buffer failed: Operation not permitted
ubuntu@ip-172-31-19-10:~$ lshw
WARNING: you should run this program as super-user.
ip-172-31-19-10
  *-core
    description: Computer
    width: 64 bits
    capabilities: vsyscall32
  *-cpu
    description: Motherboard
    physical id: 0
  *-memory
    description: System memory
    physical id: 0
    size: 1GiB
  *-cpu
    product: Intel(R) Xeon(R) CPU E5-2686 v4 @ 2.30GHz
    vendor: Intel Corp.
    physical id: 1
    bus info: cpu@0
    version: 6.79.1
    width: 64 bits
    capabilities: fpu fpu_exception wp vme de pse tsc msr pae mce cx8 apic sep mtrr pge mca cmov pat pse36 clflush mmx fxsr sse sse2 ht syscall nx rdtsvp
    stnt tsc rep_good nopl xttopology cpuid tsc_known_freq pni pclmulqdq ssse3 fma cx16 pcid sse4_1 sse4_2 x2apic movbe popcnt tsc_deadline_timer aes xsave avx f16
    serverlahf lm abm cpuid_fault invpcid_single pti fsgsbase bmi1 bmi2 smep bmi2 erms invpcid xsaveopt
    configuration: microcode=184549440
  *-pci
    description: Host bridge
    product: 440FX - 82441FX PMC [Natoma]
    vendor: Intel Corporation
    physical id: 100
    bus info: pci@0000:00:00.0
    version: 02
    width: 32 bits
    clock: 33MHz
  *-isa
    description: ISA bridge
    product: 82371SB PIIX3 ISA [Natoma/Triton II]
    vendor: Intel Corporation

```

i-01e7ecd91c23b6d72  
Public IPs: 34.249.17.67 Private IPs: 172.31.19.10



```

*memory
  description: System memory
  physical id: 0
  size: 1GiB
*cpu
  product: Intel(R) Xeon(R) CPU E5-2686 v4 @ 2.30GHz
  vendor: Intel Corp.
  physical id: 1
  bus info: cpu@0
  version: 6.79.1
  width: 64 bits
  capabilities: fpu fpu_exception wp vme de pse tsc msr pae mce cx8 apic sep mtrr pge mca cmov pat pse36 clflush mmx fxsr sse sse2 ht syscall nx rdtsvp
  stnt tsc rep_good nopl xttopology cpuid tsc_known_freq pni pclmulqdq ssse3 fma cx16 pcid sse4_1 sse4_2 x2apic movbe popcnt tsc_deadline_timer aes xsave avx f16
  serverlahf lm abm cpuid_fault invpcid_single pti fsgsbase bmi1 bmi2 smep bmi2 erms invpcid xsaveopt
  configuration: microcode=184549440
*pci
  description: Host bridge
  product: 440FX - 82441FX PMC [Natoma]
  vendor: Intel Corporation
  physical id: 100
  bus info: pci@0000:00:00.0
  version: 02
  width: 32 bits
  clock: 33MHz
*isa
  description: ISA bridge
  product: 82371SB PIIX3 ISA [Natoma/Triton II]
  vendor: Intel Corporation

```

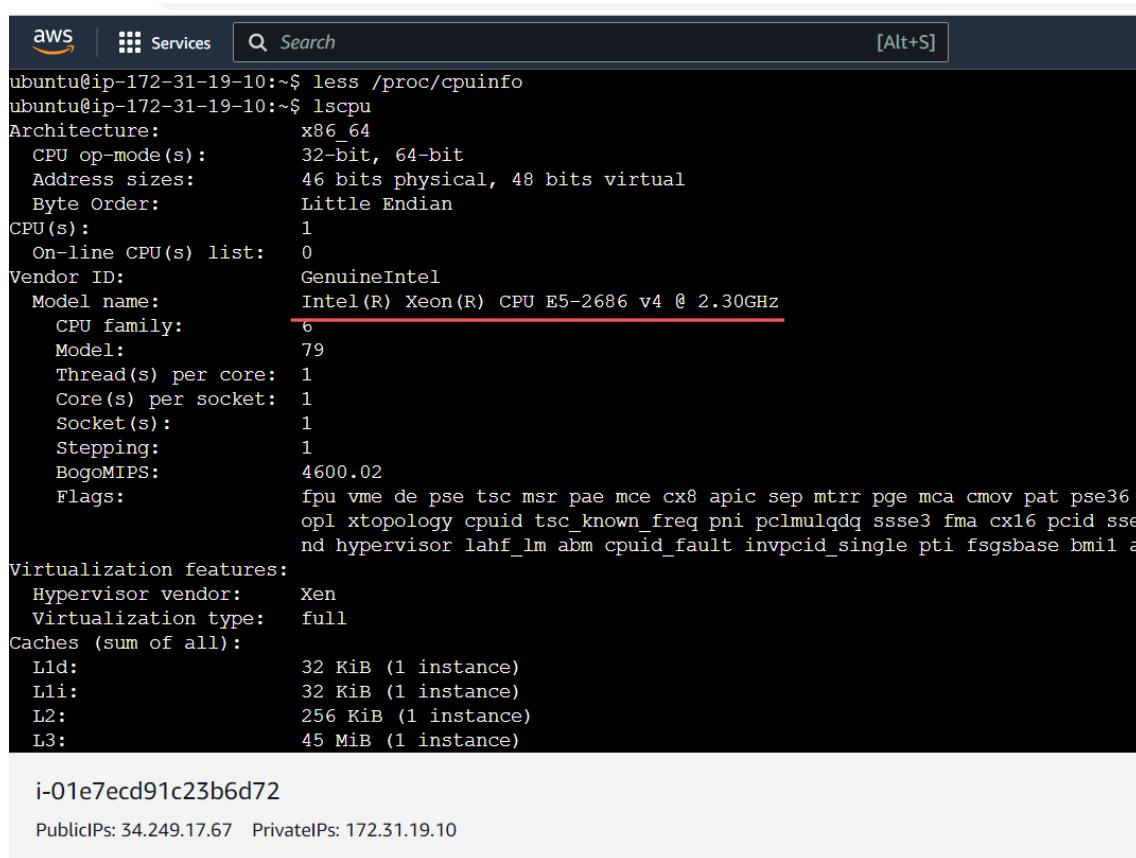
i-01e7ecd91c23b6d72  
Public IPs: 34.249.17.67 Private IPs: 172.31.19.10

¿Sobre qué tipo de hipervisor corre la máquina virtual? ¿Sobre qué modelo de procesador se ejecuta? ¿Cuántos núcleos utiliza?

**Modelo de procesador: Iscpu**

**Intel(R) Xeon(R) CPU E5-2586 V4 @ 2.3GHz**

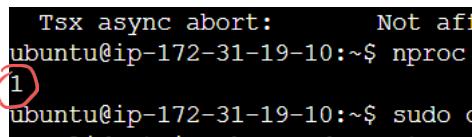
<https://www.intel.com/content/www/us/en/products/sku/91771/intel-xeon-processor-e52658-v4-35m-cache-2-30-ghz/specifications.html>



The screenshot shows the AWS Lambda function interface. At the top, there's a navigation bar with the AWS logo, 'Services' (selected), a search bar, and a key icon labeled '[Alt+S]'. The main area displays the output of the 'lscpu' command from an Ubuntu instance. The output includes details about the architecture (x86\_64), CPU op-mode(s) (32-bit, 64-bit), address sizes (46 bits physical, 48 bits virtual), byte order (Little Endian), and various model and stepping details. A red circle highlights the 'Model name' field, which shows 'Intel(R) Xeon(R) CPU E5-2686 v4 @ 2.30GHz'. Other sections shown include 'Virtualization features' (hypervisor vendor: Xen, virtualization type: full), cache sizes (L1d: 32 KiB, L1i: 32 KiB, L2: 256 KiB, L3: 45 MiB), and network information (PublicIPs: 34.249.17.67, PrivateIPs: 172.31.19.10). The Lambda function ARN 'i-01e7ecd91c23b6d72' is also visible.

### Cantidad de núcleos: nproc

Usa 1 núcleo



The screenshot shows the AWS Lambda function interface. The output of the 'nproc' command is displayed, showing the number '1' in red, indicating that only one core is being used. The command 'sudo' is partially visible at the end of the line.

### Tipo de hipervisor: sudo dmidecode -s system-product-name

The screenshot shows a terminal window titled 'eu-west-1.console.aws.amazon.com/ec2-instance-connect/ssh?connType=standard&instanceId=i-01e7ecd91c23b6d72&osU'. The window has tabs for 'aws' and 'Services', and includes a search bar and a keyboard shortcut '[Alt+S]'. The terminal output displays system information:

```
ubuntu@ip-172-31-19-10:~$ sudo dmidecode -s system-version
4.11.amazon
ubuntu@ip-172-31-19-10:~$ sudo lshw -class system
ip-172-31-19-10
  description: Computer
  product: HVM domU
  vendor: Xen
  version: 4.11.amazon
  serial: ec2fc887-fc9c-7046-406d-35ce8244e84b
  width: 64 bits
  capabilities: smbios-2.7 dmi-2.7 vsyscall32
  configuration: boot=normal uuid=ec2fc887-fc9c-7046-406d-35ce8244e84b
*-pnp00:00
  product: PnP device PNP0c02
  physical id: 0
  capabilities: pnp
  configuration: driver=system
*-pnp00:01
  product: PnP device PNP0c02
  physical id: 1
  capabilities: pnp
  configuration: driver=system
*-pnp00:02
  product: PnP device PNP0b00
  physical id: 2
  capabilities: pnp
  configuration: driver=rtc_cmos
*-pnp00:07
```

At the bottom of the terminal, the instance ID 'i-01e7ecd91c23b6d72' is displayed, along with 'PublicIPs: 34.249.17.67' and 'PrivateIPs: 172.31.19.10'.

4

## DESPLIEGUE DE SERVICIO WEB SOBRE INSTANCIAS EN LA CLOUD (EC2)

11. Instalar el servidor apache mediante el siguiente comando: **sudo apt-get install apache2**. Puede que necesite ejecutar previamente el comando: **sudo apt-get update**.

Ejecutando ambos comandos:

```
Get:28 http://eu-west-1.ec2.archive.ubuntu.com/ubuntu jammy-backports/universe Translation-en [16.5 kB]
Get:29 http://eu-west-1.ec2.archive.ubuntu.com/ubuntu jammy-backports/universe amd64 c-n-f Metadata [644 B]
Get:30 http://eu-west-1.ec2.archive.ubuntu.com/ubuntu jammy-backports/multiverse amd64 c-n-f Metadata [116 B]
Get:31 http://security.ubuntu.com/ubuntu jammy-security/main amd64 Packages [1015 kB]
Get:32 http://security.ubuntu.com/ubuntu jammy-security/main Translation-en [195 kB]
Get:33 http://security.ubuntu.com/ubuntu jammy-security/main amd64 c-n-f Metadata [11.4 kB]
Get:34 http://security.ubuntu.com/ubuntu jammy-security/restricted amd64 Packages [1179 kB]
Get:35 http://security.ubuntu.com/ubuntu jammy-security/restricted Translation-en [191 kB]
Get:36 http://security.ubuntu.com/ubuntu jammy-security/restricted amd64 c-n-f Metadata [520 B]
Get:37 http://security.ubuntu.com/ubuntu jammy-security/universe amd64 Packages [814 kB]
Get:38 http://security.ubuntu.com/ubuntu jammy-security/universe Translation-en [152 kB]
Get:39 http://security.ubuntu.com/ubuntu jammy-security/universe amd64 c-n-f Metadata [16.8 kB]
Get:40 http://security.ubuntu.com/ubuntu jammy-security/multiverse amd64 Packages [36.5 kB]
Get:41 http://security.ubuntu.com/ubuntu jammy-security/multiverse Translation-en [7060 B]
Get:42 http://security.ubuntu.com/ubuntu jammy-security/multiverse amd64 c-n-f Metadata [260 B]
Fetched 28.6 MB in 5s (5439 kB/s)
Reading package lists... Done
ubuntu@ip-172-31-19-10:~$ sudo apt-get install apache2
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following additional packages will be installed:
  apache2-bin apache2-data apache2-utils bzip2 libapr1 libaprutil1 libaprutil1-dbd-sqlite3 libaprutil1-ldap lib
Suggested packages:
  apache2-doc apache2-suexec-pristine | apache2-suexec-custom www-browser bzip2-doc
The following NEW packages will be installed:
  apache2 apache2-bin apache2-data apache2-utils bzip2 libapr1 libaprutil1 libaprutil1-dbd-sqlite3 libaprutil1-
0 upgraded, 13 newly installed, 0 to remove and 72 not upgraded.

i-01e7ecd91c23b6d72
Public IPs: 34.249.17.67 Private IPs: 172.31.19.10
```

12. Renombre el archivo de página web por defecto de Ubuntu:

**cd /var/www/html**      ↗  
**sudo mv index.html index-ant.html**      ↗

```
ubuntu@ip-172-31-19-10:~$ cd /var/www/html
ubuntu@ip-172-31-19-10:/var/www/html$ ls
index.html
ubuntu@ip-172-31-19-10:/var/www/html$ mv index.html index-ant.html
mv: cannot move 'index.html' to 'index-ant.html': Permission denied
ubuntu@ip-172-31-19-10:/var/www/html$ sudo mv index.html index-ant.html
ubuntu@ip-172-31-19-10:/var/www/html$ ls
index-ant.html
ubuntu@ip-172-31-19-10:/var/www/html$ []
```

i-01e7ecd91c23b6d72

Public IPs: 34.249.17.67 Private IPs: 172.31.19.10

13. Cree en el ordenador local sobre el que esté trabajando (PC del laboratorio o su portátil) una pequeña página web que muestre lo siguiente:

## SERVIDOR WEB 1

Creado por [su nombre aquí]. Universidad de Sevilla, [año]

Fichero.txt llamado web1.txt, cuyo contenido es la página web estática 1.



```
<!DOCTYPE html>
<html lang="es">
<head>
    <meta charset="UTF-8">
    <meta name="viewport" content="width=device-width, initial-scale=1.0">
    <title>SERVIDOR WEB 1</title>
</head>
<body>
    <h1>SERVIDOR WEB 1</h1>
    <p>Creado por Alejandro Inglés. Universidad de Sevilla, 2023</p>
</body>
</html>
```

14. Transfiera la página web que ha creado al directorio base del usuario por defecto de su instancia EC2 de AWS. Para ello puede usar el comando **scp** en el terminal de Linux, por ejemplo mediante el siguiente comando (en el cual en vez de DNS-IPV4PUBLICA debe poner el nombre DNS-IPV4 público de su instancia en AWS): **scp -i "Clave-ASSB.pem" index.html ubuntu@DNSIPV4PUBLICA:/home/ubuntu/index.html**

Copio la carpeta con los ficheros de la página web estática y la clave ssh que estaba ubicada en el escritorio de Windows y la pongo dentro del WSL instalad en mi ordenador, para hacer uso de la terminal de bash.

Abro una terminal en WSL en mi ordenador, y me desplazo hasta el directorio con la clave ssh y la página web.

En esa ubicación ejecuto el comando:

**scp -i "p4-assb.pem" web1.html [ubuntu@ec2-34-249-17-67.eu-west-1.compute.amazonaws.com](mailto:ubuntu@ec2-34-249-17-67.eu-west-1.compute.amazonaws.com):/home/ubuntu/index.html**

En la instancia con apache, la página web debe de llamarse index.html, que por defceto, el nombre del fichero que servirá apache, si lo llamo web1.html, apache no lo servirá.

Me da error, debido a que el fichero de la clave SSH lo podían modificar otros usuarios, por lo que cambios los permisos con chmod, vuelvo a ejecutar la instrucción y ahora sí funciona.

```

aleingmar@DESKTOP-2IE63G4:~/CARRERA/ASSB$ cd p4*
aleingmar@DESKTOP-2IE63G4:~/CARRERA/ASSB/p4-assb-AWS$ ls
p4-assb.pem web1.html
aleingmar@DESKTOP-2IE63G4:~/CARRERA/ASSB/p4-assb-AWS$ scp -i "p4-assb.pem" web1.html ubuntu@ip-172-31-19-10.eu-west-1.compute.internal:~/home/ubuntu/web1.html
ssh: Could not resolve hostname ip-172-31-19-10.eu-west-1.compute.internal: Name or service not known
lost connection
aleingmar@DESKTOP-2IE63G4:~/CARRERA/ASSB/p4-assb-AWS$ scp -i "p4-assb.pem" web1.html ubuntu@ec2-34-249-17-67.eu-west-1.compute.amazonaws.com:~/home/ubuntu/web1.html
aws: [REDACTED]
The authenticity of host 'ec2-34-249-17-67.eu-west-1.compute.amazonaws.com (34.249.17.67)' can't be established.
ECDSA key fingerprint is SHA256:eA2rLSuLm2u5uAMvRcQKc3kKRlxKxBH5500bFLFkk.
Are you sure you want to continue connecting (yes/no/[fingerprint])? yes
Warning: Permanently added 'ec2-34-249-17-67.eu-west-1.compute.amazonaws.com,34.249.17.67' (ECDSA) to the list of known hosts.
@@@@@@@
@         WARNING: UNPROTECTED PRIVATE KEY FILE!
@@@@@@@
Permissions 0644 for 'p4-assb.pem' are too open.
It is required that your private key files are NOT accessible by others.
This private key will be ignored.
Load key "p4-assb.pem": bad permissions
ubuntu@ec2-34-249-17-67.eu-west-1.compute.amazonaws.com: Permission denied (publickey).
lost connection
aleingmar@DESKTOP-2IE63G4:~/CARRERA/ASSB/p4-assb-AWS$ ls
p4-assb.pem web1.html
aleingmar@DESKTOP-2IE63G4:~/CARRERA/ASSB/p4-assb-AWS$ nano p4*
aleingmar@DESKTOP-2IE63G4:~/CARRERA/ASSB/p4-assb-AWS$ chmod 600 p4*
aleingmar@DESKTOP-2IE63G4:~/CARRERA/ASSB/p4-assb-AWS$ ls
p4-assb.pem web1.html
aleingmar@DESKTOP-2IE63G4:~/CARRERA/ASSB/p4-assb-AWS$ scp -i "p4-assb.pem" web1.html ubuntu@ec2-34-249-17-67.eu-west-1.compute.amazonaws.com:~/home/ubuntu/web1.html
web1.html
aleingmar@DESKTOP-2IE63G4:~/CARRERA/ASSB/p4-assb-AWS$ 100% 317 5.7KB/s 00:00
aleingmar@DESKTOP-2IE63G4:~/CARRERA/ASSB/p4-assb-AWS$ 18:33 06/12/2023

```

Podemos ver en la terminal de mi instancia de AWS, que se ha subido la página web estática en /home/ubuntu, satisfactoriamente

```

ubuntu@ip-172-31-19-10:~$ ls
ubuntu@ip-172-31-19-10:~$ ls
web1.html
ubuntu@ip-172-31-19-10:~$ 

```

Alternativamente, puede descargarse y utilizar un cliente gratuito como FileZilla, PuTTY o Winscp sobre windows. En caso necesario, tiene más detalles acerca de la configuración en la documentación de AWS

(<http://docs.aws.amazon.com/AWSEC2/latest/UserGuide/putty.html>).

15. Desde la consola de terminal de su instancia, mueva el archivo web1.html al directorio base de las páginas web que sirve Apache (suele ser /var/www/html) y cambie sus permisos para darle permiso de lectura por todos los usuarios

```

ubuntu@ip-172-31-19-10:~$ ls
web1.html
ubuntu@ip-172-31-19-10:~$ sudo mv ./web1.html /var/html/web1.html
mv: cannot move './web1.html' to '/var/html/web1.html': No such file or directory
ubuntu@ip-172-31-19-10:~$ sudo mv ./web1.html /var/www/html/web1.html
ubuntu@ip-172-31-19-10:~$ cd /var/www/html
ubuntu@ip-172-31-19-10:/var/www/html$ ls
index-ant.html web1.html
ubuntu@ip-172-31-19-10:/var/www/html$ sudo chmod a+r web1.html
ubuntu@ip-172-31-19-10:/var/www/html$ 

```

i-01e7ecd91c23b6d72

PublicIPs: 34.249.17.67 PrivateIPs: 172.31.19.10

16. Abra un navegador web en su ordenador local e introduzca la IP o el nombre público de DNS de su instancia como URL. Si obtiene como resultado su página web: felicidades, ha conseguido instalar un servidor web en la nube, con su página web, visible desde todo Internet.

Importante que sea en la url -> una petición http y NO una https 

<http://ec2-34-242-66-238.eu-west-1.compute.amazonaws.com/>



← → C ⚠ No es seguro | ec2-34-242-66-238.eu-west-1.compute.amazonaws.com

## SERVIDOR WEB 1

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17. Repita todo el procedimiento anterior para desplegar una segunda instancia idéntica a la anterior. En este caso, la página web debe mostrar:

SERVIDOR WEB 2

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Como cerré y terminé las instancias cuando trabajaba ayer, ahora cuando me he puesto a trabajar ya no tengo las intancias disponibles, por lo que siguiendo los mismos pasos voy a lanzar dos instancias. Eligiendo las mismas características de ayer e iguales para las dos.

Eligiendo las características de las instancias una a una, con las reglas de seguridad creadas ayer y el par de claves también.

Ambas instancias creadas

Name	Instance ID	Instance state	Instance type	Status check	Alarm status	Availability Zone	Public IPv4 D
Instancia 1 AWS	i-038c5177be6700270	Running	t2.micro	Initializing	View alarms +	eu-west-1b	ec2-54-253-96
Instancia 2 AWS	i-0afbe081a150cb4a8	Pending	t2.micro	-	View alarms +	eu-west-1b	ec2-54-171-1

**Y hago los mismos pasos para ambas instancias:**

Me conecto a ambas instancias a través de una terminal abierta en el navegador.

Les instalo apache2 a ambas.

```
Reading package lists... Done
ubuntu@ip-172-31-25-5:~$ sudo apt-get install apache2
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following additional packages will be installed:
```

**i-038c5177be6700270 (Instancia 1 AWS )**

PublicIPs: 3.253.96.231 PrivateIPs: 172.31.25.5

```
Get:42 http://security.ubuntu.com/ubuntu jammy-security/multiv  
Fetched 28.7 MB in 5s (5472 kB/s)  
Reading package lists... Done  
ubuntu@ip-172-31-24-100:~$ sudo apt install apache2  
Reading package lists... Done  
Building dependency tree... Done  
Reading state information... Done  
The following additional packages will be installed:  
  apache2-bin apache2-data apache2-utils bzip2 libapr1 libapr1u
```

i-0afbe081a150cb4a8 (Instancia 2 AWS)

PublicIPs: 54.171.152.253 PrivateIPs: 172.31.24.100

Cambio de nombre su página web por defecto -> a index-ant.html

Subo la página web estática 1 a instancia 1

```
lost connection  
aleingmar@DESKTOP-2IE63G4:~/CARRERA/ASSB/p4-assb-AWS$ sudo scp -i "p4-assb.pem" web1.html ubuntu@ec2-3-253-96-231.eu-west-1.compute.amazonaws.com:/home/ubuntu/index.html  
The authenticity of host 'ec2-3-253-96-231.eu-west-1.compute.amazonaws.com (3.253.96.231)' can't be established.  
ECDSA key fingerprint is SHA256:tRfooQOahqVekAiiFT0+ADNN5qr/en3QmCuNN6BMiK.  
Are you sure you want to continue connecting (yes/no/[fingerprint])? yes  
Warning: Permanently added 'ec2-3-253-96-231.eu-west-1.compute.amazonaws.com,3.253.96.231' (ECDSA) to the list of known hosts.  
web1.html                                         100%   317      5.5KB/s   00:00  
aleingmar@DESKTOP-2IE63G4:~/CARRERA/ASSB/p4-assb-AWS$
```

Subido la página web estática 2 a instancia 2 (copio en local la página web1 y modiflico con nano su contenido)

```
lost connection  
aleingmar@DESKTOP-2IE63G4:~/CARRERA/ASSB/p4-assb-AWS$ sudo scp -i "p4-assb.pem" web2.html ubuntu@ec2-54-171-152-253.eu-west-1.compute.amazonaws.com:/home/ubuntu/index.html  
The authenticity of host 'ec2-54-171-152-253.eu-west-1.compute.amazonaws.com (54.171.152.253)' can't be established.  
ECDSA key fingerprint is SHA256:rL3HjpYxiGqi+CJdVbf+m2tmK/fZixiYNHQkgkTQpc.  
Are you sure you want to continue connecting (yes/no/[fingerprint])? yes  
Warning: Permanently added 'ec2-54-171-152-253.eu-west-1.compute.amazonaws.com,54.171.152.253' (ECDSA) to the list of known hosts.  
web2.html                                         100%   317      5.6KB/s   00:00  
aleingmar@DESKTOP-2IE63G4:~/CARRERA/ASSB/p4-assb-AWS$
```

Muevo las nuevas páginas web al directorio por defecto donde apache coge las páginas webs y modiflico sus permisos.

```
No VM guests are running outdated hypervisor (qemu) binaries on this host.  
ubuntu@ip-172-31-25-5:~$ cd /var/www/html  
ubuntu@ip-172-31-25-5:/var/www/html$ ls  
index.html  
ubuntu@ip-172-31-25-5:/var/www/html$ sudo mv index.html index-ant.html  
ubuntu@ip-172-31-25-5:/var/www/html$ ls  
index-ant.html  
ubuntu@ip-172-31-25-5:/var/www/html$ sudo mv /home/ubuntu/index.html ./index.html  
ubuntu@ip-172-31-25-5:/var/www/html$ sudo chmod a+r index.html  
ubuntu@ip-172-31-25-5:/var/www/html$ ^C  
ubuntu@ip-172-31-25-5:/var/www/html$ []
```

i-038c5177be6700270 (Instancia 1 AWS)

PublicIPs: 3.253.96.231 PrivateIPs: 172.31.25.5

```
No VM guests are running outdated hypervisor (qemu) binaries on this host.  
ubuntu@ip-172-31-24-100:~$ sudo /var/www/html ↵  
sudo: /var/www/html: command not found  
ubuntu@ip-172-31-24-100:~$ cd /var/www/html ↵  
ubuntu@ip-172-31-24-100:/var/www/html$ sudo mv index.html index-ant.html ↵  
ubuntu@ip-172-31-24-100:/var/www/html$ sudo mv /home/ubuntu/index.html ./index.html  
ubuntu@ip-172-31-24-100:/var/www/html$ sudo chmod a+r index.html ↵  
ubuntu@ip-172-31-24-100:/var/www/html$ █
```

i-0afbe081a150cb4a8 (Instancia 2 AWS)

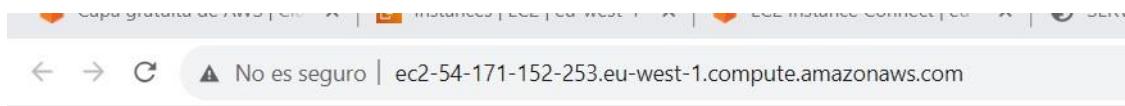
Public IPs: 54.171.152.253 Private IPs: 172.31.24.100

Envío peticiones http a través del navegador a sus **Public IPv4 DNS**



## SERVIDOR WEB 1

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18. Puede monitorizar los recursos de EC2 que tiene actualmente activos en la consola de EC2 . Puede monitorizar el estado de las instancias que ha creado seleccionando “Instances” con el ratón.

Monitorización de instancia 1

The screenshot shows the AWS EC2 Instances page. On the left sidebar, under the 'Instances' section, there is a checkbox next to 'Instancia 1 AWS'. A red arrow points to this checkbox. The main content area displays two instances: 'Instancia 1 AWS' (running, t2.micro, 2/2 checks passed) and 'Instancia 2 AWS' (running, t2.micro, 2/2 checks passed). Below the instances, there is a detailed monitoring section for 'Instancia 1 AWS' with various metrics like CPU utilization, Network in/out, and Disk operations.

## Monitorización de ambas instancias

The screenshot shows the AWS EC2 Instances page with both instances selected (checkboxes checked). A red arrow points to the 'Monitoring' tab at the top of the monitoring section. The monitoring interface is identical to the one in the previous screenshot, showing real-time data for both instances.

5

## BALANCEADOR DE CARGA (Servicio EC2)

19. Vamos a crear un balanceador de carga que distribuya las peticiones a los dos servidores web creados.

Para ello, en el menú izquierdo de la consola de EC2, seleccione “Load Balancers”.

The screenshot shows the AWS EC2 Load Balancers console. On the left sidebar, under 'Load Balancing', 'Load Balancers' is selected. At the top right, there is a 'Create load balancer' button with a red arrow pointing to it. The main area displays a message: 'No load balancers' and 'You don't have any load balancers in eu-west-1'. Below this is a 'Create load balancer' button.

A continuación, seleccione “Create Load Balancer”.

Seleccione como tipo de balanceador de carga “Classic Load Balancer”.

Captura minimizada para que se vea entera la página, el balanceador de carga clásico está abajo.

The screenshot shows the 'Compare and select load balancer type' wizard. It compares three types: Application Load Balancer, Network Load Balancer, and Gateway Load Balancer. Under 'Classic Load Balancer - previous generation', there is a diagram showing a CloudFront distribution (CLB) in front of EC2 instances. A red arrow points to the 'Create' button for this section.

En el asistente para la creación de un balanceador de carga, puede dejar los ajustes por defecto excepto los siguientes: asigne un nombre a su balanceador, asigne el balanceador de carga al mismo grupo de seguridad que creó anteriormente (para que se le apliquen las mismas reglas de acceso que a los servidores web), como chequeo de

salud elija hacer Ping mediante el protocolo TCP en el puerto 80 y añada al balanceador de carga las dos instancias que tiene ejecutándose (sus dos servidores web).

The screenshot shows the AWS CloudFront console with the following steps highlighted:

- Security groups:** A red arrow points to the 'Reglass ale 2' security group listed under 'Select up to 5 security groups'.
- Listeners and routing:** Two red arrows point to the 'Listener protocol' and 'Instance port' fields for the 'Listener HTTP:80' configuration.
- Add instances:** A red arrow points to the 'Add instances' button in the 'Configure Instances' dialog. Another red arrow points to the 'Confirm' button at the bottom right of the dialog. A third red circle highlights the checkbox for selecting instances in the list.

Available instances (2/2)
<input checked="" type="checkbox"/> i-038c5177be6700270    Instancia 1 AWS <input checked="" type="checkbox"/> i-0afbe081a150cb4a8    Instancia 2 AWS

The screenshot shows the 'Health checks' section with a red arrow pointing to the 'Info' link. Below it, the 'Ping target' section shows 'Ping protocol: TCP' and 'Ping port: 80'. Another red arrow points to the port number. The 'Instances' section shows two instances: 'Instancia 1 AWS' and 'Instancia 2 AWS', both in a 'Running' state. A red circle highlights the 'Running' status of the second instance.

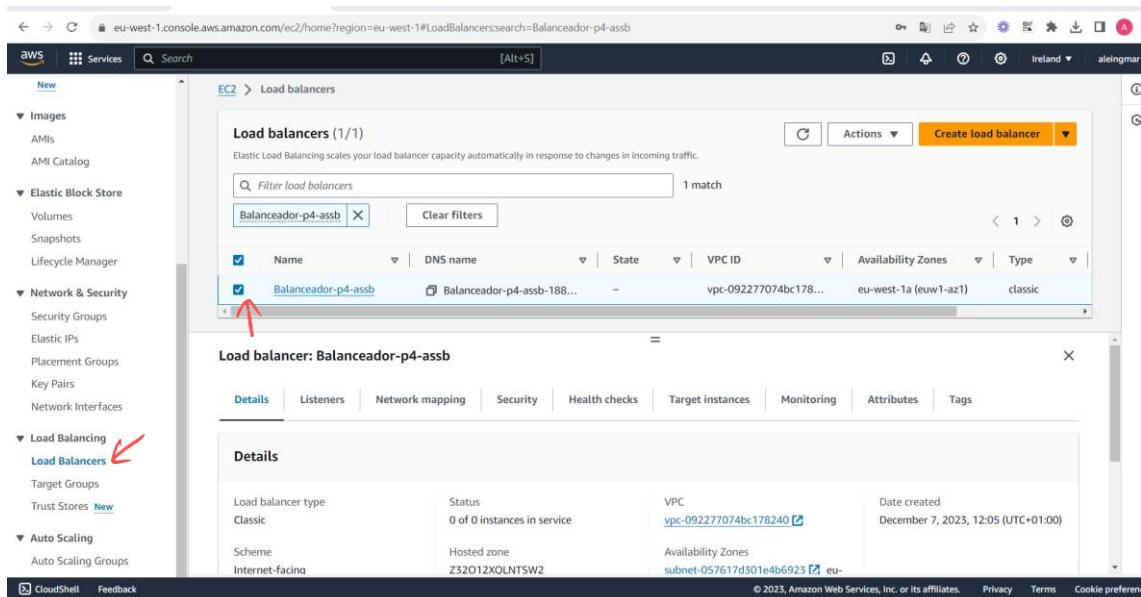
**IMPORTANTE -> me obligaba poner la zona horaria (no estaba por defecto) y había que poner mismas que las instancias que se añaden (si no, en navegador no accedía al balanceador, daba un time\_out).**

En el resumen del balanceador se observa: Networking mapping-> eu-west-1b

The screenshot shows the 'Summary' tab of the load balancer configuration. The 'Network mapping' section is highlighted with a red circle. It shows the VPC 'vpc-092277074bc178240' and the subnet 'eu-west-1b' 'subnet-090552c9c46ee86b4'. Other tabs shown include 'Basic configuration', 'Health checks', 'Instances', 'Attributes', and 'Tags'.

The screenshot shows the 'Create Classic Load Balancer' page. A green banner at the top says 'Successfully created load balancer: Balanceador-p4-assb'. Below it, a message says 'Note: It might take a few minutes for your load balancer to be fully set up and ready to route traffic. Targets will also take a few minutes to complete the registration process and pass initial health checks.' The 'View load balancer' button is visible at the bottom right.

20. Podrá monitorizar los detalles del balanceador de carga que ha creado seleccionando “Load Balancers” en el menú izquierdo de EC2.



The screenshot shows the AWS EC2 Load Balancers console. On the left, there is a navigation sidebar with various services like Images, AMIs, AMI Catalog, Elastic Block Store, Network & Security, and Load Balancing. Under Load Balancing, 'Load Balancers' is selected, indicated by a red arrow. The main area displays a table titled 'Load balancers (1/1)'. It shows one entry: 'Balanceador-p4-assb'. The table includes columns for Name, DNS name, State, VPC ID, Availability Zones, and Type. Below the table, a detailed view of 'Balanceador-p4-assb' is shown with tabs for Details, Listeners, Network mapping, Security, Health checks, Target instances, Monitoring, Attributes, and Tags. The 'Details' tab is selected. The details include Load balancer type (Classic), Status (0 of 0 instances in service), VPC (vpc-092277074bc178240), and Date created (December 7, 2023, 12:05 (UTC+01:00)). Scheme is listed as Hosted zone (Z32O12XOLNTSW2).

Copie el nombre DNS de su balanceador

DNS Name -> **p4-assb-balancer-560613640.eu-west-1.elb.amazonaws.com**

21. Abra un navegador web en su ordenador local e introduzca el nombre DNS del balanceador de carga como URL. Puede ser necesario esperar varios minutos y volver a cargar la página. En caso de que obtenga el resultado de “página no encontrada” debido a un error “err\_name\_not\_resolved”, puede ser necesario limpiar previamente la caché del “resolver DNS” del navegador (por ejemplo, en Chrome cargar chrome://net-internals/#dns y pulsar en “Clear host cache”) y del sistema operativo (por ejemplo, en Windows hacer: menú inicio → ejecutar → “cmd” → teclear “ipconfig/flushdns”).

Lo he hecho por si acaso, aunque no me daba ese problema

The screenshot shows two windows side-by-side. On the left is the 'net-internals' interface in Chrome, specifically the 'DNS lookup' section. It has a sidebar with 'Events', 'Proxy', 'DNS', 'Sockets', 'Domain Security Policy', and 'Shared Dictionaries'. The main area has a 'DNS lookup' heading with a text input field containing 'example.com' and a 'Lookup' button. Below it is a 'Host resolver cache' section with a 'Clear host cache' button. On the right is a Windows terminal window titled 'Símbolo del sistema'. It displays the output of the 'ipconfig /flushdns' command, which shows the cache was successfully cleared.

```
Símbolo del sistema
Microsoft Windows [Versión 10.0.22621.2715]
(c) Microsoft Corporation. Todos los derechos reservados.

C:\Users\User>ipconfig/flushdns

Configuración IP de Windows

Se vació correctamente la caché de resolución de DNS.

C:\Users\User>
```

Conseguido acceder al balanceador de carga a través del navegador, copiando y pegando el DNS Name.

<http://p4-assb-balancer-560613640.eu-west-1.elb.amazonaws.com/>

En las imágenes, se puede observar como en distintas peticiones con la misma url (petición http que le llega y distribuye el balanceador entre las instancias), llega efectivamente a las diferentes instancias y se muestran los dos contenidos distintos.



## SERVIDOR WEB 2

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← → ⌂ ▲ No es seguro | p4-assb-balancer-560613640.eu-west-1.elb.amazonaws.com

## SERVIDOR WEB 1

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22. Cargue repetidas veces la página web obtenida, seleccionando con el ratón el campo donde se introduce la URL en el navegador (con el nombre DNS del balanceador) y pulsando enter, o pulsando en el icono de recarga de página.

23. Si unas veces obtiene como resultado la página web del servidor 1 y otras la del servidor 2, querrá decir que el balanceador que ha instalado está funcionando correctamente.

En las imágenes, se puede observar como en distintas peticiones con la misma url (petición http que le llega y distribuye el balanceador entre las instancias), llega efectivamente a las diferentes instancias y se muestran los dos contenidos distintos.

← → ⌂ ▲ No es seguro | p4-assb-balancer-560613640.eu-west-1.elb.amazonaws.com

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← → ⌂ ▲ No es seguro | p4-assb-balancer-560613640.eu-west-1.elb.amazonaws.com

## SERVIDOR WEB 1

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### CAMBIAR IP DINÁMICAS DE INSTANCIAS, A IPS FIJAS (EC2)

24. (Los siguientes pasos están regular, mejor en imágenes). Las direcciones IP asignadas a las instancias activas son IP dinámicas. Cambian cada vez que la máquina

se reinicia. Si quiere añadir una dirección IP fija a sus servidores web, siga el siguiente procedimiento:

Haga click sobre “Elastic Ips” en el menú izquierdo de la consola de EC2. Pulse el botón “Allocate New Address”. Le aparecerá en la consola la nueva IP asignada. Pulse sobre ella con el botón derecho del ratón y elija “Associate Address”. Pique en el campo “Instance” y seleccione una de las instancias correspondientes a sus servidores web. Repita el procedimiento para el otro servidor web.

Consola de ips -> click en botón de arriba a la izq -> para generar ips estáticas para nuestras instancias

The screenshot shows the AWS EC2 console with the 'Elastic IP addresses' page open. On the left sidebar, under 'Network & Security', the 'Elastic IPs' link is highlighted with a red arrow. At the top right of the main content area, there is a prominent orange 'Allocate Elastic IP address' button, also highlighted with a red arrow. The main area displays a table with columns for Name, Allocated IPv4 address, Type, Allocation ID, Reverse DNS record, and Associated instance ID. A message at the bottom encourages users to view IP address usage and recommendations with Public IP insights.

Click en allocate

This screenshot shows the 'Allocate Elastic IP address' dialog box. It includes sections for 'Elastic IP address settings' (with options for Public IPv4 address pool, Global static IP addresses, and Create accelerator), 'Tags - optional' (with a note about AWS Global Accelerator), and a 'Tags' section. At the bottom right, there is a large orange 'Allocate' button, which is highlighted with a red arrow. To its left, the 'Allocated IPv4 address' field displays the value '34.241.107.111', also circled with a red marker.

Repetir dos veces -> y en la consola aparecerán dos ips estáticas ya creadas

The screenshot shows the 'Elastic IP addresses' page again, but this time it lists two entries in the table. The first entry has the 'Allocated IPv4 address' field set to '34.241.107.111' and the second entry has it set to '54.229.100.131'. Both entries are circled with red markers, and two red arrows point to the 'Allocated IPv4 address' column to draw attention to the newly assigned static IPs.

Ahora hay que asignar estas ips fijas a las instancias:

Click izq sobre una ip (en la consola)-> click en el botón naranja Associate Elastic IP address

Summary			
Allocated IPv4 address 54.229.100.131	Type Public IP	Allocation ID eipalloc-0dce37b66b78aedce	Reverse DNS record -
Association ID -	Scope VPC	Associated instance ID -	Private IP address -
Network interface ID -	Network interface owner account ID -	Public DNS -	NAT Gateway ID -
Address pool Amazon			

Tags (0) Manage tags

Elegir una de las instancias

**Associate Elastic IP address**  
Choose the instance or network interface to associate to this Elastic IP address (54.229.100.131)

Elastic IP address: 54.229.100.131

Resource type  
Choose the type of resource with which to associate the Elastic IP address.

Instance  
 Network interface

**Important** If you associate an Elastic IP address with an instance that already has an Elastic IP address associated, the previously associated Elastic IP address will be disassociated, but the address will still be allocated to your account. [Learn more](#)

If no private IP address is specified, the Elastic IP address will be associated with the primary private IP address.

Instance

Private IP address  
The private IP address with which to associate the Elastic IP address.

Reassociation  
Specify whether the Elastic IP address can be reassigned with a different resource if it already associated with a resource.  
 Allow this Elastic IP address to be reassigned

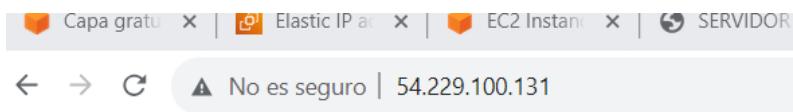
Repetir dos veces, y en la consola se ve las dos ips asociadas a dos instancias distintas.

**Elastic IP addresses (2)**

Allocated IPv4 address	Type	Allocation ID	Reverse DNS record	Associated instance ID
34.241.107.111	Public IP	eipalloc-051d7ea8f5d5c44b1	-	i-0afbe081a150cb4a8
54.229.100.131	Public IP	eipalloc-0dce37b66b78aedce	-	i-038c5177be6700270

25. A continuación introduzca las direcciones IP asignadas en un navegador y verifique si obtiene la página web de cada servidor web

Petición a Ip fija asignada a la instancia 1



## SERVIDOR WEB 1

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Petición a Ip fija asignada a la instancia 2



## SERVIDOR WEB 2

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7

### CIERRE DE RECURSOS USADOS EN AWS (EC2)

26. Ha completado los ejercicios de esta práctica. Llegado a este punto, tendrá una serie de recursos activos en AWS. Para no incurrir en ningún cargo en su tarjeta de crédito, es imprescindible que detenga y elimine todos los recursos una vez completada la práctica.

Para ello vaya a la consola de ECS (por ejemplo, picando en el icono de un cubo arriba a la izquierda de la página de AWS y luego seleccionando “EC2”).

En resources le aparecen todos los recursos que tiene activos.

Activos 2 instancias, 2 ips, un balanceador de carga, 2 volumes (uno por cada instancia), 2 grupos de reglas de seguridad y un par de claves asimétricas ssh.

The screenshot shows the AWS EC2 Dashboard. On the left, there's a sidebar with navigation links like Instances, Images, and Elastic Block Store. The main area has a red box around the 'Resources' section, which displays a summary of Amazon EC2 resources in the Europe (Ireland) Region. It includes tables for Instances (running), Auto Scaling Groups, Dedicated Hosts, Elastic IPs, Instances, Key pairs, Load balancers, Placement groups, Security groups, Snapshots, Volumes, and Volumes. Below this is the 'Launch instance' section with a 'Launch Instance' button and a note about launching instances in the Europe (Ireland) Region. To the right is the 'Service health' section, which shows the AWS Health Dashboard, the Region (Europe (Ireland)), and Zones (Zone name: eu-west-1a, Zone ID: euw1-az1). A sidebar on the right is titled 'EC2 Free Tier' and provides information about offers for all AWS Regions.

27. Empiece parando y eliminando las instancias. Haga click en instancias. Pique con el botón derecho del ratón sobre cada instancia, seleccione “Instance State” y “Terminate”.

The screenshot shows the AWS EC2 Instances page. The sidebar on the left lists various EC2 services. The main area shows a table of instances with two entries: 'Instancia 1 AWS' (i-038c5177be6700270) and 'Instancia 2 AWS' (i-0afbe081a150cb4a8). Both instances are in the 'Running' state. A context menu is open over 'Instancia 1 AWS', with the 'Terminate instance' option highlighted by a red arrow. To the right, there's a detailed view for 'Instancia 1 AWS' showing monitoring data for CPU utilization, network traffic, and disk operations over the last hour. The status bar at the bottom indicates it's from July 12, 2023.

28. Seleccione ahora en la consola de ECS “Elastic IPs”. Pique con el botón derecho del ratón sobre cada IP y seleccione “Release Address”.

The screenshot shows the AWS Elastic IP addresses page for the IP address 34.241.107.111. The sidebar on the left includes Network & Security services. The main area shows a summary table for the IP. A red arrow points to the IP address itself. To the right, a context menu is open with options: 'Actions' (with 'Associate Elastic IP address' highlighted), 'Release Elastic IP addresses', 'Disassociate Elastic IP address', 'Update reverse DNS', 'Enable transfers', 'Disable transfers', and 'Accept transfers'. The status bar at the bottom indicates it's from July 12, 2023.

29. Seleccione ahora en la consola de ECS “Load Balancer”. Pique con el botón derecho del ratón sobre el balanceador y seleccione “Delete”.

The screenshot shows the AWS EC2 Load Balancers console. On the left, there's a navigation sidebar with various services like Images, AMIs, Elastic Block Store, Network & Security, Load Balancing, Auto Scaling, and Load Balancers. The 'Load Balancers' link is highlighted with a red arrow. The main pane displays a table titled 'Load balancers (1/1)' with one entry: 'p4-assb-balancer'. To the right of the table, there are tabs for Details, Listener, Edit IP address type, Edit subnets, Manage instances, Edit health check settings, Edit listeners, Load balancer type (Classic), Edit security groups, Edit load balancer attributes, Scheme (Internet-facing), Manage tags, and Delete load balancer. A red arrow points to the 'Delete' link in the context menu for the selected load balancer.

30. Los pares de claves y grupos de seguridad no deberían generar cargos, pero puede borrarlos de la misma manera.

Actions -> Delete

The image contains two screenshots of AWS management consoles. The top screenshot shows the 'Key pairs' page with a table listing one key pair named 'p4-assb-keypair'. A red arrow points to the 'Actions' dropdown menu, and another red arrow points to the 'Delete' option within it. The bottom screenshot shows the 'Security Groups' page with a table listing two security groups: 'sg-0ebf3815460a7e034' and 'sg-0e5e8b596ca61'. A red arrow points to the 'Delete' button for the first security group.