



Instituto Tecnológico y de Estudios Superiores de Monterrey

### **Instalación de Spark en AWS**

Integrantes:

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Monterrey, Nuevo León, México 30 de Octubre del 2023

Inteligencia artificial avanzada para la ciencia de datos II (Gpo 501)

Se instalará Spark en una instancia EC2 de AWS acorde a lo visto en clase y se entregará lo siguiente para comprobar su instalación correcta.

1.- Impresión de pantalla del listado de instancias de EC2 de AWS en donde se muestre la instancia creada.

Instancias (1) 

Información

Conectar

Estado de la instancia

Acciones

Lanzar instancias

Buscar Instance por atributo o etiqueta (case-sensitive)

<

1

>

<input type="checkbox"/>	Name <div></div>	ID de la instancia	Estado de la i... <div></div>	Tipo de inst... <div></div>	Comprobación ...	Estado de la ...	Zona de dispon... <div></div>	DNS de IPv4 p
<input type="checkbox"/>	Instancia_Test	i-02c650c1cbef64ae3	<div><div></div>Detenida</div> <div><div></div></div>	t2.micro	-	Sin alarmas <div></div>	us-east-2a	-

2.- Impresión de pantalla conectado al servidor ya sea por Terminal o Putty, ya una vez dentro, ejecutar el comando ls -l para la toma de la impresión de pantalla.

```
barbacoa@LAPTOP-VPQAG8TV:~/jupyter$ cd
barbacoa@LAPTOP-VPQAG8TV:~$ ls
Anaconda3-2023.07-2-Linux-x86_64.sh  anaconda3  barbacoa.pem  Zone.Identifier  snap
Anaconda3-2023.07-2-Linux-x86_64.sh.1  barbacoa.pem  certs
barbacoa@LAPTOP-VPQAG8TV:~$ ssh-keygen -y -f barbacoa.pem
ssh-keygen -y -f barbacoa.pem
Warning: UNPROTECTED PRIVATE KEY FILE!
Permissions 0644 for 'barbacoa.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 "barbacoa.pem": bad permissions
barbacoa@LAPTOP-VPQAG8TV:~$ sudo chmod 400 barbacoa.pem
[sudo] password for barbacoa:
barbacoa@LAPTOP-VPQAG8TV:~$ ssh-keygen -y -f barbacoa.pem
ssh-rsa AAAAB3NzaC1yc2EAAAADAQABAAQCZ0hgChpBRBH73qEtCtX89MuIcQTZE/Gin+9oQESD0vG+bD0tTfjg5hZ12CzBFRNivA+wPsmR5v90iyaVpuWPygO2EyJnnGV3S1BNG+AqN5MaCvd2AYOg018xb3jPMeUJGaSNLzx6dPG7c67H6d1/0QhQX9J32xOM1CyLX67c97X06+MRnqEFRKK3JLV62oR80uh8GIorUppvPM8HltGH08synmjSghPw952bcc1Xbdtaf+KH1HQcwEZxaYEHt2IOFcrcYBHKv311Kv9ob8BNjMXPq117iTRQp67ubuSoD8GeQj124kQh2q2dZCvxdYQswk7A3Hmg2hz8GEErLED
```

```
barbacoa@LAPTOP-VPQAG8TV:~$ ssh-keygen -y -f barbacoa.pem ubuntu@ec2-3-145-173-35-us-east-2.compute.amazonaws.com
Too many arguments.
usage: ssh-keygen [-q] [-a rounds] [-b bits] [-C comment] [-f output_keyfile]
                  [-m format] [-N new_passphrase] [-O option]
                  [-t dsa | ed25519 | ed25519-sk | rsa]
                  [-w provider] [-Z cipher]
ssh-keygen -p [-a rounds] [-f keyfile] [-m format] [-N new_passphrase]
              [-P old_passphrase] [-Z cipher]
ssh-keygen -i [-f input_keyfile] [-m key_format]
ssh-keygen -e [-f input_keyfile] [-m key_format]
ssh-keygen -y [-f input_keyfile]
ssh-keygen -c [-a rounds] [-C comment] [-f keyfile] [-P passphrase]
ssh-keygen -l [-v] [-E fingerprint_hash] [-f input_keyfile]
ssh-keygen -B [-f input_keyfile]
ssh-keygen -D pkcs11
ssh-keygen -F hostname [-lv] [-f known_hosts_file]
ssh-keygen -H [-f known_hosts_file]
ssh-keygen -K [-a rounds] [-w provider]
ssh-keygen -R hostname [-f known_hosts_file]
ssh-keygen -r hostname [-g] [-f input_keyfile]
ssh-keygen -M generate [-O option] output_file
ssh-keygen -M screen [-f input_file] [-O option] output_file
ssh-keygen -I certificate_identity -s ca_key [-H] [-D pkcs11_provider]
                  [-n principals] [-O option] [-V validity_interval]
                  [-z serial_number] file ...
ssh-keygen -L [-f input_keyfile]
ssh-keygen -A [-a rounds] [-f prefix_path]
ssh-keygen -k [-f krl_file] [-u] [-s ca_public] [-z version_number]
                  file ...
ssh-keygen -Q [-l] -f krl_file [file ...]
ssh-keygen -Y find-principals -s signature_file -f allowed_signers_file
ssh-keygen -Y match-principals -I signer_identity -f allowed_signers_file
ssh-keygen -Y check-novalidate -n namespace -s signature_file
ssh-keygen -Y sign -f key_file -n namespace file [-O option] ...
ssh-keygen -Y verify -f allowed_signers_file -I signer_identity
                  -n namespace -s signature_file [-r krl_file] [-O option]
```

```
barbacoa@LAPTOP-VPQAG8TV:~$ ssh-keygen -y -f barbacoa.pem
ssh-rsa AAAAB3NzaC1yc2EAAAADAQABAAQCZ0hgChpBRBH73qEtCtX89MuIcQTZE/Gin+9oQESD0vG+bD0tTfjg5hZ12CzBFRNivA+wPsmR5v90iyaVpuWPygO2EyJnnGV3S1BNG+AqN5MaCvd2AYOg018xb3jPMeUJGaSNLzx6dPG7c67H6d1/0QhQX9J32xOM1CyLX67c97X06+MRnqEFRKK3JLV62oR80uh8GIorUppvPM8HltGH08synmjSghPw952bcc1Xbdtaf+KH1HQcwEZxaYEHt2IOFcrcYBHKv311Kv9ob8BNjMXPq117iTRQp67ubuSoD8GeQj124kQh2q2dZCvxdYQswk7A3Hmg2hz8GEErLED
barbacoa@LAPTOP-VPQAG8TV:~$ ssh -i "barbacoa.pem" ubuntu@ec2-3-145-173-35-us-east-2.compute.amazonaws.com
The authenticity of host 'ec2-3-145-173-35-us-east-2.compute.amazonaws.com (3.145.173.35)' can't be established.
ED25519 key fingerprint is SHA256:11D9K24N9CDO23Am/a51zy+desZamPETYP2H3a4U.
This key is not known by any other names
Are you sure you want to continue connecting (yes/no/[fingerprint])? yes
Warning: Permanently added 'ec2-3-145-173-35-us-east-2.compute.amazonaws.com' (ED25519) to the list of known hosts.
Welcome to Ubuntu 22.04.3 LTS (GNU/Linux 5.19.0-1025-aws x86_64)

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

System information as of Mon Oct 30 06:10:14 UTC 2023

System load:  0.0          Processes:      98
Usage of /:   30.4% of 7.5GB  Users logged in: 1
Memory usage: 31%          IPv4 address for eth0: 172.31.2.166
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

*** System restart required ***
Last login: Mon Oct 30 05:59:34 2023 from 3.16.146.4
```

3.- Impresión de pantalla de la pestaña Detalles para que se vea la ip pública, la ip privada y el DNS público de la instancia (es necesario que la instancia esté Running).

<div> <div>EC2 &gt; Instancias &gt; i-02c650c1cbef64ae3</div> <div> <div>Resumen de instancia de i-02c650c1cbef64ae3 (Instancia_Test)</div> <div>Información</div> <div> <div> <div>↺</div> <div>Conectar</div> <div>Estado de la instancia ▼</div> <div>Acciones ▼</div> </div> </div> </div> <div>Se ha actualizado hace less than a minute</div> </div>		
<div>ID de la instancia</div> <div> <div>i-02c650c1cbef64ae3 (Instancia_Test)</div> </div>	<div>Dirección IPv4 pública</div> <div> <div>3.145.173.35  dirección abierta</div> </div>	<div>Direcciones IPv4 privadas</div> <div> <div>172.31.2.166</div> </div>
<div>Dirección IPv6</div> <div> <div>–</div> </div>	<div>Estado de la instancia</div> <div> <div>En ejecución</div> </div>	<div>DNS de IPv4 pública</div> <div> <div>ec2-3-145-173-35.us-east-2.compute.amazonaws.com  dirección abierta</div> </div>
<div>Tipo de nombre de anfitrión</div> <div> <div>Nombre de IP: ip-172-31-2-166.us-east-2.compute.internal</div> </div>	<div>Nombre DNS de IP privada (solo IPv4)</div> <div> <div>ip-172-31-2-166.us-east-2.compute.internal</div> </div>	
<div>Responder al nombre DNS de recurso privado IPv4 (A)</div> <div> <div>–</div> </div>	<div>Tipo de instancia</div> <div> <div>t2.micro</div> </div>	<div>Direcciones IP elásticas</div> <div> <div>–</div> </div>
<div>Dirección IP asignada automáticamente</div> <div> <div>3.145.173.35 [IP pública]</div> </div>	<div>ID de VPC</div> <div> <div>vpc-05997e1ed7df65217</div> </div>	<div>Hallazgo de AWS Compute Optimizer</div> <div> <div>Suscribirse a AWS Compute Optimizer para recibir recomendaciones.</div> <div>Más información</div> </div>
<div>Rol de IAM</div> <div> <div>–</div> </div>	<div>ID de subred</div> <div> <div>subnet-08c94079de0ee4d1a</div> </div>	<div>Nombre del grupo de Auto Scaling</div> <div> <div>–</div> </div>
<div>IMDSv2</div> <div> <div>Optional</div> </div>		

4.- Impresión de pantalla de la terminal o putty una vez que se ejecuta el comando jupyter notebook.

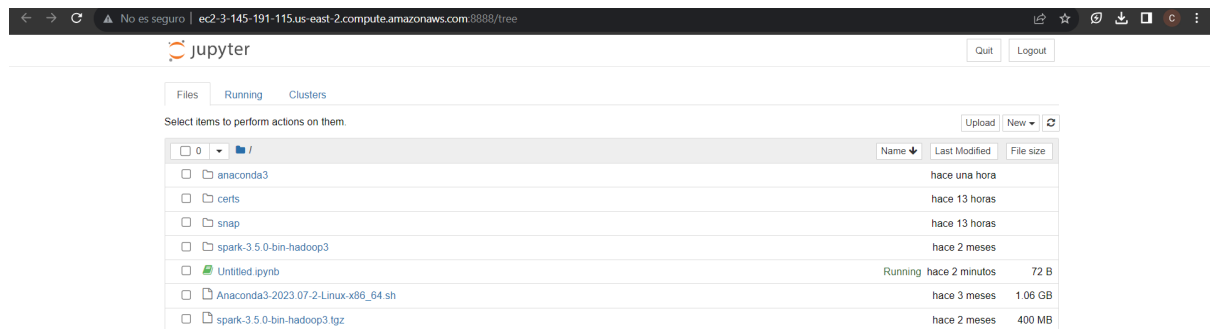
```
ubuntu@ip-172-31-2-166:~$ jupyter notebook --generate-config
Writing default config to: /home/ubuntu/snap/jupyter/6/.jupyter/jupyter_notebook_config.py
```

```
ubuntu@ip-172-31-2-166:~$ cd ~/.jupyter/
ubuntu@ip-172-31-2-166:~/.jupyter$ vi jupyter_notebook_config.py
```

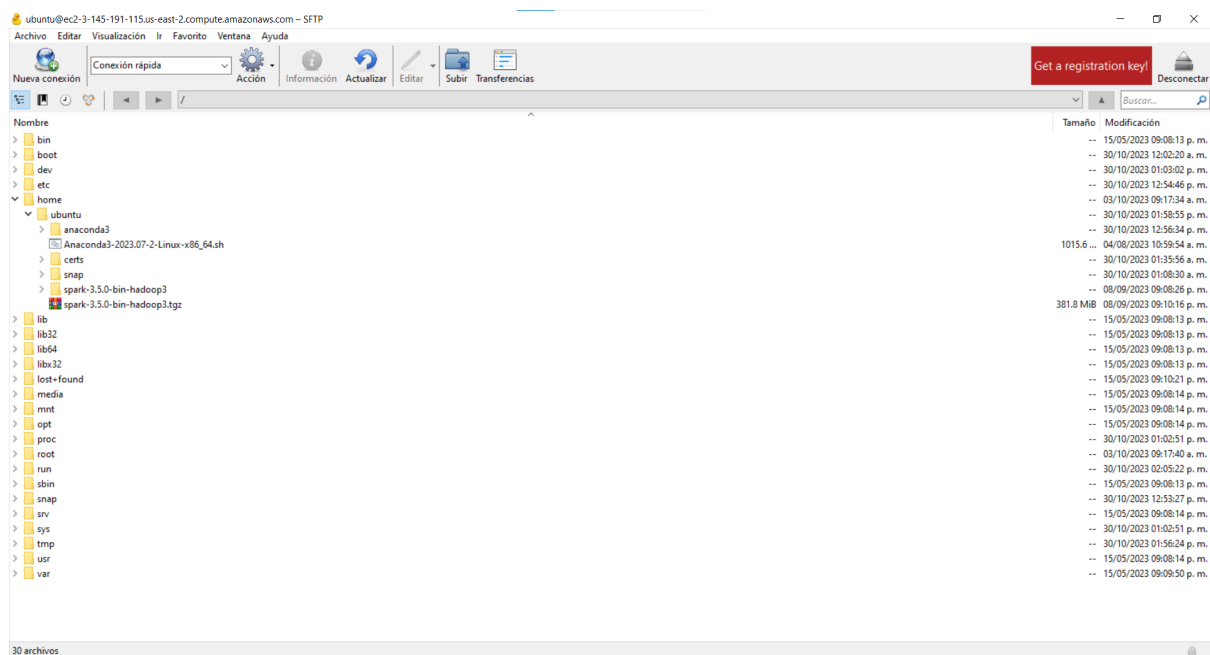
```
ubuntu@ip-172-31-2-166:~$ jupyter notebook
[I 19:57:07.614 NotebookApp] Writing notebook server cookie secret to /home/ubuntu/.local/share/jupyter/runtime/notebook_cookie_secret
[W 19:57:08.535 NotebookApp] WARNING: The notebook server is listening on all IP addresses and not using encryption. This is not recommended.
[I 19:57:08.547 NotebookApp] Serving notebooks from local directory: /home/ubuntu
[I 19:57:08.548 NotebookApp] Jupyter Notebook 6.4.0 is running at:
[I 19:57:08.548 NotebookApp] http://ip-172-31-2-166:8888/?token=08c1d8ba3b261403717e690971a7c56f470b5148685aedd
[I 19:57:08.548 NotebookApp] or http://127.0.0.1:8888/?token=08c1d8ba3b261403717e690971a7c56f470b5148685aedd
[I 19:57:08.548 NotebookApp] Use Control-C to stop this server and shut down all kernels (twice to skip confirmation).
[C 19:57:08.554 NotebookApp]

To access the notebook, open this file in a browser:
file:///home/ubuntu/.local/share/jupyter/runtime/nbserver-1041-open.html
Or copy and paste one of these URLs:
http://ip-172-31-2-166:8888/?token=08c1d8ba3b261403717e690971a7c56f470b5148685aedd
or http://127.0.0.1:8888/?token=08c1d8ba3b261403717e690971a7c56f470b5148685aedd
[I 19:57:18.771 NotebookApp] 302 GET /?token=23a04afe2dc44272734a8cc0ffce6de3958ff6056fd4a595 (189.152.129.79) 0.67000ms
[I 19:57:18.885 NotebookApp] 302 GET /tree?token=23a04afe2dc44272734a8cc0ffce6de3958ff6056fd4a595 (189.152.129.79) 0.80000ms
[I 19:57:20.070 NotebookApp] 302 GET /tree?token=23a04afe2dc44272734a8cc0ffce6de3958ff6056fd4a595 (187.189.129.74) 0.72000ms
[W 19:57:32.617 NotebookApp] 401 POST /login?next=%2Ftree%3Ftoken%3D23a04afe2dc44272734a8cc0ffce6de3958ff6056fd4a595 (189.152.129.79) 1.54000ms referer=http://ec2-3-145-191-115.us-east-2.compute.amazonaws.com:8888/login?next=%2Ftree%3Ftoken%3D23a04afe2dc44272734a8cc0ffce6de3958ff6056fd4a595
[I 19:57:50.085 NotebookApp] 302 POST /login?next=%2Ftree%3Ftoken%3D23a04afe2dc44272734a8cc0ffce6de3958ff6056fd4a595 (189.152.129.79) 0.95000ms
```

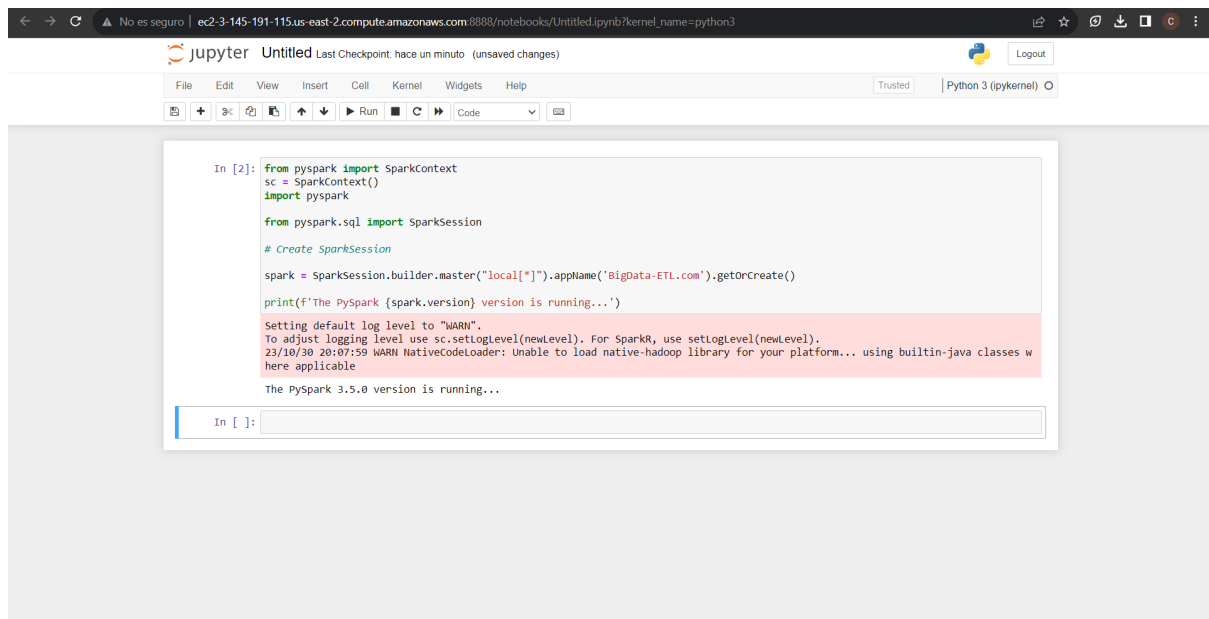
5.- Impresión de pantalla de jupyter notebook visualizando el listado de los notebooks que se proporcionaron como ejemplos.



## 6.- Impresión de pantalla de la conexión abierta al servidor utilizando Cyberduck o Filezilla (ver listado de archivos).



## 7.- Crear un notebook con su nombre y colocar el llamado a Pyspark para visualizar la versión instalada.



Todas las impresiones de pantalla se entregarán en un zip o en un documento de Word.

Descarga e Instala anaconda:

```
ubuntu@ip-172-31-2-166:~$ wget https://repo.anaconda.com/archive/Anaconda3-2023.07-2-Linux-x86_64.sh
--2023-10-30 06:42:09-- https://repo.anaconda.com/archive/Anaconda3-2023.07-2-Linux-x86_64.sh
Resolving repo.anaconda.com (repo.anaconda.com)... 104.16.130.3, 104.16.131.3, 2606:4700::6810:8303, ...
Connecting to repo.anaconda.com (repo.anaconda.com)|104.16.130.3|:443... connected.
HTTP request sent, awaiting response... 200 OK
Length: 1064920017 (1016M) [application/x-sh]
Saving to: 'Anaconda3-2023.07-2-Linux-x86_64.sh'

Anaconda3-2023.07-2-Linux-x86_64.sh          100%[=====] 1016M  61.5MB/s   in 15s

2023-10-30 06:42:23 (69.7 MB/s) - 'Anaconda3-2023.07-2-Linux-x86_64.sh' saved [1064920017/1064920017]
```

```
ubuntu@ip-172-31-2-166:~$ bash Anaconda3-2023.07-2-Linux-x86_64.sh

Welcome to Anaconda3 2023.07-2

In order to continue the installation process, please review the license
agreement.
Please, press ENTER to continue
>>>
=====
End User License Agreement - Anaconda Distribution
=====

Copyright 2015-2023, Anaconda, Inc.

All rights reserved under the 3-clause BSD License:
```

```

Anaconda3 will now be installed into this location:
/home/ubuntu/anaconda3

- Press ENTER to confirm the location
- Press CTRL-C to abort the installation
- Or specify a different location below

[/home/ubuntu/anaconda3] >>>
ERROR: File or directory already exists: '/home/ubuntu/anaconda3'
If you want to update an existing installation, use the -u option.

```

Ver que version de Python estás utilizando y cambiarlo:

```

ubuntu@ip-172-31-2-166:~$ which python3
/usr/bin/python3
ubuntu@ip-172-31-2-166:~$ source .bashrc
ubuntu@ip-172-31-2-166:~$ which python3
/usr/bin/python3

```

Configuración Jupyter Notebook:

```

ubuntu@ip-172-31-2-166:~$ jupyter notebook --generate-config
Writing default config to: /home/ubuntu/snap/jupyter/6/.jupyter/jupyter_notebook_config.py

```

Crear certificados:

```

ubuntu@ip-172-31-2-166:~$ mkdir certs
ubuntu@ip-172-31-2-166:~$ cd certs
ubuntu@ip-172-31-2-166:~/certs$ sudo openssl req -x509 -nodes -days 365 -newkey rsa:1024 -keyout mycert.pem -out mycert.pem
.....+-----+
++++
.....+-----+
++++
-----
You are about to be asked to enter information that will be incorporated
into your certificate request.
What you are about to enter is what is called a Distinguished Name or a DN.
There are quite a few fields but you can leave some blank
For some fields there will be a default value,
If you enter '.', the field will be left blank.
-----
Country Name (2 letter code) [AU]:MX
State or Province Name (full name) [Some-State]:LEON
Locality Name (eg, city) []:MTY
Organization Name (eg, company) [Internet Widgits Pty Ltd]:TEC
Organizational Unit Name (eg, section) []:TEC
Common Name (e.g. server FQDN or YOUR name) []:CARLOS
Email Address []:A01275316@tec.mx
ubuntu@ip-172-31-2-166:~/certs$

```

Editar archivo de configuración:

```

ubuntu@ip-172-31-2-166:~$ cd ~/.jupyter/
ubuntu@ip-172-31-2-166:~/.jupyter$ vi jupyter_notebook_config.py

```



## Editar reglas de entrada [Información](#)

Las reglas de entrada controlan el tráfico entrante que puede llegar a la instancia.

Reglas de entrada [Información](#)

ID de la regla del grupo de seguridad	Tipo <a href="#">Información</a>	Protocolo <a href="#">Información</a>	Intervalo de puertos <a href="#">Información</a>	Origen <a href="#">Información</a>	Descripción: opcional <a href="#">Información</a>	
sgr-0151f6754549da11c	SSH	TCP	22	Perso... <input type="text" value="Q"/>	<input type="text"/>	<div>Eliminar</div>
0.0.0.0/0 <input type="button" value="X"/>						
sgr-07257dccb46d8510c	TCP personalizado	TCP	8888	Perso... <input type="text" value="Q"/>	<input type="text"/>	<div>Eliminar</div>
0.0.0.0/0 <input type="button" value="X"/>						
<div>Agregar regla</div>						

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

X

## Lanzar Jupyter Notebook:

```
ubuntu@ip-172-31-2-166:~/jupyter$ jupyter notebook
[E 07:41:56.597 NotebookApp] Exception while loading config file /home/ubuntu/.jupyter/jupyter_notebook_config.py
Traceback (most recent call last):
  File "/snap/jupyter/6/lib/python3.7/site-packages/traitlets/config/application.py", line 562, in _load_config_file
    config = loader.load_config()
  File "/snap/jupyter/6/lib/python3.7/site-packages/traitlets/config/loader.py", line 457, in load_config
    self._read_file_as_dict()
  File "/snap/jupyter/6/lib/python3.7/site-packages/traitlets/config/loader.py", line 489, in _read_file_as_dict
    py3compat.execfile(conf_filename, namespace)
  File "/snap/jupyter/6/lib/python3.7/site-packages/ipython_genutils/py3compat.py", line 196, in execfile
    with open(fname, 'rb') as f:
PermissionError: [Errno 13] Permission denied: b'/home/ubuntu/.jupyter/jupyter_notebook_config.py'
[I 07:41:56.890 NotebookApp] Writing notebook server cookie secret to /run/user/1000/snap.jupyter/jupyter/notebook_cookie_secret
[I 07:41:58.731 NotebookApp] Serving notebooks from local directory: /home/ubuntu/.jupyter
[I 07:41:58.731 NotebookApp] The Jupyter Notebook is running at:
[I 07:41:58.731 NotebookApp] http://localhost:8888/?token=b162da7be25ab58b8cd332dc2bb985b0f73892723bceedfb
[I 07:41:58.731 NotebookApp] Use Control-C to stop this server and shut down all kernels (twice to skip confirmation).
[W 07:41:58.737 NotebookApp] No web browser found: could not locate runnable browser.
[C 07:41:58.737 NotebookApp]

To access the notebook, open this file in a browser:
file:///run/user/1000/snap.jupyter/jupyter/nbserver-929-open.html
Or copy and paste one of these URLs:
http://localhost:8888/?token=b162da7be25ab58b8cd332dc2bb985b0f73892723bceedfb
```

## Instalar Java:

```
ubuntu@ip-172-31-2-166:~/jupyter$ sudo apt-get update
Hit:1 http://us-east-2.ec2.archive.ubuntu.com/ubuntu jammy InRelease
Get:2 http://us-east-2.ec2.archive.ubuntu.com/ubuntu jammy-updates InRelease [119 kB]
Get:3 http://us-east-2.ec2.archive.ubuntu.com/ubuntu jammy-backports InRelease [109 kB]
Get:4 http://security.ubuntu.com/ubuntu jammy-security InRelease [110 kB]
Fetched 338 kB in 1s (482 kB/s)
Reading package lists... Done
ubuntu@ip-172-31-2-166:~/jupyter$ sudo apt-get install default-jre
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following additional packages will be installed:
  alsa-topology-conf alsa-ucm-conf at-spi2-core ca-certificates-java dconf-gsettings-backend dconf-service default-jre-headless fontconfig-config fonts-dejavu-core fonts-dejavu-extra gsettings-desktop-schemas
  java-common libasound2 libasound2-data libatk-bridge2.0-0 libatk-wrapper-java libatk-wrapper-java-jni libatk1.0-0 libatk1.0-data libatspi2.0-0 libavahi-client3 libavahi-common-data libavahi-common3 libcups2
  libdbus-1-3 libdconf1 libdrm-amdgpu libdrm-intel1 libdrm-nouveau2 libdrm-radeon1 libfontconfig1 libfontconfig1 libgl1 libgl1-amdgpu-dri libgl1-mesa-dri libglapi-mesa libglvnd0 libglx-mesa0 libglx0 libgraphite2-3
  libharfbuzz0b libice6 libjpeg-turbo8 libjpeg8 liblcms2-2 libllvm15 liblcms2-2 libltdl7 libltdl8 libltdl9 libltdl10 libltdl11 libltdl12 libltdl13 libltdl14 libltdl15 libltdl16 libltdl17 libltdl18 libltdl19 libltdl20
  libltdl21 libltdl22 libltdl23 libltdl24 libltdl25 libltdl26 libltdl27 libltdl28 libltdl29 libltdl30 libltdl31 libltdl32 libltdl33 libltdl34 libltdl35 libltdl36 libltdl37 libltdl38 libltdl39 libltdl40 libltdl41
  libltdl42 libltdl43 libltdl44 libltdl45 libltdl46 libltdl47 libltdl48 libltdl49 libltdl50 libltdl51 libltdl52 libltdl53 libltdl54 libltdl55 libltdl56 libltdl57 libltdl58 libltdl59 libltdl60 libltdl61 libltdl62 libltdl63
  libltdl64 libltdl65 libltdl66 libltdl67 libltdl68 libltdl69 libltdl70 libltdl71 libltdl72 libltdl73 libltdl74 libltdl75 libltdl76 libltdl77 libltdl78 libltdl79 libltdl80 libltdl81 libltdl82 libltdl83 libltdl84 libltdl85
  libltdl86 libltdl87 libltdl88 libltdl89 libltdl90 libltdl91 libltdl92 libltdl93 libltdl94 libltdl95 libltdl96 libltdl97 libltdl98 libltdl99 libltdl100 libltdl101 libltdl102 libltdl103 libltdl104 libltdl105
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  libltdl1442 libltdl1443 libltdl1444 libltdl1445 libltdl1446 libltdl1447 libltdl1448 lib
```



```
done.
done.
Setting up at-spi2-core (2.44.0-3) ...
Scanning processes...
Scanning linux images...

Running kernel seems to be up-to-date.

No services need to be restarted.

No containers need to be restarted.

No user sessions are running outdated binaries.

No VM guests are running outdated hypervisor (qemu) binaries on this host.
```

```
ubuntu@ip-172-31-2-166:~/jupyter$ java -version
openjdk version "11.0.20.1" 2023-08-24
OpenJDK Runtime Environment (build 11.0.20.1+1-post-Ubuntu-0ubuntu122.04)
OpenJDK 64-Bit Server VM (build 11.0.20.1+1-post-Ubuntu-0ubuntu122.04, mixed mode, sharing)
```

Instalar Scala:

```
ubuntu@ip-172-31-2-166:~/jupyter$ sudo apt-get install scala
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following additional packages will be installed:
  libhawtjni-runtime-java libjansi-java libjansi-native-java libjline2-java scala-library scala-parser-combinators scala-
Suggested packages:
  scala-doc
The following NEW packages will be installed:
  libhawtjni-runtime-java libjansi-java libjansi-native-java libjline2-java scala scala-library scala-parser-combinators
0 upgraded, 8 newly installed, 0 to remove and 0 not upgraded.
Need to get 25.1 MB of archives.
After this operation, 28.6 MB of additional disk space will be used.
Do you want to continue? [Y/n] Y
```

```
update-alternatives: using /usr/share/scala-2.11/bin/scala to provide /usr/bin/scala (scala) in auto mode
Scanning processes...
Scanning linux images...

Running kernel seems to be up-to-date.

No services need to be restarted.

No containers need to be restarted.

No user sessions are running outdated binaries.

No VM guests are running outdated hypervisor (qemu) binaries on this host.
```

```
ubuntu@ip-172-31-2-166:~/jupyter$ scala -version
Scala code runner version 2.11.12 -- Copyright 2002-2017, LAMP/EPFL
```

Instalar py4j:

```
ubuntu@ip-172-31-2-166:~/jupyter$ export PATH=$PATH:$HOME/anaconda3/bin

ubuntu@ip-172-31-2-166:~/jupyter$ which pip
/usr/bin/pip
```

```
ubuntu@ip-172-31-2-166:~/.jupyter$ pip install py4j
Defaulting to user installation because normal site-packages is not writeable
Collecting py4j
  Downloading py4j-0.10.9.7-py2.py3-none-any.whl (200 kB)
    200.5/200.5 KB 3.7 MB/s eta 0:00:00
Installing collected packages: py4j
Successfully installed py4j-0.10.9.7
```

Instalar Spark y Hadoop:

\*asegurate de estar en el directorio principal

```
ubuntu@ip-172-31-2-166:~/.jupyter$ cd
ubuntu@ip-172-31-2-166:~$ wget http://archive.apache.org/dist/spark/spark-3.5.0/spark-3.5.0-bin-hadoop3.tgz
2023-10-30 08:16:35 -- http://archive.apache.org/dist/spark/spark-3.5.0/spark-3.5.0-bin-hadoop3.tgz
Resolving archive.apache.org (archive.apache.org)... 65.108.204.189, 2a01:4f9:1a:a084::2
Connecting to archive.apache.org (archive.apache.org)[65.108.204.189]:80... connected.
HTTP request sent, awaiting response... 200 OK
Length: 400395283 (382M) [application/x-gzip]
Saving to: 'spark-3.5.0-bin-hadoop3.tgz'

spark-3.5.0-bin-hadoop3.tgz      100%[=====] 381.85M  10.8MB/s   in 73s
2023-10-30 08:17:49 (5.20 MB/s) - 'spark-3.5.0-bin-hadoop3.tgz' saved [400395283/400395283]
```

```
ubuntu@ip-172-31-2-166:~$ sudo tar -zxvf spark-3.5.0-bin-hadoop3.tgz
spark-3.5.0-bin-hadoop3/
spark-3.5.0-bin-hadoop3/kubernetes/
spark-3.5.0-bin-hadoop3/kubernetes/tests/
spark-3.5.0-bin-hadoop3/kubernetes/tests/pyfiles.py
spark-3.5.0-bin-hadoop3/kubernetes/tests/decommissioning.py
spark-3.5.0-bin-hadoop3/kubernetes/tests/autoscale.py
spark-3.5.0-bin-hadoop3/kubernetes/tests/python_executable_check.py
spark-3.5.0-bin-hadoop3/kubernetes/tests/worker_memory_check.py
spark-3.5.0-bin-hadoop3/kubernetes/tests/py_container_checks.py
spark-3.5.0-bin-hadoop3/kubernetes/tests/decommissioning_cleanup.py
spark-3.5.0-bin-hadoop3/kubernetes/dockerfiles/
spark-3.5.0-bin-hadoop3/kubernetes/dockerfiles/spark/
spark-3.5.0-bin-hadoop3/kubernetes/dockerfiles/spark/decom.sh
spark-3.5.0-bin-hadoop3/kubernetes/dockerfiles/spark/bindings/
spark-3.5.0-bin-hadoop3/kubernetes/dockerfiles/spark/bindings/R/
spark-3.5.0-bin-hadoop3/kubernetes/dockerfiles/spark/bindings/R/Dockerfile
spark-3.5.0-bin-hadoop3/kubernetes/dockerfiles/spark/bindings/python/
spark-3.5.0-bin-hadoop3/kubernetes/dockerfiles/spark/bindings/python/Dockerfile
spark-3.5.0-bin-hadoop3/kubernetes/dockerfiles/spark/Dockerfile
spark-3.5.0-bin-hadoop3/kubernetes/dockerfiles/spark/entrypoint.sh
spark-3.5.0-bin-hadoop3/NOTICE
spark-3.5.0-bin-hadoop3/R/
spark-3.5.0-bin-hadoop3/R/lib/
spark-3.5.0-bin-hadoop3/R/lib/SparkR/
spark-3.5.0-bin-hadoop3/R/lib/SparkR/doc/
spark-3.5.0-bin-hadoop3/R/lib/SparkR/doc/sparkr-vignettes.html
```

Decirle a Python donde encontrar Spark:

```
ubuntu@ip-172-31-2-166:~$ export SPARK_HOME='/home/ubuntu/spark-3.5.0-bin-hadoop3'
ubuntu@ip-172-31-2-166:~$ export PATH=$SPARK_HOME:$PATH
ubuntu@ip-172-31-2-166:~$ PYTHONPATH=$SPARK_HOME/python:$PYTHONPATH
```

Lanzar Jupyter Notebook:

Lanzar Spark:

```

barbacoa@LAPTOP-VPQA6BTv:~$ ls
Anaconda3-2023.07-2-Linux-x86_64.sh  anaconda3  barbacoa.pem:Zone.Identifier  snap
Anaconda3-2023.07-2-Linux-x86_64.sh.1  barbacoa.pem  certs
barbacoa@LAPTOP-VPQA6BTv:~$ ssh-keygen -y -f barbacoa.pem
@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@
@                WARNING: UNPROTECTED PRIVATE KEY FILE!          @
@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@
Permissions 0644 for 'barbacoa.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 "barbacoa.pem": bad permissions
barbacoa@LAPTOP-VPQA6BTv:~$ sudo chmod 400 barbacoa.pem
[sudo] password for barbacoa:
barbacoa@LAPTOP-VPQA6BTv:~$ ssh-keygen -y -f barbacoa.pem
ssh-rsa AAAAB3NzaC1yc2EAAAADAQABAAQACZ0hgCHpBRBH73qEtCXT89MuIoQTZE/Gin+9oQESD0vG+bD0tTfjg5hZJ2CZbFRNivA+wPsrM5v90iyaV
puNPWygOzEyjnnGV3S1BMG+AqWslWacvd2AY0gO18xb3jMNeUNJGaSNLzx6dPG7c67H6d1/0QhQX9J2xOMICyLXW7c97XW6+AMRnqEfRkKJ1LV62oR80uh8GI
orUpvrM8hltGHD8synmjsqhPm9S2bccixbbtaf+KH1HQcwEZxaYEht2IOfcRcYBHKv311kV9ob8bNlMXPq1i7iTRQpG7ubuSoD8GeQji24kQh2q2dZCvxdYQ
swk7AJhWg2hz0GEERLED
barbacoa@LAPTOP-VPQA6BTv:~$ ssh-keygen -y -f barbacoa.pem ubuntu@ec2-3-145-173-35.us-east-2.compute.amazonaws.com
Too many arguments.
usage: ssh-keygen [-q] [-a rounds] [-b bits] [-C comment] [-f output_keyfile]
                  [-m format] [-N new_passphrase] [-O option]

```

```

barbacoa@LAPTOP-VPQA6BTv:~$ ssh-keygen -y -f barbacoa.pem
ssh-rsa AAAAB3NzaC1yc2EAAAADAQABAAQACZ0hgCHpBRBH73qEtCXT89MuIoQTZE/Gin+9oQESD0vG+bD0tTfjg5hZJ2CZbFRNivA+wPsrM5v90iyaV
puNPWygOzEyjnnGV3S1BMG+AqWslWacvd2AY0gO18xb3jMNeUNJGaSNLzx6dPG7c67H6d1/0QhQX9J2xOMICyLXW7c97XW6+AMRnqEfRkKJ1LV62oR80uh8GI
orUpvrM8hltGHD8synmjsqhPm9S2bccixbbtaf+KH1HQcwEZxaYEht2IOfcRcYBHKv311kV9ob8bNlMXPq1i7iTRQpG7ubuSoD8GeQji24kQh2q2dZCvxdYQ
swk7AJhWg2hz0GEERLED
barbacoa@LAPTOP-VPQA6BTv:~$ ssh -i "barbacoa.pem" ubuntu@ec2-3-145-173-35.us-east-2.compute.amazonaws.com
The authenticity of host 'ec2-3-145-173-35.us-east-2.compute.amazonaws.com (3.145.173.35)' can't be established.
ED25519 key fingerprint is SHA256:119JK2kM9CD023Anm/a51+zy+desZamPETYPZN3a4U.
This key is not known by any other names
Are you sure you want to continue connecting (yes/no/[fingerprint])? yes
Warning: Permanently added 'ec2-3-145-173-35.us-east-2.compute.amazonaws.com' (ED25519) to the list of known hosts.
Welcome to Ubuntu 22.04.3 LTS (GNU/Linux 5.19.0-1025-aws x86_64)

```

barbacoa@LAPTOP-VPQA6BTv:~\$ ls

Anaconda3-2023.07-2-Linux-x86\_64.sh anaconda3 barbacoa.pem:Zone.Identifier snap

Anaconda3-2023.07-2-Linux-x86\_64.sh.1 barbacoa.pem certs

barbacoa@LAPTOP-VPQA6BTv:~\$ ssh-keygen -y -f barbacoa.pem

@@  
 @@

@ WARNING: UNPROTECTED PRIVATE KEY FILE! @

@@  
 @@

Permissions 0644 for 'barbacoa.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 "barbacoa.pem": bad permissions

```
barbacoa@LAPTOP-VPQA6BTv:~$ sudo chmod 400 barbacoa.pem
```

[sudo] password for barbacoa:

```
barbacoa@LAPTOP-VPQA6BTv:~$ ssh-keygen -y -f barbacoa.pem
```

ssh-rsa

```
AAAAB3NzaC1yc2EAAAADAQABAAQBAQCZ0hgCHpBRBH73qEtCxT89MuIoQTZE/  
Gin+9oQESDOvG+bDOtTfjg5hZJ2CZbFRNivA+wPsrM5v9OiyaVpuNPWygOzEyjnnGV  
3S1BMG+AqWsWaCvd2AYOgOl8xb3jMNeUNJGaSNLzx6dPG7c67H6dl/0QhQX9J2xOM  
ICyLXW7c97XW6+AMRnqEfRKk1LV62oR8Ouh8GIorUpvrM8hltGHD8synmjSqhPm9S2  
bcciXbbtaf+KH1HQcwEZXaYEht2IOfcRcYBHKv3l1kV9ob8bNIMXPq1i7iTRQpG7ubuSo  
D8GeQji24kQh2q2dZCvxdYQswk7AJhWg2hz0GEErLED
```

```
barbacoa@LAPTOP-VPQA6BTv:~$ ssh-keygen -y -f barbacoa.pem
```

```
ubuntu@ec2-3-145-173-35.us-east-2.compute.amazonaws.com
```

Too many arguments.

usage: ssh-keygen [-q] [-a rounds] [-b bits] [-C comment] [-f output\_keyfile]

[-m format] [-N new\_passphrase] [-O option]

[-t dsa | ecdsa | ecdsa-sk | ed25519 | ed25519-sk | rsa]

[-w provider] [-Z cipher]

ssh-keygen -p [-a rounds] [-f keyfile] [-m format] [-N new\_passphrase]

[-P old\_passphrase] [-Z cipher]

ssh-keygen -i [-f input\_keyfile] [-m key\_format]

ssh-keygen -e [-f input\_keyfile] [-m key\_format]

ssh-keygen -y [-f input\_keyfile]

ssh-keygen -c [-a rounds] [-C comment] [-f keyfile] [-P passphrase]

ssh-keygen -l [-v] [-E fingerprint\_hash] [-f input\_keyfile]

ssh-keygen -B [-f input\_keyfile]

ssh-keygen -D pkcs11

ssh-keygen -F hostname [-lv] [-f known\_hosts\_file]

ssh-keygen -H [-f known\_hosts\_file]

```

ssh-keygen -K [-a rounds] [-w provider]

ssh-keygen -R hostname [-f known_hosts_file]

ssh-keygen -r hostname [-g] [-f input_keyfile]

ssh-keygen -M generate [-O option] output_file

ssh-keygen -M screen [-f input_file] [-O option] output_file

ssh-keygen -I certificate_identity -s ca_key [-hU] [-D pkcs11_provider]

    [-n principals] [-O option] [-V validity_interval]

    [-z serial_number] file ...

ssh-keygen -L [-f input_keyfile]

ssh-keygen -A [-a rounds] [-f prefix_path]

ssh-keygen -k -f krl_file [-u] [-s ca_public] [-z version_number]

    file ...

ssh-keygen -Q [-l] -f krl_file [file ...]

ssh-keygen -Y find-principals -s signature_file -f allowed_signers_file

ssh-keygen -Y match-principals -I signer_identity -f allowed_signers_file

ssh-keygen -Y check-novalidate -n namespace -s signature_file

ssh-keygen -Y sign -f key_file -n namespace file [-O option] ...

ssh-keygen -Y verify -f allowed_signers_file -I signer_identity

    -n namespace -s signature_file [-r krl_file] [-O option]

```

```

barbacoa@LAPTOP-VPQA6BTv:~$ ssh-keygen -y -f barbacoa.pem

```

```

ssh-rsa

```

```

AAAAB3NzaC1yc2EAAAADAQABAAQBAQCZ0hgCHpBRBH73qEtCxT89MuIoQTZE/
Gin+9oQESDOvG+bDOtTfjg5hZJ2CZbFRNivA+wPsrM5v9OiyaVpuNPWygOzEyjnnGV
3S1BMG+AqWsWaCvd2AYOgOI8xb3jMNeUNJGaSNLzx6dPG7c67H6dl/0QhQX9J2xOM
ICyLXW7c97XW6+AMRnqEfRKkJ1LV62oR8Ouh8GIorUpvrM8hltGHD8synmjSqhPm9S2
bcciXbbtaf+KH1HQcwEZXaYEHT2IOfcRcYBHKv3l1kV9ob8bNIMXPq1i7iTRQpG7ubuSo
D8GeQji24kQh2q2dZCvxdYQswk7AJhWg2hz0GEErLED

```

```

barbacoa@LAPTOP-VPQA6BTv:~$ ssh -i "barbacoa.pem"
ubuntu@ec2-3-145-173-35.us-east-2.compute.amazonaws.com

```

```

The authenticity of host 'ec2-3-145-173-35.us-east-2.compute.amazonaws.com
(3.145.173.35)' can't be established.

```

ED25519 key fingerprint is  
SHA256:119JK2kMV9CDO23Anm/a51+zy+desZamPETYPZN3a4U.

This key is not known by any other names

Are you sure you want to continue connecting (yes/no/[fingerprint])? yes

Warning: Permanently added 'ec2-3-145-173-35.us-east-2.compute.amazonaws.com' (ED25519) to the list of known hosts.

Welcome to Ubuntu 22.04.3 LTS (GNU/Linux 5.19.0-1025-aws x86\_64)

\* Documentation: <https://help.ubuntu.com>

\* Management: <https://landscape.canonical.com>

\* Support: <https://ubuntu.com/advantage>

System information as of Mon Oct 30 06:10:14 UTC 2023

System load: 0.0 Processes: 98

Usage of /: 30.4% of 7.57GB Users logged in: 1

Memory usage: 31% IPv4 address for eth0: 172.31.2.166

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`

\*\*\* System restart required \*\*\*

Last login: Mon Oct 30 05:59:34 2023 from 3.16.146.4