



DEPARTAMENTO DE SEÑALES, SISTEMAS Y RADIOCOMUNICACIONES



## Google Cloud

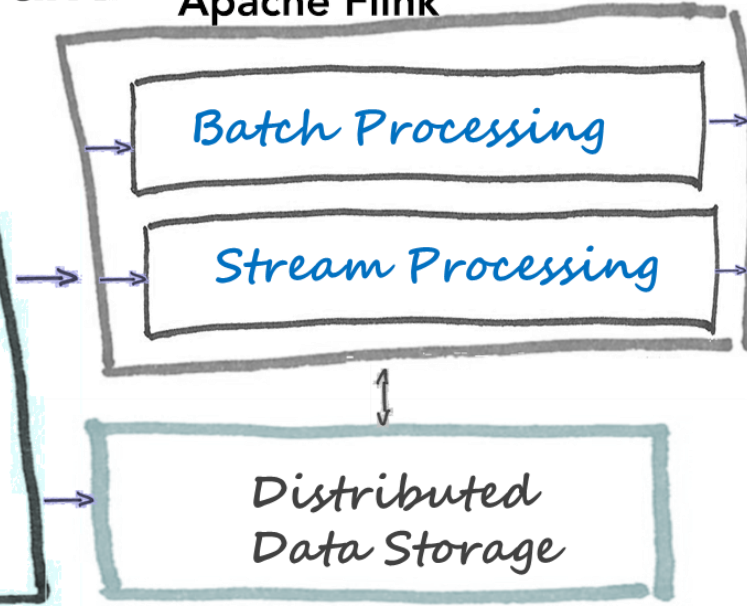
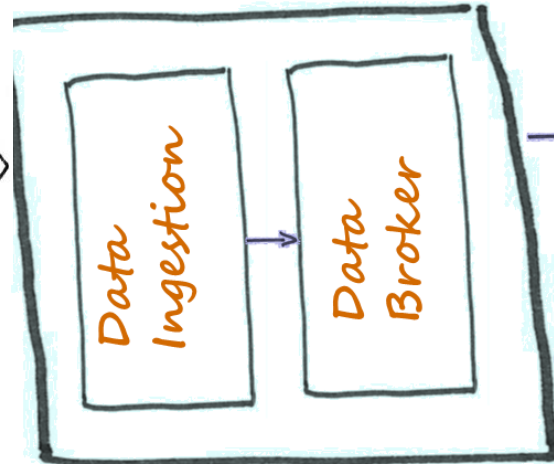
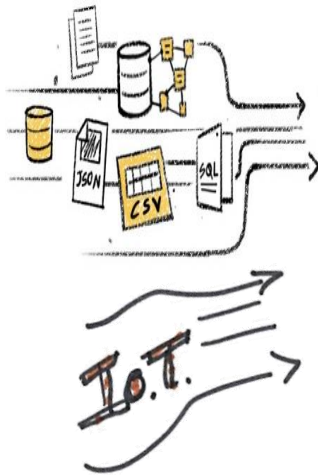
Master of Science in Signal Theory and Communications  
TRACK: Signal Processing and Machine Learning for Big Data

Departamento de Señales, Sistemas y Radiocomunicaciones  
E.T.S. Ingenieros de Telecomunicación  
Universidad Politécnica de Madrid

# Big Data Architecture



Data Sources



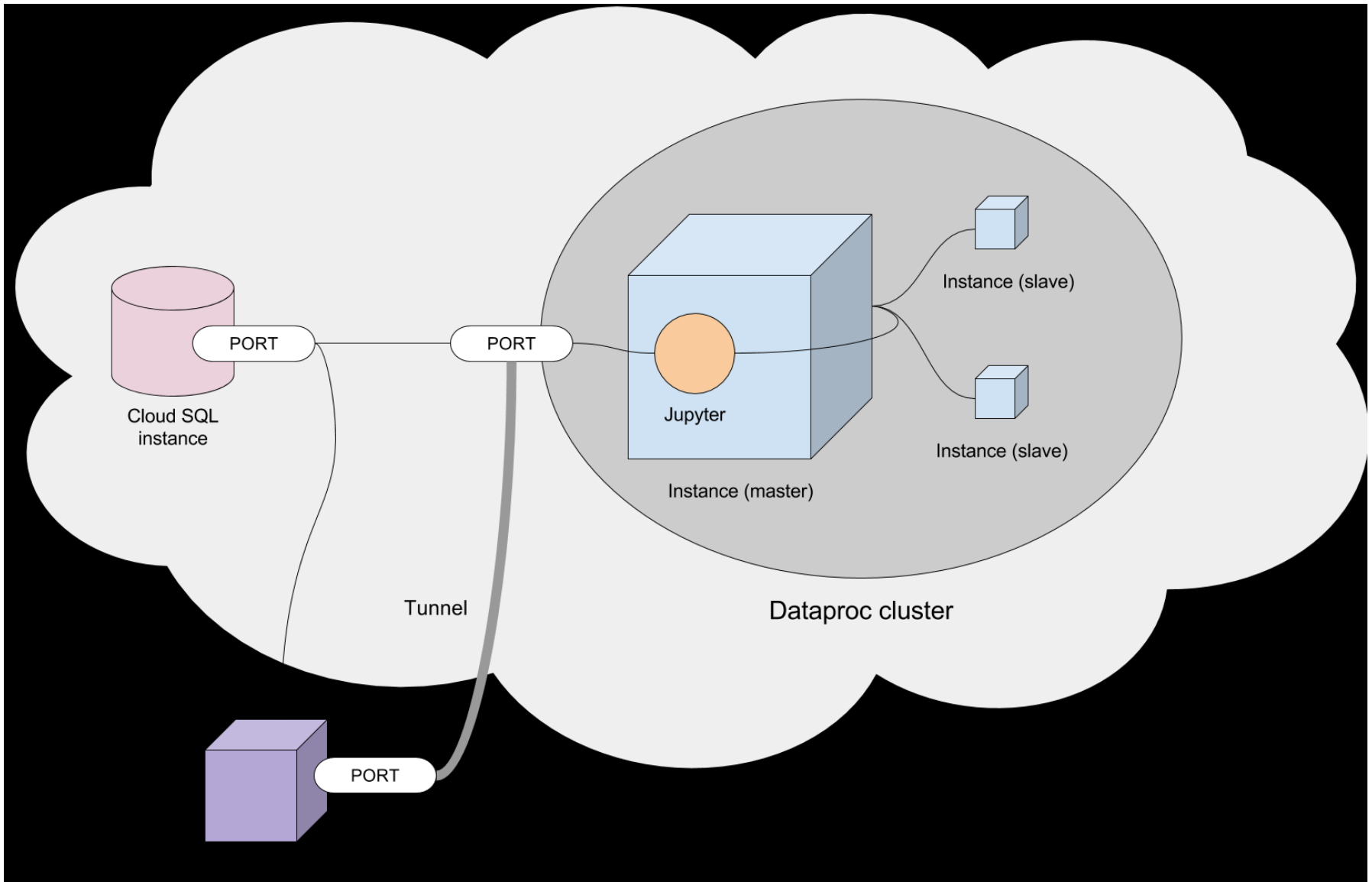
- Business Intelligence
- Visualization
- Analytics

Data Customers



<https://github.com/naranjja/gcp-jupyter-sql>

- It can be *very* useful to outsource processing to the cloud as it allows for **easy horizontal and vertical scaling**.
- **Google Cloud Platform** has all the necessary infrastructure to run Jupyter Notebooks in the cloud,
  - from creating a **clusterized server** configuration of notebooks,
  - to reading and writing data to a database based on **Cloud SQL**.



Access with my/your Gmail account

<https://console.cloud.google.com/education>

## A Caveat

You and your students are working with the "regular" version of the Google Cloud Console (There is no separate student version). Because of that, you will be encouraged to sign up for the GCP Free Trial. You do not need to sign up for the Free Trial. The credits we provide are in place of the Free Trial.

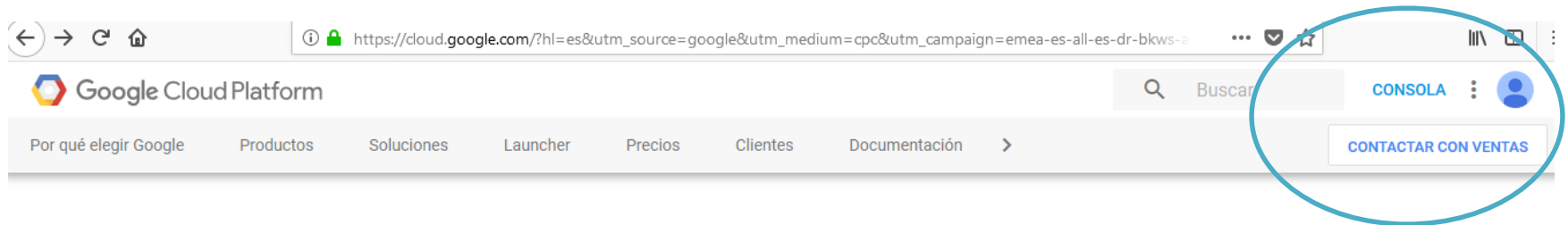
In particular, you should not provide a credit card number to use the EDU Grants Program. If you or your students are asked for a credit card, you are probably using the Free Trial instead.

You do not need a credit card to sign up  
for the Edu Grants Program.

## Setup project

- In this session we will open and learn [Google Cloud CONSOLE](#)
- You should also try: download and install [Google Cloud SDK](#).
  - Once installed, the gcloud command should be usable from any command prompt with an up-to-date PATH variable.

# Access with your Gmail account



Diseña el futuro  
Desarrolla mejor software, más rápido

- ✓ Utiliza la infraestructura base, el análisis de datos y el sistema de aprendizaje automático de Google.
- ✓ Ensambla tu propia nube de aplicaciones con Google Cloud Platform.

<https://towardsdatascience.com/running-jupyter-notebook-in-google-cloud-platform-in-15-min-61e16da34d52>

The screenshot displays the Google Cloud Platform (GCP) dashboard for a project named 'Mi primer proyecto'. The interface is divided into several sections:

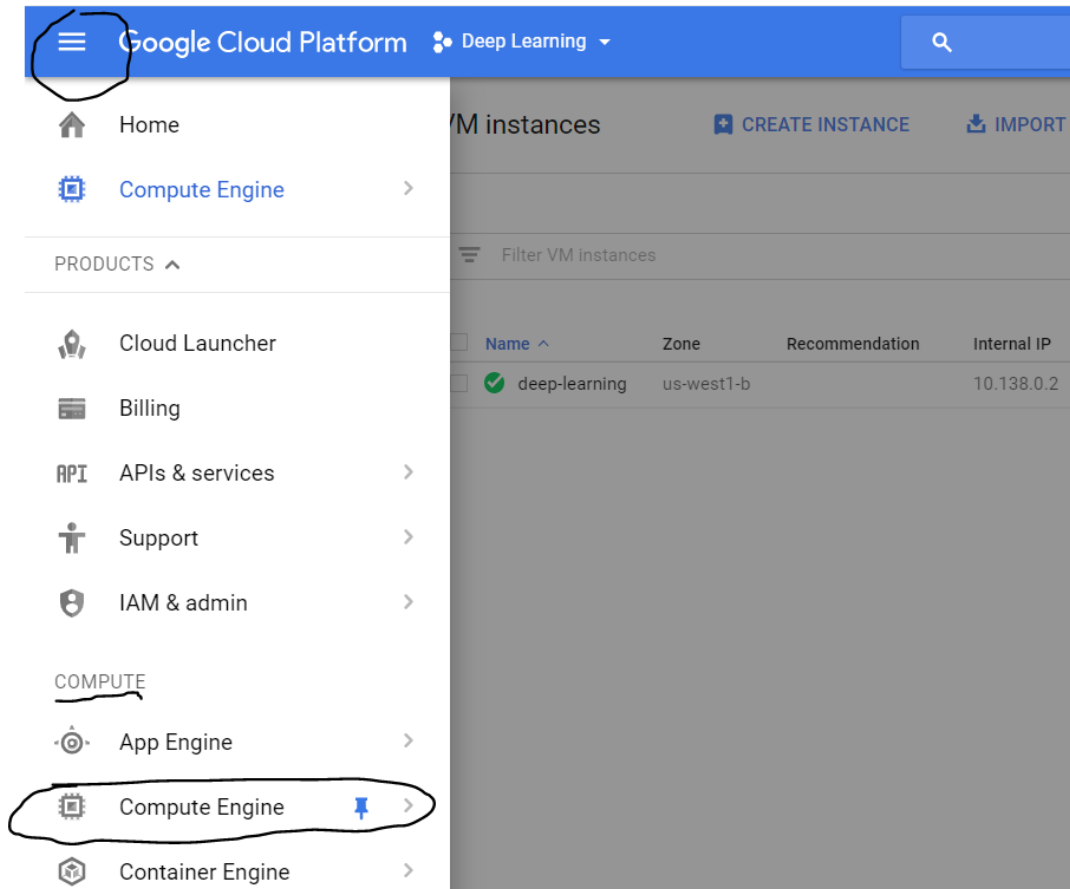
- Header:** Includes the Google Cloud Platform logo, the project name 'Mi primer proyecto', a search bar, and notification icons.
- Navigation:** Tabs for 'PANEL DE CONTROL' (selected) and 'ACTIVIDAD'. A 'PERSONALIZA' link is visible on the right.
- Información del proyecto:** A card showing project details:
  - Nombre de proyecto:** Mi primer proyecto
  - ID de proyecto:** winged-keyword-177211
  - Número del proyecto:** 786315417377A link 'Ir a la configuración del proyecto' is provided.
- Recursos:** A card listing resources:
  - Cloud Storage:** 1 segmento
  - BiaQuerv:** (with a small icon)
- API APIs:** A card showing API metrics:
  - Solicitudes (solicitudes/s):** A line chart with data points at 5:15, 5:30, 5:45, and 6 p. m. The y-axis ranges from 0,0155 to 0,0175.
  - Peticiones:** A purple dot icon.
  - A link 'Ir a la visión general de las API' is at the bottom.
- Estado de Google Cloud Platform:** A card showing the service status:
  - Estado de todos los servicios:** normal
  - A link 'Ir al panel de estado de Cloud' is provided.
- Facturación:** A card showing billing information:
  - Cargos estimados:** 0,00 USD \$
  - Del periodo de facturación:** 1-27 ene. 2018
  - A link 'Ver cargos en detalle' is provided.
- Error Reporting:** A card with a bug icon and the text 'Error Reporting'.



<https://towardsdatascience.com/running-jupyter-notebook-in-google-cloud-platform-in-15-min-61e16da34d52>

## Step 3 : Create a VM instance

Click on the three lines on the upper left corner, then on the compute option, click on **'Compute Engine'**



This region is important if you need GPUs

Name ?

instance-1

Zone ?

us-west1-b

Machine type

8 vCPUs

30 GB memory

[Customize](#)

[Upgrade your account](#) to create instances with up to 64 cores

Boot disk ?



New 10 GB standard persistent disk

Image

Ubuntu 16.04 LTS

[Change](#)

Identity and API access ?

Service account ?

Compute Engine default service account

Access scopes ?

- ☒ Allow default access
- ☐ Allow full access to all Cloud APIs
- ☐ Set access for each API

If you click on 'customize', you will be able to find options for using GPUs. You can choose between 2 NVIDIA GPUs

Don't do it!!

We will discuss why...

## Machine type

Basic view

### Cores

8 vCPU 1 - 8

### Memory

30 GB 7.2 - 52

☐ Extend memory ?

### CPU platform ?

Automatic

### GPUs

The number of GPU dies is linked to the number of CPU cores and memory selected for this instance. For this machine type, you can select no fewer than 1 GPU die.

[Learn more](#)

### Number of GPUs

2

### GPU type

NVIDIA Tesla K80



Machines with GPUs can't be preemptible nor migrate on host maintenance

[^](#) Less

[Choosing a machine type](#) [↗](#)

[Upgrade your account](#) to create instances with up to 64 cores

### CPU platform

Unknown CPU Platform

### Firewall ?

Add tags and firewall rules to allow specific network traffic from the Internet

- ☒ Allow HTTP traffic
- ☒ Allow HTTPS traffic

Management

**Disks**

Networking

SSH Keys

### Deletion rule

- ☐ Delete boot disk when instance is deleted

### Encryption ?

Automatic (recommended) ▼

### Additional disks ? (Optional)

+ Add item

⤴ Less

Instanc... de VM

CREAR INSTANCIA IMPORTAR VM ACTUALIZAR INICIAR

Filtrar las instancias de VM

Columnas

<input type="checkbox"/>	Nombre ^	Zona	Recomendación	IP interna	IP externa	Conectar
<input type="checkbox"/>	✓ instance-2	us-central1-c		10.128.0.2	35.226.97.181	SSH

IMPORTANT : DON'T FORGET TO STOP YOUR GPU INSTANCE AFTER YOU ARE DONE BY CLICKING ON THE THREE DOTS ON THE IMAGE ABOVE AND SELECTING STOP. OTHERWISE GCP WILL KEEP CHARGING YOU ON AN HOURLY BASIS.

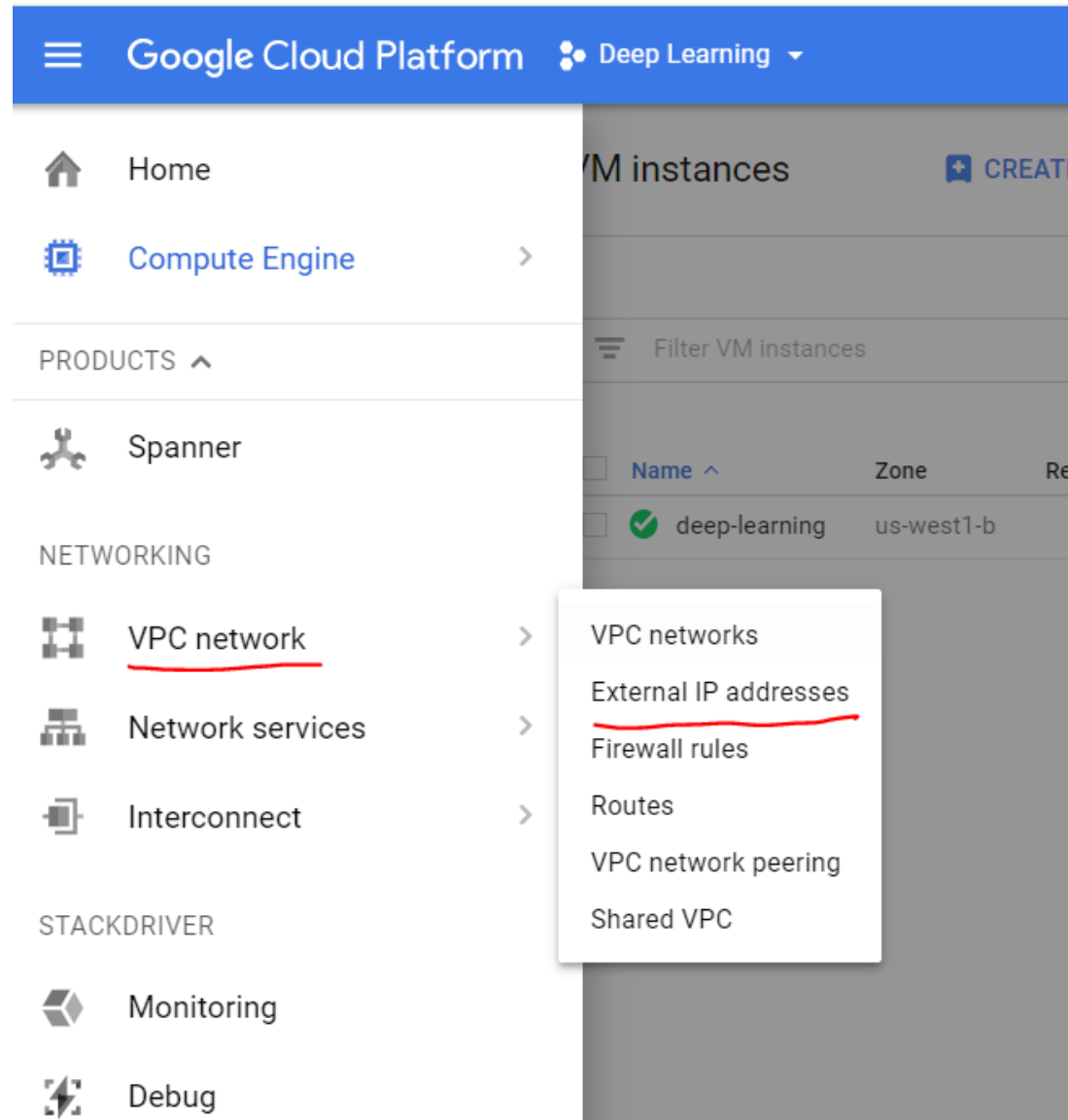
<input type="checkbox"/>	Name ^	Zone	Recommendation	Internal IP	External IP	Connect
<input type="checkbox"/>	✓ deep-learning	us-west1-b		10.138.0.2	<del>35.226.97.181</del>	SSH

- Start
- Stop
- Reset
- Delete
- New instance group
- View logs

# FOLLOW THIS LINK:

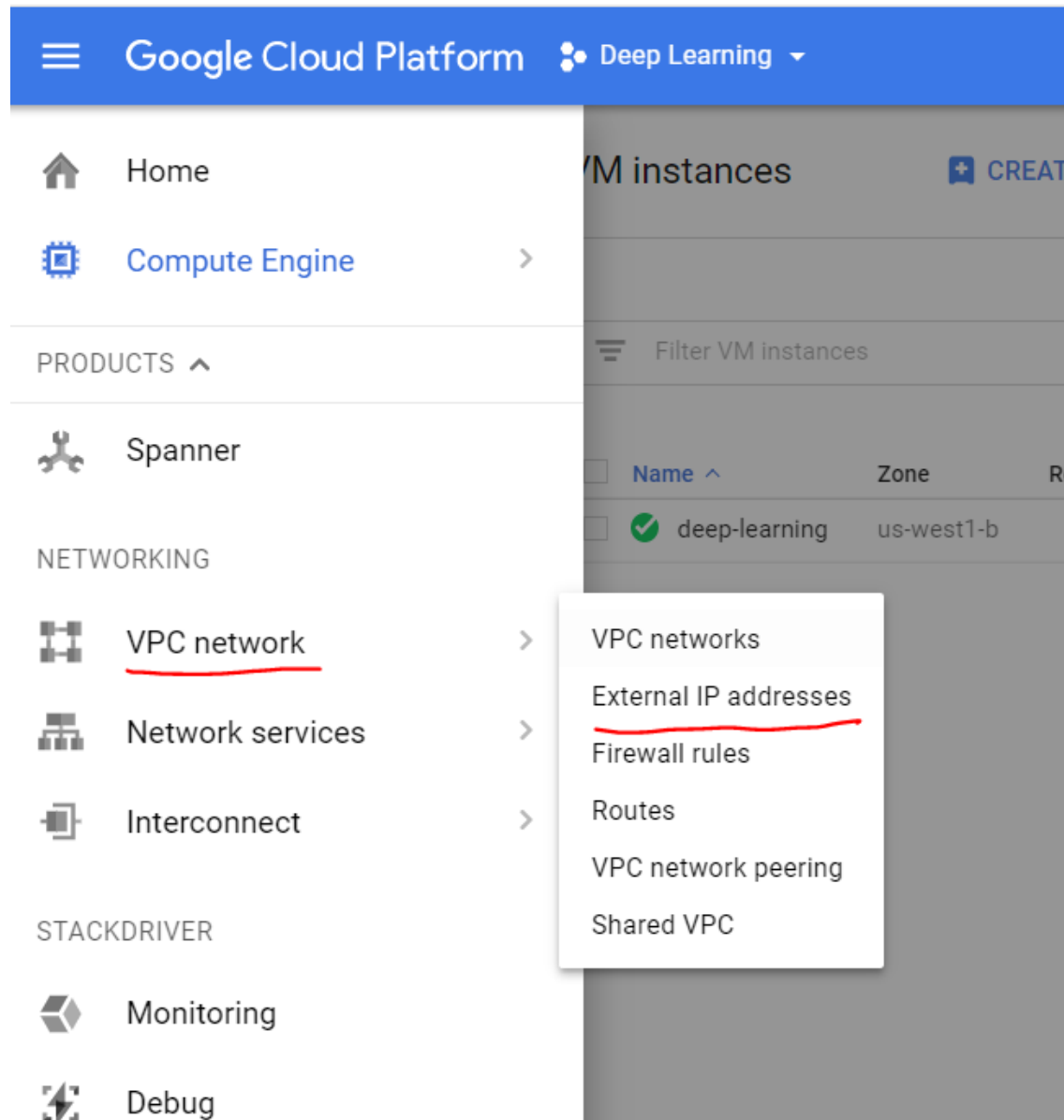
<https://towardsdatascience.com/running-jupyter-notebook-in-google-cloud-platform-in-15-min-61e16da34d52>

Step 4:  
Make  
external  
IP  
address  
as static



<input type="checkbox"/>	Name	External Address	Region	Type <span>▼</span>	Version	In use by	Labels
<input type="checkbox"/>	deep-static	<del>10.10.10.10</del>	us-west1	Static <span>▼</span>	IPv4	VM instance deep-learning (Zone b)	<a href="#">Change</a>

## Step 5: Change the Firewall setting





## Step 5: Change the Firewall setting




Create a new firewall rule:

Name : ruletcp5000

The screenshot shows the 'Firewall rule details' form. The form includes the following fields and sections:

- Description:** A text input field.
- Network:** default
- Priority:** 1000
- Direction:** Ingress
- Action on match:** Allow
- Targets:** A dropdown menu with 'All instances in the network' selected. This section is circled in red.
- Source filter:** A dropdown menu with 'IP ranges' selected.
- Source IP ranges:** A text input field with '0.0.0.0/0' and a clear button. This section is circled in red.
- Second source filter:** A dropdown menu with 'None' selected.
- Protocols and ports:** A section with two radio buttons: 'Allow all' (unselected) and 'Specified protocols and ports' (selected). Below the radio buttons is a text input field with 'tcp:5000'. This entire section is circled in red.
- Buttons:** 'Save' and 'Cancel' buttons at the bottom.

# Step 6: Start your VM instance

<input type="checkbox"/> Name ^	Zone	Recommendation	Internal IP	External IP	Connect
<input type="checkbox"/>  deep-learning	us-west1-b		10.138.0.2	<del>35.243.172.14</del> 	<u>SSH</u>  <div><u>Start</u> Stop Reset ...</div>

## Step 7 : Install Jupyter notebook and other packages

This next step has already been done for you in another Computer Engine

## Step 9 : Launching Jupyter Notebook

Connect using SSH through **CONSOLE**

- **Make you me!** :  
    > sudo su lahg235
- Change directory:  
    > cd /home/lahg235
- Then start jupyter-notebook

jupyter-notebook --no-browser --port=5000

- Connect to jupyter from your laptop using the  
External IP

http:\\<external IP>:5000

- Open another connection using SSH through **CONSOLE**
- You can check that GPU is installed (and used... `nvidia-smi -l 5`)

```
done.
done.
Enabled persistence mode for GPU 00000000:00:04.0.
All done.
lahg235@dispoloud:~$ nvidia-smi
Fri Mar 30 21:21:08 2018
```

NVIDIA-SMI 390.30				Driver Version: 390.30			
GPU	Name	Persistence-M	Bus-Id	Disp.A	Volatile	Uncorr. ECC	
Fan	Temp	Perf	Pwr:Usage/Cap	Memory-Usage	GPU-Util	Compute M.	
0	Tesla P100-PCIE...	On	00000000:00:04.0	Off		0	
N/A	37C	P0	27W / 250W	0MiB / 16280MiB	0%	Default	

Processes:					GPU Memory
GPU	PID	Type	Process name		Usage
No running processes found					

# After install check:

nvidia-smi

```
done.
done.
Enabled persistence mode for GPU 00000000:00:04.0.
All done.
lahg235@dispccloud:~$ nvidia-smi
Fri Mar 30 21:21:08 2018
```

NVIDIA-SMI 390.30 Driver Version: 390.30							
GPU	Name	Persistence-M	Bus-Id	Disp.A	Volatile	Uncorr. ECC	
Fan	Temp	Perf	Pwr:Usage/Cap	Memory-Usage	GPU-Util	Compute M.	
0	Tesla P100-PCIE...	On	00000000:00:04.0	Off		0	
N/A	37C	P0	27W / 250W	0MiB / 16280MiB	0%	Default	

Processes:						GPU Memory
GPU	PID	Type	Process name			Usage
No running processes found						



<https://towardsdatascience.com/running-jupyter-notebook-in-google-cloud-platform-in-15-min-61e16da34d52>

<https://github.com/naranjja/gcp-jupyter-sql>

- The following are instructions to run a (Python 3, Anaconda3) Jupyter Notebook Server
  - using Google **Cloud Platform's Dataproc** (for clusterized processing) or **Compute Engine** (for normal processing),
  - as well as Cloud SQL for storing data.

## Step 7 : Install Jupyter notebook and other packages

In your SSH terminal, enter

```
sudo wget https://repo.continuum.io/archive/Anaconda3-5.0.0.1-Linux-x86_64.sh
```

```
sudo apt-get install bzip2  
bash Anaconda3-5.0.0.1-Linux-x86_64.sh
```

check if conda registered to path by running the conda command.

If not recognized, add to path manually:

```
source ~/.bashrc
```

## INSTALL Anaconda3 to have JUPYTER: More details of previous step

From: <https://github.com/naranjja/gcp-jupyter-sql>

```
sudo wget https://repo.continuum.io/archive/Anaconda3-5.0.0.1-Linux-x86_64.sh
```

NOTE: You can always visit the Anaconda archive to get any version's URL.

Proceed to install Anaconda3 (install bzip2 to be able to decompress some Anaconda3 installation files):

```
sudo apt-get install bzip2  
bash Anaconda3-5.0.0.1-Linux-x86_64.sh
```

NOTE: Do not run sudo bash for the installation, as it will be installed elsewhere.

NOTE: During the installation, you will be asked if you want to add Anaconda3 to the PATH variable (albeit in very quirky wording). Type yes to this step when prompted.

Check if installation is successful by running the ls command and checking that the anaconda3 folder is present. Then, check if conda registered to path by running the conda command. If not recognized, add to path manually:

```
source ~/.bashrc
```

## Step 8: Set up the VM server

Open up a SSH session to your VM. Check if you have a Jupyter configuration file:

```
ls ~/.jupyter/jupyter_notebook_config.py
```

If it doesn't exist, create one:

```
jupyter notebook --generate-config
```

# Modify jupyter\_notebook\_config.py

```
c = get_config()
c.NotebookApp.ip = '*'
c.NotebookApp.open_browser = False
c.NotebookApp.port = 5000
```

```
Configurable configuration
-----

c = get_config()
c.NotebookApp.ip = '*'
c.NotebookApp.open_browser = False
c.NotebookApp.port = 8123

LoggingConfigurable configuration
-----

A parent class for Configurables that log.

Subclasses have a log trait, and the default behavior is to get the logger
from the currently running Application.
```

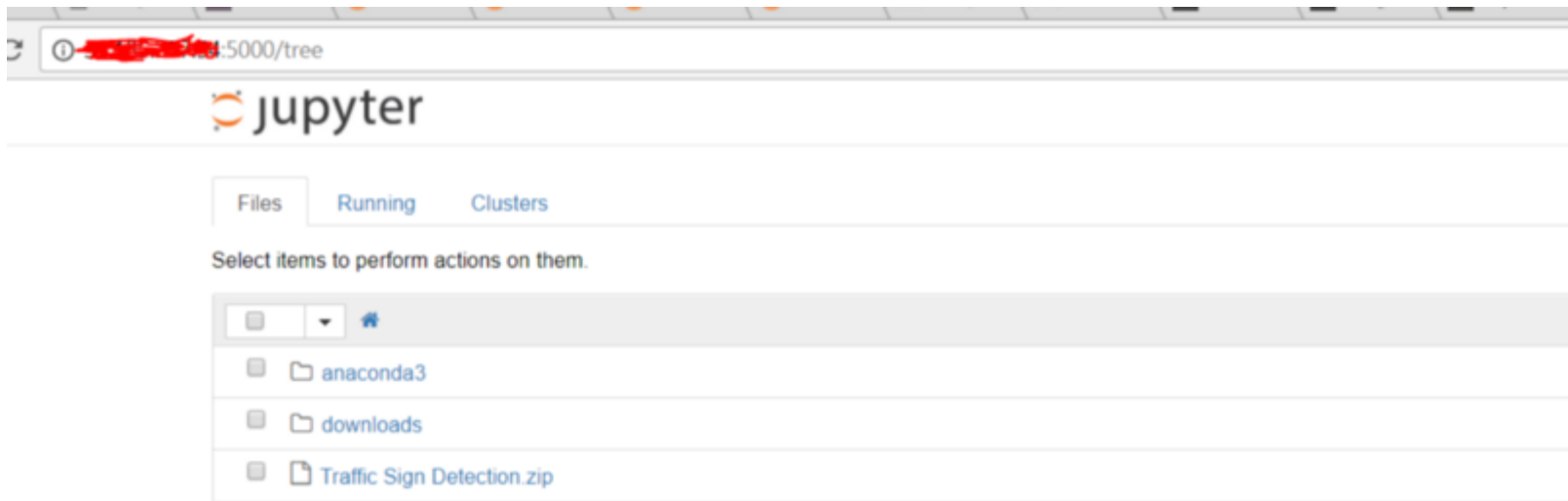
## Step 9 : Launching Jupyter Notebook

```
jupyter-notebook --no-browser --port=<PORT-  
NUMBER>
```

```
jupyter-notebook --no-browser --port=5000
```

Now to launch your jupyter notebook in **your laptop**, just type the following in your browser:

http://<External Static IP Address>:<Port Number>



**ATTENTION — FOR THE LOVE  
OF GOD! DO NOT FORGET TO  
STOP THE VM INSTANCE!!**