

Práctica obligatoria - Elaboración de una memoria de la práctica

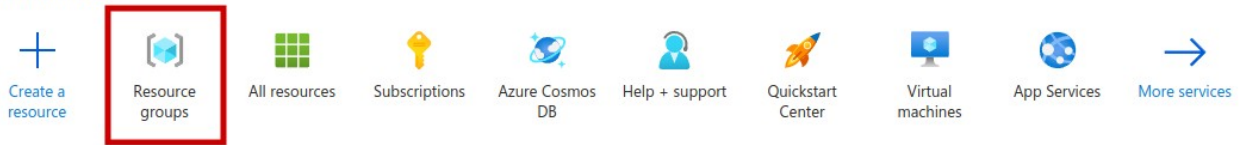
5.0. Creación cuenta de estudiante Azure

Hemos creado una cuenta de estudiante en Azure.

5.1. Creación de grupo de recursos

Desde la página de home pulsamos Resource Group para crear un grupo de recursos.

Azure services



Después de hacer click en Resource Group, pulsamos “Create Resource Group”.

Rellenamos la pestaña “Basic”:

Subscription: Azure for Students

Resource group: merve-resource-group

Region: (Europe) West Europe

Microsoft Azure Search resources, services, and docs (G+/)

Home > Resource groups >

Create a resource group

Basics Tags Review + create

Resource group - A container that holds related resources for an Azure solution. The resource group can include all the resources for the solution, or only those resources that you want to manage as a group. You decide how you want to allocate resources to resource groups based on what makes the most sense for your organization. [Learn more](#)

Project details

Subscription * ⓘ Azure for Students

Resource group * ⓘ merve-resource-group

Resource details

Region * ⓘ (Europe) West Europe

Review + create < Previous Next : Tags >



En la pestaña “Tags”:
Rellenamos 2 tags para para ayudarnos a la gestión de los servicios:
Name | Value
owner **merve-owner**
project **merve-project**

Home > Resource groups >

Create a resource group ...

Basics Tags Review + create


Apply tags to your Azure resources to logically organize them by categories. A tag consists of a key (name) and a value. Tag names are case-insensitive and tag values are case-sensitive. [Learn more](#)

Name ⓘ	Value ⓘ	Resource
owner	: merve-owner	Resource group 
<input type="text" value="project"/>	: <input type="text" value="merve-project"/>	Resource group 
<input type="text"/>	: <input type="text"/>	Resource group

En la pestaña Review + Create
Cuando vemos Validation passed, pulsamos en Create

Home > Resource groups >

Create a resource group ...

 Validation passed.

Basics Tags Review + create

Basics

Subscription	Azure for Students
Resource group	merve-resource-group
Region	West Europe

Tags

owner	merve-owner
project	merve-project

Microsoft Azure

Search resources, services, and docs (G+/I)

Home >

Resource groups

UAM (dauam.onmicrosoft.com)

+ Create Manage view Refresh Export to CSV Open query Assign tags

Filter for any field... Subscription equals all Location equals all Add filter

Showing 1 to 1 of 1 records. No grouping List view

Name	Subscription	Location
merve-resource-group	Azure for Students	West Europe

Page 1 of 0

Give feedback

Notifications

More events in the activity log → Dismiss all

Resource group created

Creating resource group 'merve-resource-group' in subscription 'Azure for Students' succeeded.

Go to resour... Pin to da...

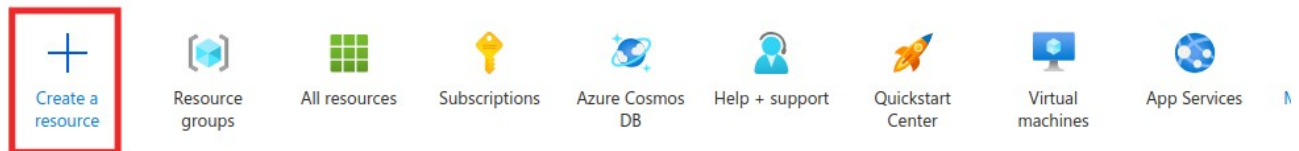
a few seconds ago

Como vemos aquí, hemos creado el resource group con éxito.

5.2. Creación de servicio de IoT Hub

Desde la página de home, pulsamos Create a Resource para crear servicios.

Azure services



Primero, creamos el servicio de IoT Hub. Para ello, escribimos “IoT Hub” en el buscador y hacemos click en él. Después de pulsar “Create”, rellenamos la pestaña “Basic”.

Home > Resource groups > merve-resource-group > Marketplace > IoT Hub >

IoT hub

Microsoft

Basics Networking Management Add-ons Tags Review + create

Create an IoT hub to help you connect, monitor, and manage billions of your IoT assets. [Learn more](#)

Project details

Choose the subscription you'll use to manage deployments and costs. Use resource groups like folders to help you organize and manage resources.

Subscription *	Azure for Students
Resource group *	merve-resource-group

[Create new](#)

Instance details

IoT hub name *	merve-iot-hub
Region *	West Europe
Tier *	Free

[Free trial explores the app with live data. Trials cannot scale or be upgraded later.](#)

[Compare tiers](#)

Daily message limit *	8,000 (\$0/month)
-----------------------	-------------------

En la pestaña “Tags”, rellenamos 2 tags para ayudarnos a la gestión de los servicios como antes:

Name		Value
owner		merve-owner
project		merve-project

IoT hub

Microsoft

BasicsNetworkingManagementAdd-onsTagsReview + create

Tags are name/value pairs. To categorize resources and consolidate billing, apply the same tag to multiple resources and resource groups. Your tags will update automatically if you change your resources. [Learn more](#)

Name	Value	Resource
owner	: merve-owner	IoT Hub
project	: merve-project	IoT Hub
	:	IoT Hub

En la pestaña de Review + create visualizamos los detalles del servicio, especialmente el precio, antes de la creación. Si todo está correcto, podemos pulsar en “Create”.

Home > Resource groups > merve-resource-group > Marketplace > IoT Hub >

IoT hub

Microsoft

BasicsNetworkingManagementAdd-onsTagsReview + create

Pricing

IoT hub

\$0 USD per month

Change basics

Add-ons total

Change add-ons

Basics

Subscription

Resource group

IoT hub name

Region

Disaster recovery enabled

Tier

Daily message limit

Azure for Students

merve-resource-group

merve-iot-hub

West Europe

Yes

Free

8,000 (\$0/month)

Networking

Connectivity configuration

Private endpoint connections

Allow public network access

Public access

None

Enabled

Management

Tier

Number of F1 IoT hub units

Device-to-cloud partitions

Enable Defender for IoT

Preview mode

F1

1

2

Disabled

Off

Create

< Previous: Tags

Next >

Automation options

Microsoft Azure Search resources, services, and docs (G+/)

Home > merve-iot-hub-22215378 | Overview Deployment

Search < Delete Cancel Redeploy Download Refresh

Overview Inputs Outputs Template

✓ Your deployment is complete

Deployment name: merve-iot-hub-22215378
Subscription: Azure for Students
Resource group: merve-resource-group
Start time: 2/22/2024, 3:37:11 PM
Correlation ID: 6e15c287-2a6f-4f09-9731-e6fdc3e18177

Deployment details

Next steps

Add and configure IoT Devices Recommended
Configure routing rules for device messaging Recommended

Go to resource

Give feedback
Tell us about your experience with deployment

Cost Management
Get notified to stay within your budget and prevent unexpected charges on your bill.
Set up cost alerts >

Microsoft Defender for Cloud

Notifications

More events in the activity log → Dismiss all

✓ Deployment succeeded
Deployment 'merve-iot-hub-22215378' to resource group 'merve-resource-group' was successful.
Go to res... Pin to dash...
2 minutes ago

✓ Resource group created
Creating resource group 'merve-resource-group' in subscription 'Azure for Students' succeeded.
Go to resour... Pin to da...
22 minutes ago

"Como vemos que "Your deployment is complete", hemos creado el servicio IoT Hub con éxito."

5.3. Creación de servicio de Stream Analytics Job

Desde la página de home, pulsamos Create a Resource para crear servicios nuevamente.

Para crear el servicio de Stream Analytics Job, escribimos “Stream Analytics Job” en el buscador y hacemos click en él. Después de pulsar “Create”, rellenamos la pestaña “Basic”.

Microsoft Azure Search resources, services, and docs (G+/I)

Home > Create a resource > Marketplace > Stream Analytics job >

New Stream Analytics job

Basics Storage Tags Review + create

Azure Stream Analytics is a fully managed, SQL-based stream processing engine designed to help you tackle scenarios like streaming ETL to Azure Data Lake Storage, real-time dashboarding with Power BI, event driven applications with Azure SQL DB & Cosmos DB, remote monitoring, predictive maintenance, and more. [Learn more about Azure Stream Analytics](#)

Project details

Select the subscription to manage deployed resources and costs. Use resource groups like folders to organize and manage all your resources.

Subscription * Azure for Students

Resource group * merve-resource-group [Create new](#)

Instance details

Name * merve-stream-analytics-job

Region * (Europe) West Europe

Hosting environment * ☒ Cloud ☐ Edge

Streaming unit details

Streaming units (SUs) represents the computing resources that are allocated to execute a Stream Analytics job. The higher the number of SUs, the more CPU and memory resources are allocated for your job. The number of SUs can be modified once you create the job. You will be charged for the job's Streaming Units only when the job runs. [Learn more about streaming units](#)

Previous Next Review + create [Give feedback](#)

En la pestaña “Tags”, rellenamos 2 tags para ayudarnos a la gestión de los servicios como antes:

Name	Value
owner	merve-owner
project	merve-project

Name	Value
owner	: merve-owner
project	: merve-project

En la pestaña de Review + create también visualizamos los detalles del servicio, especialmente el precio, antes de la creación. Si todo está correcto, podemos pulsar en “Create”.

New Stream Analytics job

Basics

Storage

Tags

Review + create

View automation template

Basics

Subscription

Azure for Students

Resource group

merve-resource-group

Name

merve-stream-analytics-job

Location

West Europe

Hosting environment

Cloud

Streaming units

1

Vemos que hemos creado el servicio de Stream Analytics Job con éxito.

Home >

merve-stream-analytics-job

Stream Analytics job

Search

Start job

Delete

Move

Refresh

Share feedback

3 actions required

Overview

Activity log

Access control (IAM)

Tags

Diagnose and solve problems

Job topology

Inputs

Functions

Query

Outputs

No-code editor (preview)

Settings

Environment

Storage account settings

Created

JSON View

Essentials

Resource group (move)

merve-resource-group

Location

West Europe

Status

Created

Subscription (move)

Azure for Students

Subscription ID

bb097a35-1c23-42d6-be24-f9c36d608d0a

Pricing plan

StandardV2 (manage)

Tags (edit)

owner : merve-owner

project : merve-project

Created

Thursday, February 22, 2024 3:51 PM

Started

Output watermark

Cluster

Shared

Hosting environment

Cloud

Virtual Network

Disabled

5.4. Creación de servicio de Azure Cosmos DB

Desde la página de home, pulsamos Create a Resource para crear servicios nuevamente.

Escribimos “Azure Cosmos DB” para encontrarlo y hacemos click en él. Después de pulsar “create” seleccionamos “Azure Cosmos DB for NoSQL”.

Luego, rellanamos la pestaña Basic:

Microsoft Azure Search resources, services, and docs (G+)

Home >

Create Azure Cosmos DB Account - Azure Cosmos DB for NoSQL

Basics Global Distribution Networking Backup Policy Encryption Tagging

Azure Cosmos DB is a fully managed NoSQL and relational database service for building scalable applications for production starting at \$24/month per database, multiple containers included. [Learn more](#)

Project Details

Select the subscription to manage deployed resources and costs. Use resource groups like

Subscription * Azure for Students

Resource Group * merve-resource-group [Create new](#)

Instance Details

Account Name * merve-cosmos-db-account

Configure availability zone settings for your account. You cannot change these settings once created.

Availability Zones ⓘ ☐ Enable ☒ Disable

Location * ⓘ (Europe) North Europe

Capacity mode ⓘ ☒ Provisioned throughput ☐ Serverless

[Learn more about capacity mode](#)

Available locations are determined by your subscription's access and availability zone support (if that is enabled). If you don't see or cannot select your desired location, please open a support request for region access. [Click here for more details on how to create a region access request](#)

With Azure Cosmos DB free tier, you will get the first 1000 RU/s and 25 GB of storage for free in an account. You can enable free tier on up to one account per subscription. Estimated \$64/month

[Review + create](#) [Previous](#) [Next: Global Distribution](#) [Feedback](#)

Aunque he intentado refrescar la página varias veces e incluso intenté crearla desde otros navegadores, elegí la opción de (Europe) North Europe porque la de (Europe) West Europe no aparecía.

En la pestaña “Tags”, rellenamos 2 tags para ayudarnos a la gestión de los servicios como antes:

Name	Value
owner	merve-owner
project	merve-project

Home >

Create Azure Cosmos DB Account - Azure Cosmos DB for NoSQL

Basics Global Distribution Networking Backup Policy Encryption Tags Review + create

Tags are name/value pairs that enable you to categorize resources and view consolidated billing by applying the same tag to multiple resources and resource groups. [learn more](#)

Note that if you create tags and then change resource settings on other tabs, your tags will be automatically updated.

<input type="checkbox"/> Key	Value	Resource Type
<input type="checkbox"/> owner	merve-owner	Azure Cosmos DB account
<input type="checkbox"/> project	merve-project	Azure Cosmos DB account
<input type="text"/>		Azure Cosmos DB account

En la pestaña de Review + create también visualizamos los detalles del servicio antes de la creación. Si todo está correcto, podemos pulsar en “Create”.

Home >

Create Azure Cosmos DB Account - Azure Cosmos DB for NoSQL

Validation Success

Basics Global Distribution Networking Backup Policy Encryption Tags Review + create

Creation Time

Estimated Account Creation Time (in minutes) 2

The estimated creation time is calculated based on the location you have selected

Basics

Subscription

Azure for Students

Resource Group

merve-resource-group

Location

North Europe

Account Name

(new) merve-cosmos-db-account

API

Azure Cosmos DB for NoSQL

Capacity mode

Provisioned throughput

Geo-Redundancy

Disable

Multi-region Writes

Disable

Availability Zones

Disable

Backup Policy

Backup policy

Periodic

Backup storage redundancy

Locally-redundant backup storage

Networking

Connectivity method

All networks

Minimum TLS Protocol

TLS 1.2

Tags

Create Previous Next Download a template for automation

"Como vemos que “Your deployment is complete”, hemos creado el servicio Azure Cosmos DB con éxito."

Microsoft Azure

Search resources, services, and docs (G+ /)

Home >

Microsoft.Azure.CosmosDB-20240222171023 | Overview

Deployment

Search

Delete Cancel Redeploy Download Refresh

Overview

Inputs

Outputs

Template

✓ Your deployment is complete

Deployment name : Microsoft.Azure.CosmosDB-20240222171023

Subscription : Azure for Students

Resource group : merve-resource-group

Start time : 2/22/2024, 5:10:25 PM

Correlation ID : aea78cc1-c1ff-4e08-b0ff-dc7109388aaf

Deployment details

Next steps

Go to resource

Give feedback

Notifications

More events in the activity log → Dismiss all

Deployment succeeded

Deployment 'Microsoft.Azure.CosmosDB-20240222171023' to resource group 'merve-resource-group' was successful.

Go to res... Pin to dash...

a few seconds ago

5.5. Verificación servicios creados

Desde la página de home, hacemos click : en All resources para verificar si los servicios se han creado.

Create a resource

Resource groups

All resources

Subscriptions

Azure Cosmos DB

Help + support

Quickstart Center

Virtual machines

App Services

Microsoft

Vemos que todos los servicios se han creado correctamente.

All resources

UAM (dauam.onmicrosoft.com)

Create Manage view Refresh Export to CSV Open query Assign tags Delete

Filter for any field...

Subscription equals all

Resource group equals all

Add filter

More (2)

0 Recommendations

0 Unsecure resources

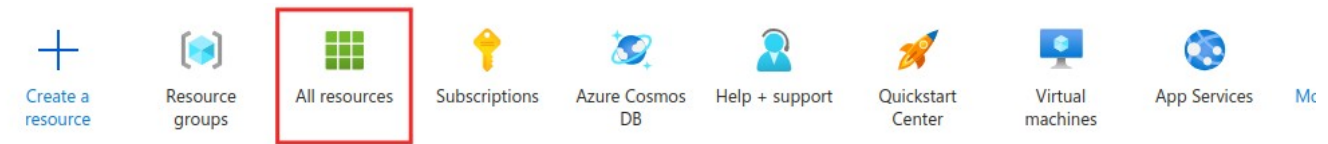
No grouping

List view

Name	Type	Resource group	Location	Subscription
merve-cosmos-db-account	Azure Cosmos DB acc...	merve-resource-group	North Europe	Azure for Students
merve-iot-hub	IoT Hub	merve-resource-group	West Europe	Azure for Students
merve-stream-analytics-job	Stream Analytics job	merve-resource-group	West Europe	Azure for Students

5.6. Creación Dispositivo en IoT Hub

Desde la página de home, hacemos click en All resources.



Pulsamos sobre merve-iot-hub.

All resources ✎ ...

UAM (dauam.onmicrosoft.com)

+ Create ⚙️ Manage view ▾ ↻ Refresh ⬇️ Export to CSV 🔗 Open query | 🏷️ Assign tags 🗑️ Delete

Filter for any field... Subscription equals all Resource group equals all ✕ + Add filter ▾ More (2)

0 Recommendations 0 Unsecure resources

No grouping ▾ List view ▾

<input type="checkbox"/> Name ↑↓	Type ↑↓	Resource group ↑↓	Location ↑↓	Subscription ↑↓	
<input type="checkbox"/> merve-cosmos-db-account	Azure Cosmos DB acc...	merve-resource-group	North Europe	Azure for Students	...
<input type="checkbox"/> merve-iot-hub	IoT Hub	merve-resource-group	West Europe	Azure for Students	...
<input type="checkbox"/> merve-stream-analytics-job	Stream Analytics job	merve-resource-group	West Europe	Azure for Students	...

Primero, pulsamos en “Devices” y luego en “Add Device”.

Home > merve-iot-hub

merve-iot-hub | Devices ✎ ☆ ...

IoT Hub

Search

View, create, delete, and update devices in your IoT Hub. [Learn more](#)

+ Add Device Edit columns ↻ Refresh 🏷️ Assign tags

enter device ID Types: All + Add filter

Device management

☒ Devices

Rellenamos los campos:

Elegimos un nombre para **Device ID** personalizado: **merve-device-cellphone**

Y pulsamos “Save”.

The screenshot shows the 'Create a device' page in the Microsoft Azure portal. The 'Device ID' field is highlighted with a red box and contains the text 'merve-device-cellphone'. Below this field, there are several options: 'IoT Edge Device' (unchecked), 'Authentication type' (Symmetric key selected), 'Auto-generate keys' (checked), and 'Connect this device to an IoT hub' (Enable selected). At the bottom, there is a 'Save' button.

Microsoft Azure Search resources, services, and docs (G+)

Home > merve-iot-hub | Devices

Create a device

Find Certified for Azure IoT devices in the Device Catalog

Device ID *

☐ IoT Edge Device

Authentication type ☒ Symmetric key ☐ X.509 Self-Signed ☐ X.509 CA Signed

Auto-generate keys ☒

Connect this device to an IoT hub

Parent device **No parent device**
[Set a parent device](#)

Save

Vemos que hemos creado el dispositivo correctamente y pulsamos sobre el nombre del dispositivo.

The screenshot shows the 'merve-iot-hub | Devices' page in the Microsoft Azure portal. The 'Device ID' field in the table is highlighted with a red box. The table has columns: Device ID, Type, Status, Last status update, Auth..., C2D ..., and Tags. The row for 'merve-device-cellphone' shows it is an 'IoT Device' with status 'Enabled'.

Microsoft Azure Search resources, services, and docs (G+)

Home > merve-iot-hub

merve-iot-hub | Devices IoT Hub

Search

View, create, delete, and update devices in your IoT Hub. [Learn more](#)

+ Add Device Edit columns Refresh Assign tags Delete Find devices using a query

enter device ID Types: All + Add filter

Device ID	Type	Status	Last status update	Auth...	C2D ...	Tags
merve-device-cellphone	IoT Device	Enabled	--	Shared...	0	

Device management

- Devices
- IoT Edge
- Configurations + Deployments
- Updates
- Queries

Hub settings

Copiamos la **Primary connection string** al clipboard.

The screenshot shows the Microsoft Azure portal interface. At the top, the navigation bar includes the Microsoft Azure logo, a search bar, and a user profile. The breadcrumb trail indicates the location: Home > merve-iot-hub | Devices >. The main heading is 'merve-device-cellphone', with a sub-heading 'merve-iot-hub'. Below this, there are action buttons: Save, Message to Device, Direct method, Add Module Identity, Device twin, and Refresh. The configuration section includes fields for Device ID (merve-device-cellphone), Primary key, Secondary key, Primary connection string (highlighted with a red box), and Secondary connection string. Below these are options for Tags (No tags), Enable connection to IoT Hub (radio buttons for Enable and Disable), and Parent device (No parent device). At the bottom, there are tabs for Module Identities and Configurations. A table at the very bottom shows columns for Module ID, Connection State, Connection State Last Updated, and Last Activity Time (UTC).

Microsoft Azure Search resources, services, and docs (G+)

Home > merve-iot-hub | Devices >

merve-device-cellphone merve-iot-hub

Save Message to Device Direct method Add Module Identity Device twin Refresh

Device ID merve-device-cellphone

Primary key

Secondary key

Primary connection string

Secondary connection string

Tags (edit) No tags

Enable connection to IoT Hub ☒ Enable ☐ Disable

Parent device No parent device

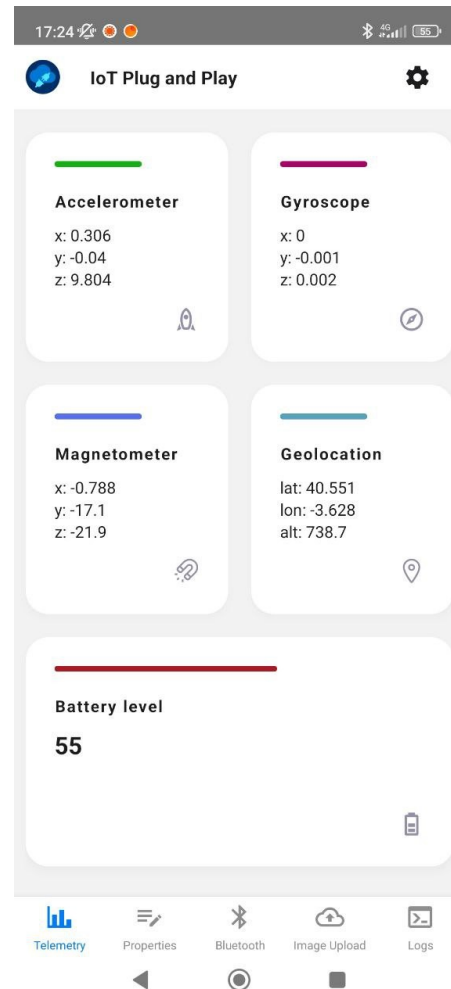
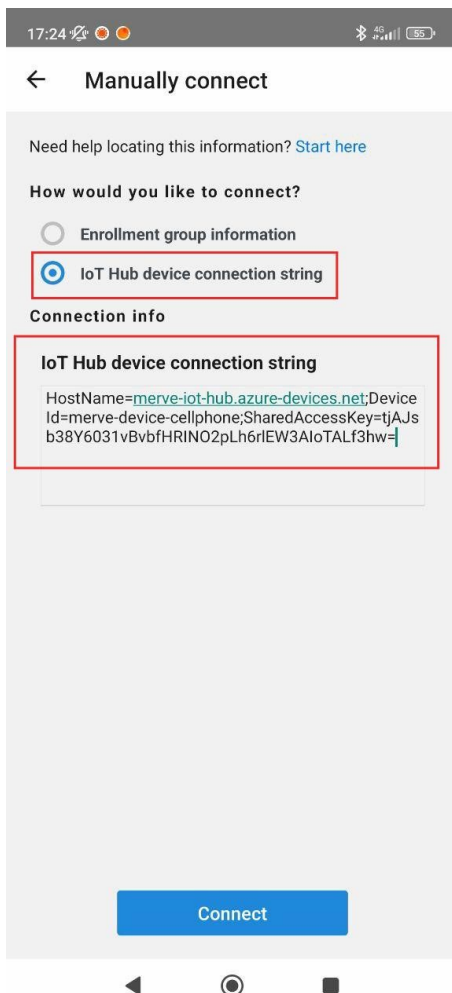
Module Identities Configurations

Module ID	Connection State	Connection State Last Updated ...	Last Activity Time (UTC)
-----------	------------------	-----------------------------------	--------------------------

5.7. Descarga y configuración de la app IoT PnP

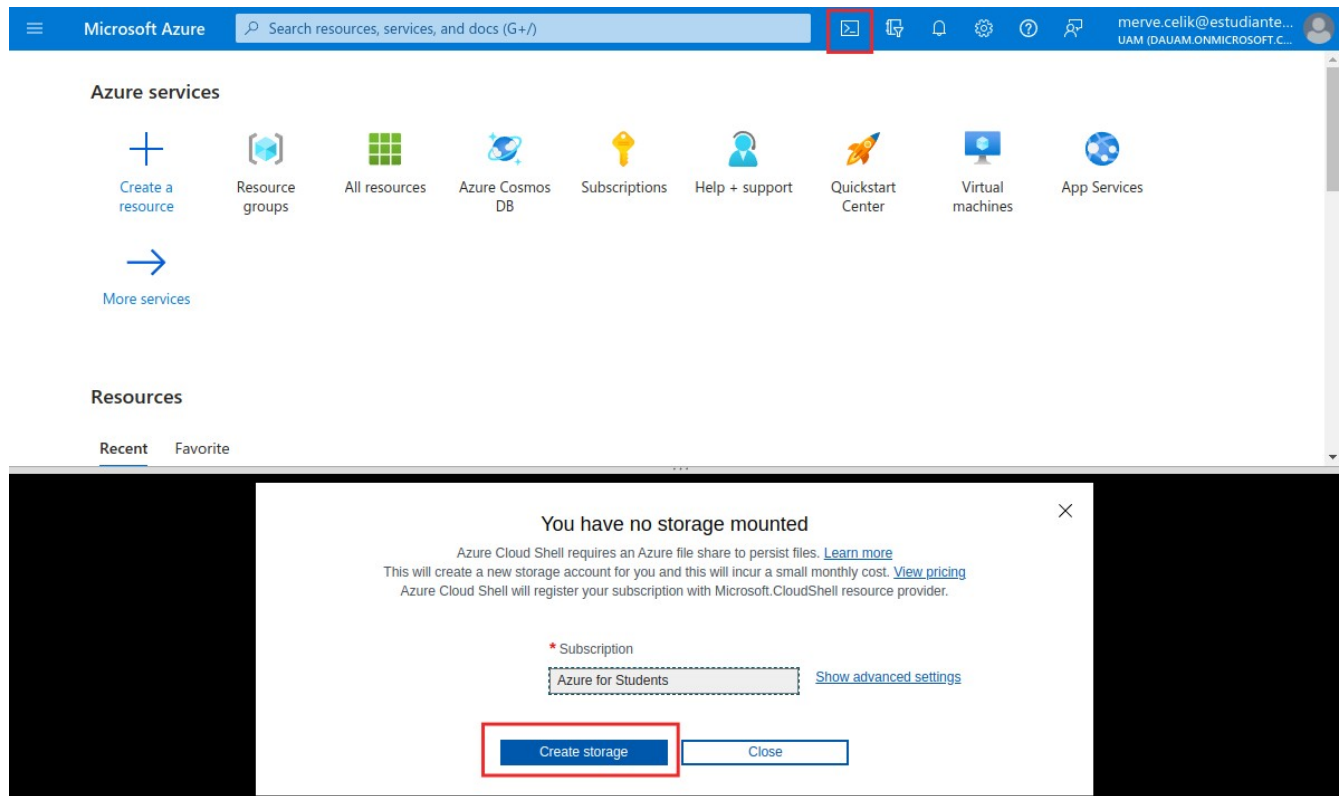
Descargamos una aplicación de "IoT Plug and Play" para nuestro teléfono móvil que nos permite conectarnos a la plataforma prácticamente de forma plug and play.

Después de pulsar sobre "Scan QR Code" y sobre "Connect manually", pegamos la Primary connection string en el campo que se muestra al elegir "IoT Hub Device connection string". Pulsamos sobre "Connect". Visualizamos el dashboard con diferentes valores de sensores y otras fuentes de información del teléfono móvil.



5.8. Visualización datos simulados en Azure

Volvemos a Azure Portal y pulsamos sobre el botón de “Cloud Shell”. Como no tenemos ningún almacenamiento montado, debemos pulsar sobre el botón “Create storage”.

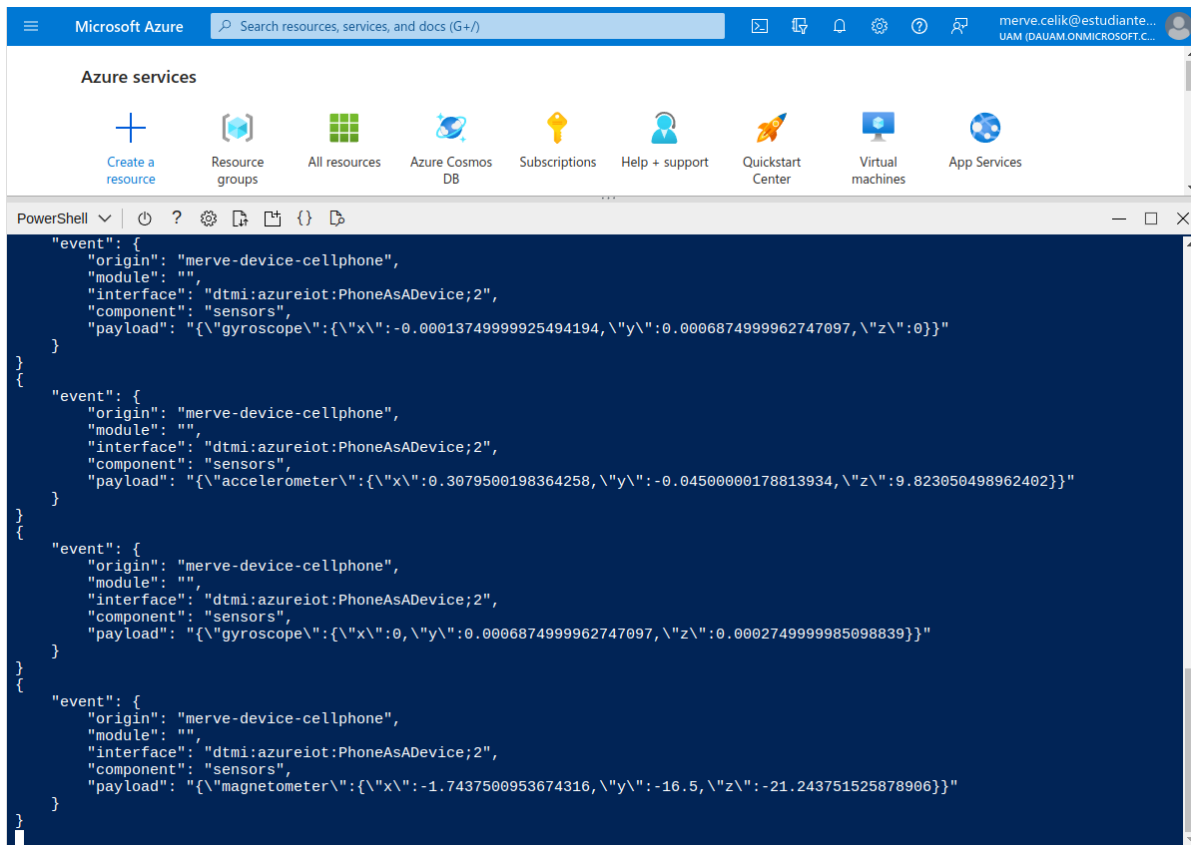


Ejecutamos el siguiente comando en la línea de comandos:

az iot hub monitor-events --hub-name merve-iot-hub --device-id merve-device-cellphone

Ese comando se utiliza para monitorear los eventos del dispositivo 'merve-device-cellphone' en el IoT Hub 'merve-iot-hub'. Nos permite visualizar en tiempo real los eventos que se están generando desde ese dispositivo, ya que está conectado con el móvil usando la aplicación IoT Plug and Play. De esta manera, podemos ver el dashboard con diferentes valores de sensores y otras fuentes de información del teléfono móvil.

```
VERBOSE: Authenticating to Azure ...
VERBOSE: Building your Azure drive ...
PS /home/merve> az iot hub monitor-events --hub-name merve-iot-hub --device-id merve-device-cellphone
Starting event monitor, filtering on device: merve-device-cellphone, use ctrl-c to stop...
{
  "event": {
    "origin": "merve-device-cellphone",
    "module": "",
    "interface": "dtmi:azureiot:PhoneAsADevice;2",
    "component": "sensors",
    "payload": "{\"accelerometer\":{\"x\":0.2670000195503235,\"y\":-0.04500000178813934,\"z\":9.823050498962402}}"
```



The screenshot shows the Microsoft Azure portal interface. At the top, there's a navigation bar with the Azure logo, a search bar, and user information. Below the navigation bar, there's a section titled 'Azure services' with various icons for different services. In the foreground, a PowerShell terminal window is open, displaying the output of the 'az iot hub monitor-events' command. The output shows a series of JSON events from the 'merve-device-cellphone' device, including accelerometer and gyroscope data.

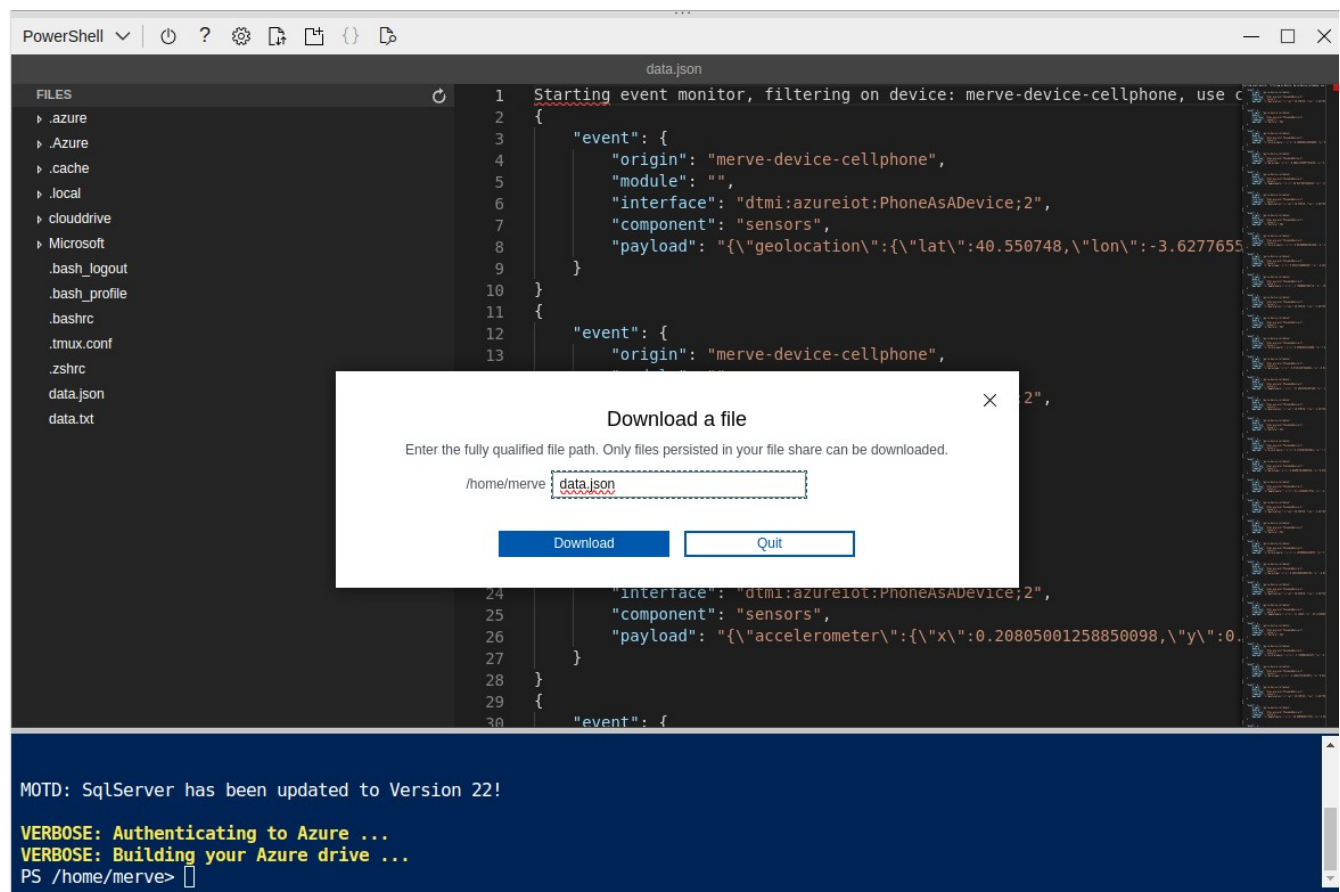
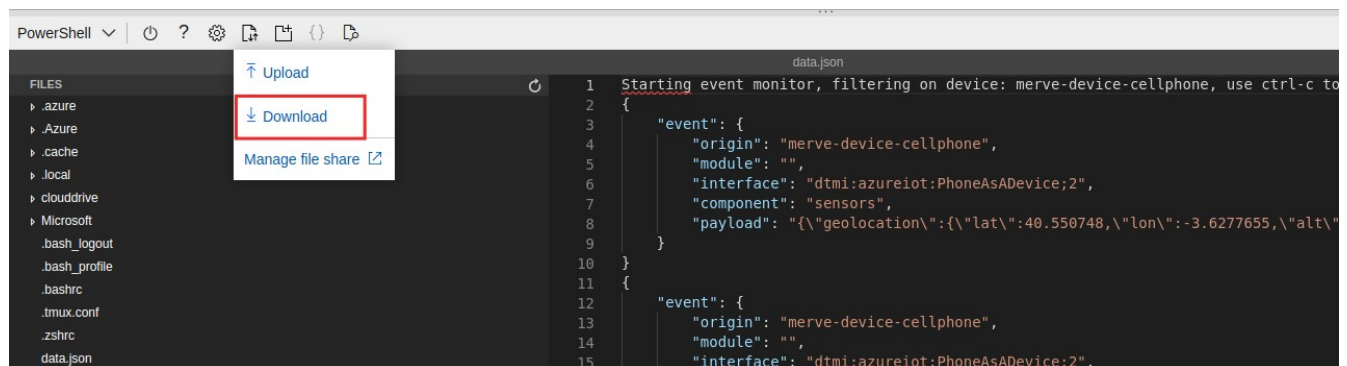
```
"event": {
  "origin": "merve-device-cellphone",
  "module": "",
  "interface": "dtmi:azureiot:PhoneAsADevice;2",
  "component": "sensors",
  "payload": "{\"gyroscope\":{\"x\":-0.00013749999925494194,\"y\":0.0006874999962747097,\"z\":0}}"
```


Para guardar en nuestro ordenador los datos que hemos visualizado, podemos ejecutar el siguiente comando:

```
az iot hub monitor-events --hub-name merve-iot-hub --device-id merve-device-cellphone > data.json
```

```
PS /home/merve> az iot hub monitor-events --hub-name merve-iot-hub --device-id merve-device-cellphone > data.json
^C
PS /home/merve>
```

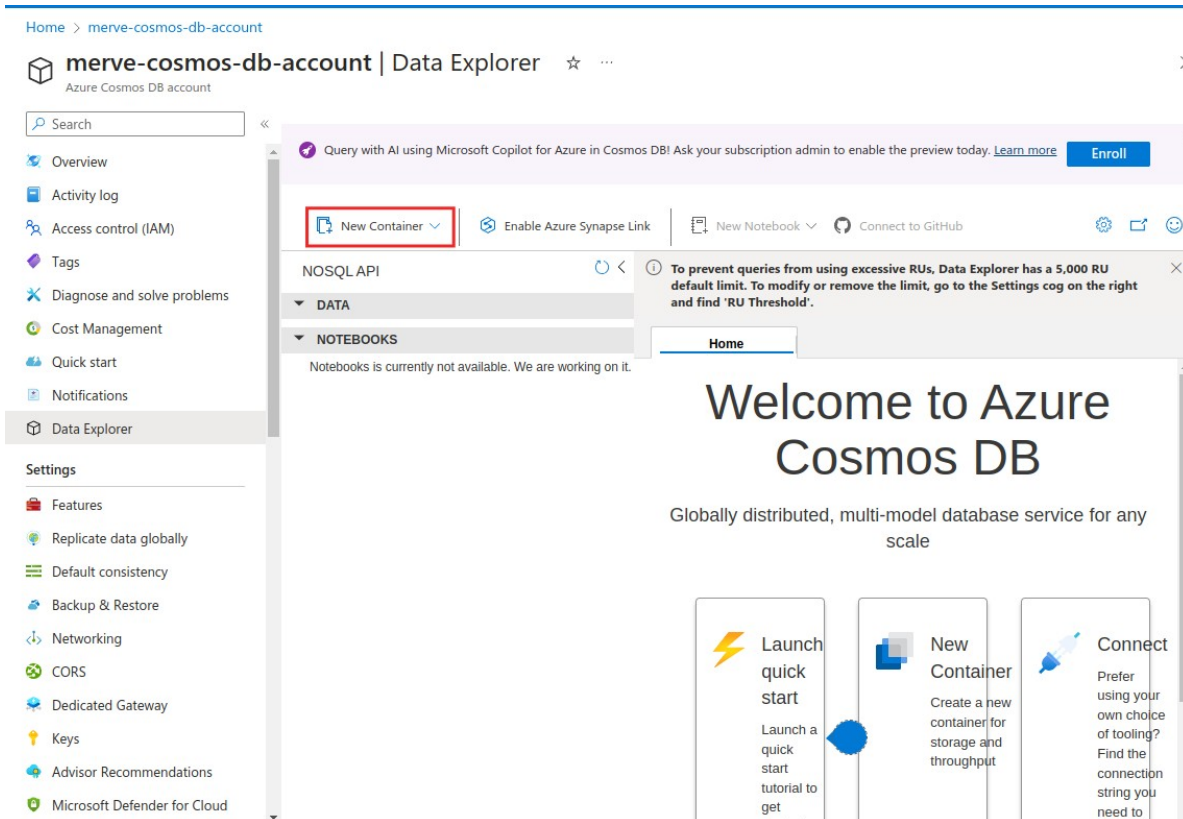
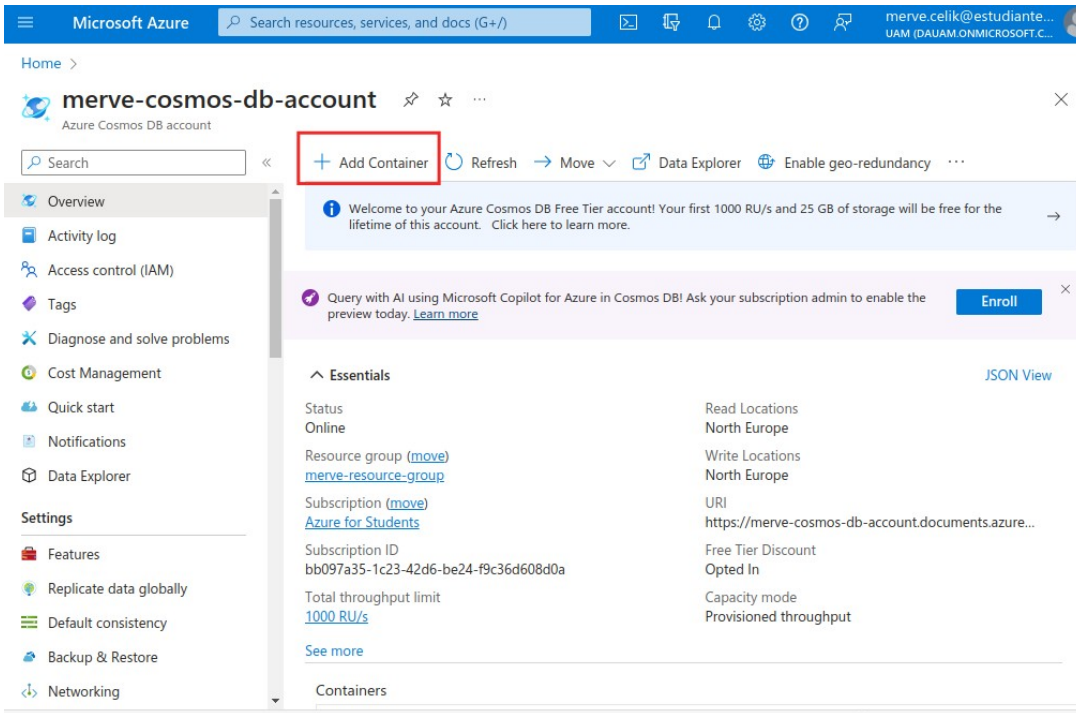
Y después de pulsar “Download”, podemos guardar los datos.



5.9. Creación de contenedor en CosmosDB

Volvemos al servicio ya desplegado de Cosmos DB

Creamos un Contenedor para albergar los datos, por lo que pulsamos en “+ Add Container” y luego “New Container”



Rellenamos los campos:

Database id: merve-cosmos-db-id-cellphone

Container id: merve-cosmos-db-container-id-cellphone

Partition: /id

El resto de valores los dejamos por defecto

Hacemos scroll hacia abajo en la barra lateral y pulsamos sobre Ok

* Database id ⓘ

☒ Create new ☐ Use existing

merve-cosmos-db-id-cellphone

☒ Share throughput across containers ⓘ

* Database throughput (autoscale) ⓘ

☒ Autoscale ☐ Manual

Estimate your required RU/s with [capacity calculator](#).

* Container id ⓘ

merve-cosmos-db-container-id-cellphone

* Indexing

☒ Automatic ☐ Off

All properties in your documents will be indexed by default for flexible and efficient queries. [Learn more](#)

* Partition key ⓘ

/id

Add hierarchical partition key

Unique keys ⓘ

+ Add unique key

Analytical store ⓘ

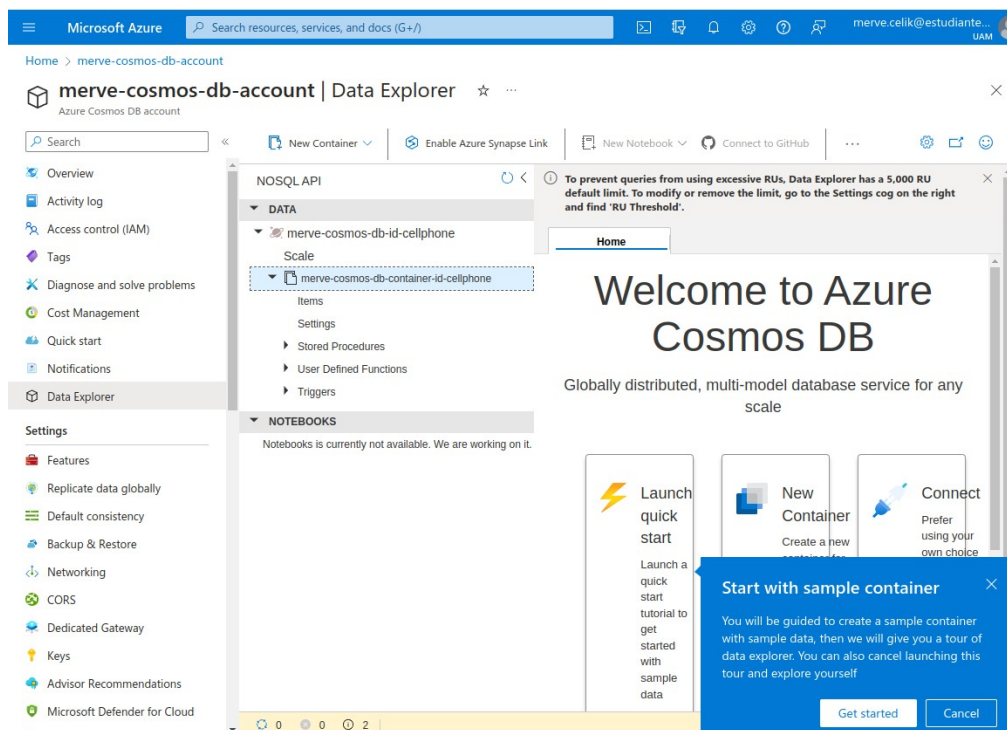
☐ On ☒ Off

Azure Synapse Link is required for creating an analytical store container. Enable Synapse Link for this Cosmos DB account. [Learn more](#)

Enable

> Advanced

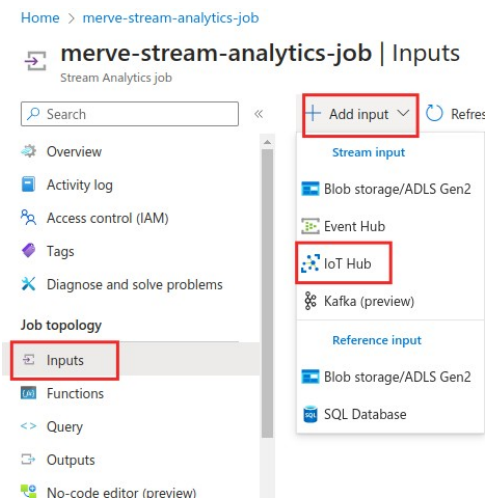
Creamos Contenedor correctamente.



5.10. Entradas y Salidas en Stream Analytics Job

Volvemos al servicio ya desplegado de Stream Analytics Job

Creamos una entrada de datos, por lo que pulsamos en “Inputs”, luego sobre “+Add input” y en el desplegable, en “IoT Hub”:



Rellenamos los campos:

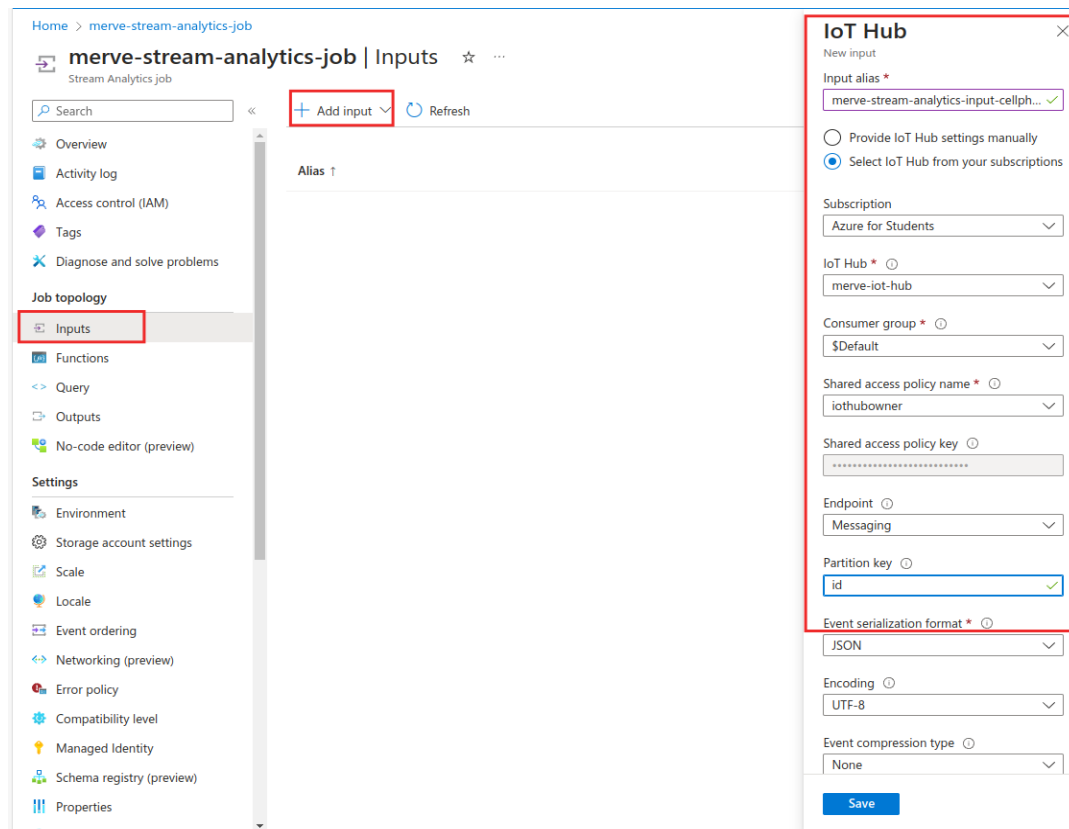
Input alias: merve-stream-analytics-input-cellphone

Subscription: Azure for Students

Shared Access policy name: iothubowner

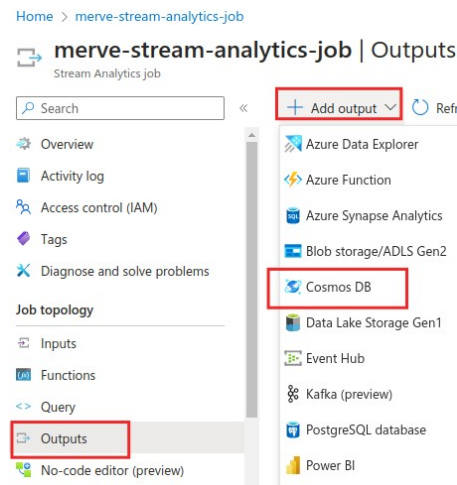
Partition key: id

El resto de valores los dejamos por defecto y pulsamos en “Save”



Ahora creamos una salida de datos, por lo que pulsamos en “Outputs” en la venta principal del servicio de Stream Analytics Jobs.

Luego pulsamos sobre “+Add output” y en el desplegable, en “Cosmos DB”:

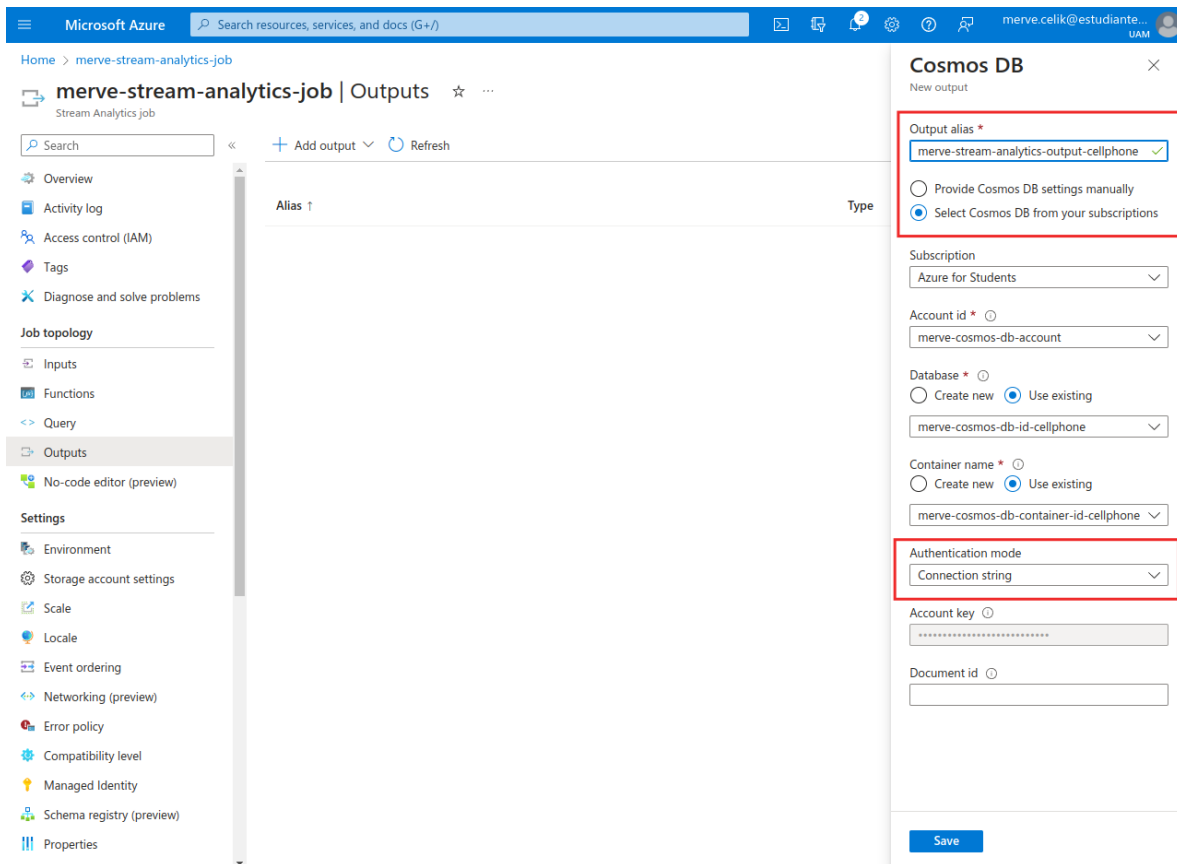


Rellenamos los campos:

Output alias: merve-stream-analytics-output-cellphone

Authentication mode: Connection string

El resto de valores los dejamos por defecto y pulsamos en Save



5.11. Consulta en Stream Analytics Job

En la barra lateral del servicio Stream Analytics Job, donde gestionamos las entradas y salidas, seleccionamos “Query”. Luego, ajustamos la consulta, reemplazando los campos

MyOutputAlias: merve-stream-analytics-output-cellphone

MyInputAlias: merve-stream-analytics-input-cellphone

Finalmente, guardamos la consulta (Save Query).

The screenshot shows the Microsoft Azure portal interface for a Stream Analytics job named 'merve-stream-analytics-job'. The 'Query' tab is selected in the left sidebar. The query editor displays the following SQL query:

```
1 SELECT
2 *
3 INTO
4 [merve-stream-analytics-output-cellphone]
5 FROM
6 [merve-stream-analytics-input-cellphone]
```

Below the query editor, the 'Input preview' tab is active, showing sample data from the input alias 'merve-stream-analytics-input-cellphone'. The data is presented in a table with columns: accelerometer record, EventProcessedUtcTime, PartitionId, EventEnqueuedUtcTime, and IoT Hub record. The table shows two rows of data.

Vamos a la ventana de Overview dentro de Stream Analytics Jobs, en la barra lateral. Iniciamos el Job, por lo que pulsamos en “Start”.

The screenshot shows the Microsoft Azure portal interface for a Stream Analytics job named 'merve-stream-analytics-job'. The 'Overview' tab is selected in the left sidebar. The 'Start job' button is highlighted in the top bar. The 'Start job' dialog box is open, showing job details and a 'Start' button at the bottom.


The 'Start job' dialog box displays the following information:

- Job name: merve-stream-analytics-job
- Streaming units: 1
- Environment: Standard
- Job output start time: Now
- Tags: owner: merve-owner, project: merve-project

The 'Start' button is highlighted in the bottom right corner of the dialog box.

Esperamos a que Job se inicie y observamos su estado hasta que cambie a “Running”.

Home >

**merve-stream-analytics-job**

☆ ...

Stream Analytics job

☐ Stop job

Delete

Move

Refresh

Share feedback

Overview

Activity log

Access control (IAM)

Tags

Diagnose and solve problems

Job topology

Inputs

Functions

Query

Outputs

No-code editor (preview)

Settings

Environment

Storage account settings

Running

ⓘ

Essentials

Resource group [\(move\)](#)

[merve-resource-group](#)

Location

West Europe

Status

Running

Subscription [\(move\)](#)

[Azure for Students](#)

Subscription ID

bb097a35-1c23-42d6-be24-f9c36d608d0a

Pricing plan

StandardV2 [\(manage\)](#)

Tags [\(edit\)](#)

owner : merve-owner

project : merve-project

Created

Thursday, February 22, 2024 3:51 PM

Started

Sunday, February 25, 2024 7:53 PM

Output watermark

Cluster

Shared

Hosting environment

Cloud

Virtual Network

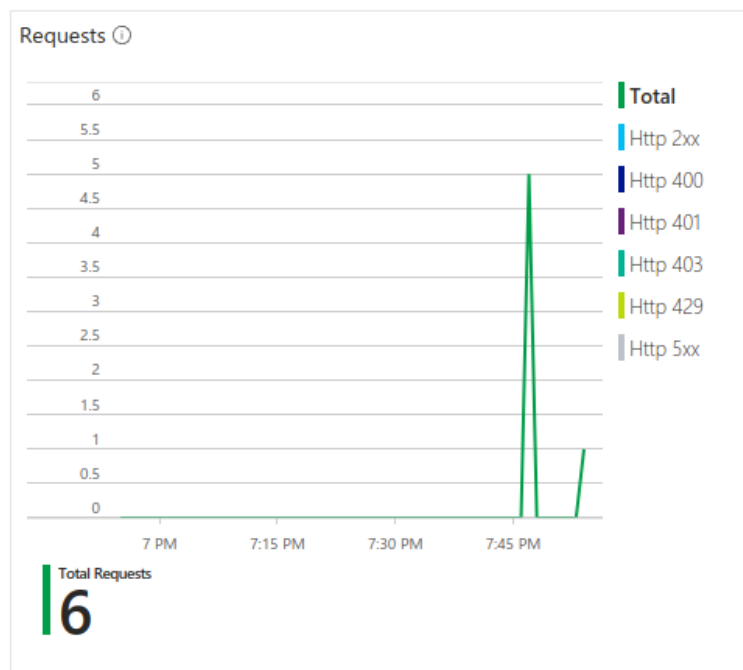
[Disabled](#)

[JSON View](#)

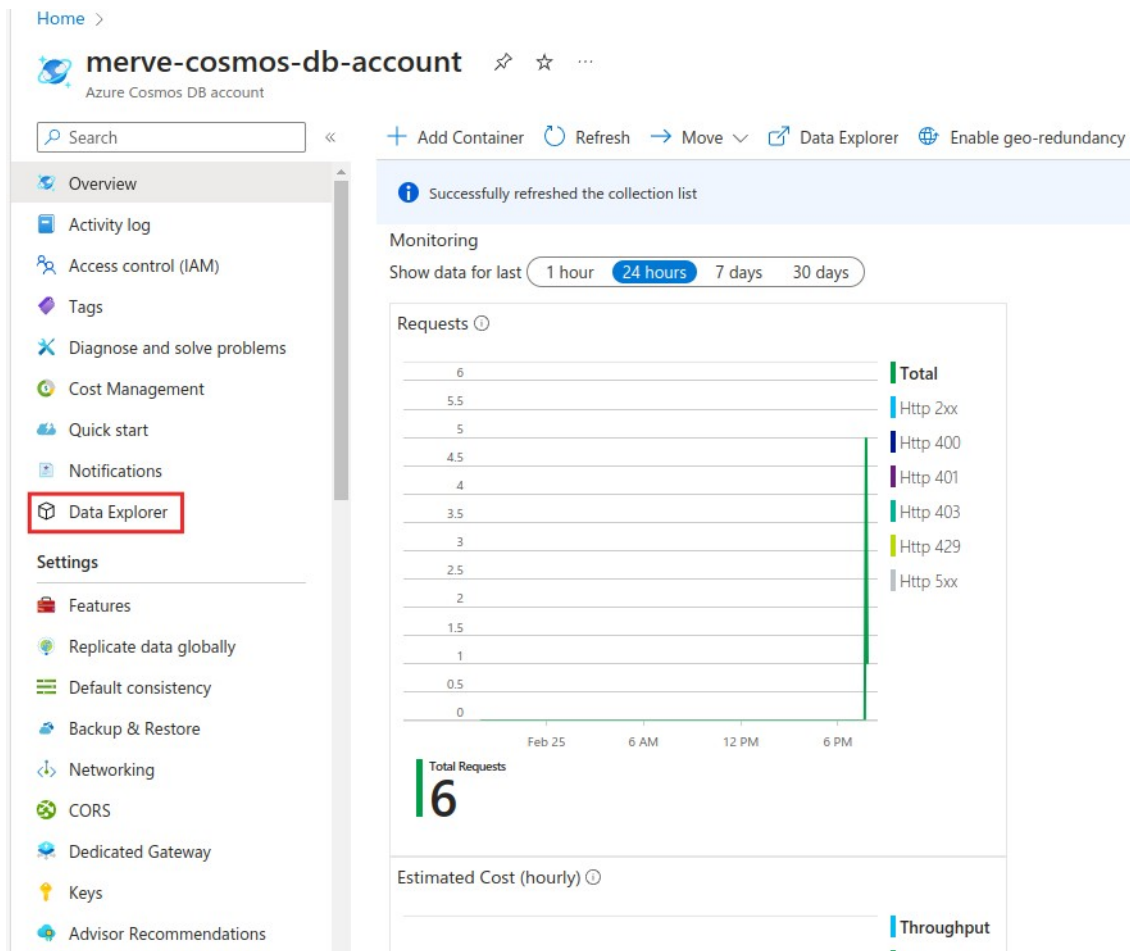
5.12. Exploración de los datos

Volvemos al servicio de Cosmos DB.

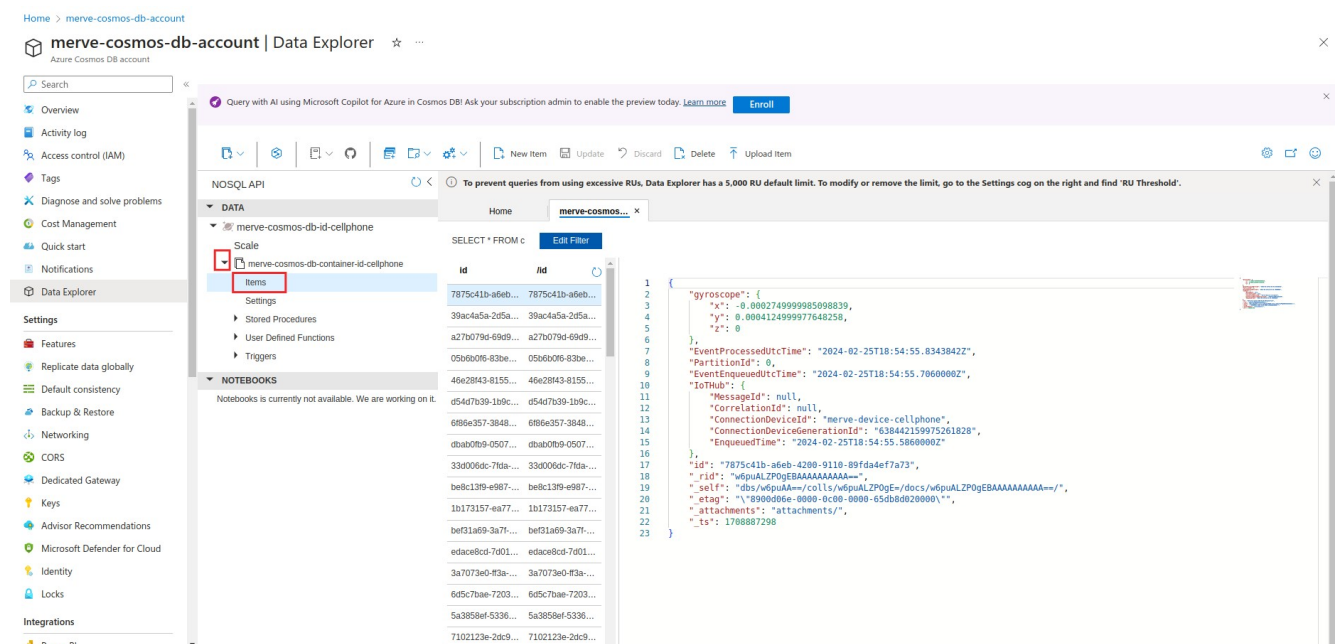
Podemos ver que ya entran datos en el dashboard de Monitorización



Pulsamos sobre Data Explorer:



Pulsamos sobre la flecha junto al contenedor previamente creado y luego sobre “Items”.



Podemos ver los mensajes enviados por el dispositivo pulsando sobre cualquier ID por el que hemos segmentado nuestra base de datos NoSQL,

SELECT * FROM c

Edit Filter

id	/id
7875c41b-a6eb...	7875c41b-a6eb...
39ac4a5a-2d5a...	39ac4a5a-2d5a...
a27b079d-69d9...	a27b079d-69d9...
05b6b0f6-83be...	05b6b0f6-83be...
46e28f43-8155...	46e28f43-8155...
d54d7b39-1b9c...	d54d7b39-1b9c...
6f86e357-3848...	6f86e357-3848...
dbab0fb9-0507...	dbab0fb9-0507...
33d006dc-7fda...	33d006dc-7fda...
be8c13f9-e987...	be8c13f9-e987...
1b173157-ea77...	1b173157-ea77...
bef31a69-3a7f...	bef31a69-3a7f...
edace8cd-7d01...	edace8cd-7d01...
3a7073e0-f3a...	3a7073e0-f3a...
6d5c7bae-7203...	6d5c7bae-7203...
5a3858ef-5336...	5a3858ef-5336...
7102123e-2dc9...	7102123e-2dc9...

```
1 {
2   "gyroscope": {
3     "x": -0.0002749999985098839,
4     "y": 0.0004124999977648258,
5     "z": 0
6   },
7   "EventProcessedUtcTime": "2024-02-25T18:54:55.8343842Z",
8   "PartitionId": 0,
9   "EventEnqueuedUtcTime": "2024-02-25T18:54:55.7060000Z",
10  "IoTHub": {
11    "MessageId": null,
12    "CorrelationId": null,
13    "ConnectionDeviceId": "merve-device-cellphone",
14    "ConnectionDeviceGenerationId": "638442159975261828",
15    "EnqueuedTime": "2024-02-25T18:54:55.5860000Z"
16  },
17  "id": "7875c41b-a6eb-4200-9110-89fda4ef7a73",
18  "_rid": "w6puALZP0gEBAAAAAAAAA==",
19  "_self": "dbs/w6puAA==/colls/w6puALZP0gE=/docs/w6puALZP0gEBAAAAAAAAA==/",
20  "_etag": "\"8900d06e-0000-0c00-0000-65db8d020000\"",
21  "_attachments": "attachments/",
22  "_ts": 1708887298
23 }
```

SELECT * FROM c

Edit Filter

id	/id
7875c41b-a6eb...	7875c41b-a6eb...
39ac4a5a-2d5a...	39ac4a5a-2d5a...
a27b079d-69d9...	a27b079d-69d9...
05b6b0f6-83be...	05b6b0f6-83be...
46e28f43-8155...	46e28f43-8155...
d54d7b39-1b9c...	d54d7b39-1b9c...
6f86e357-3848...	6f86e357-3848...
dbab0fb9-0507...	dbab0fb9-0507...
33d006dc-7fda...	33d006dc-7fda...
be8c13f9-e987...	be8c13f9-e987...
1b173157-ea77...	1b173157-ea77...
bef31a69-3a7f...	bef31a69-3a7f...
edace8cd-7d01...	edace8cd-7d01...
3a7073e0-f3a...	3a7073e0-f3a...
6d5c7bae-7203...	6d5c7bae-7203...
5a3858ef-5336...	5a3858ef-5336...
7102123e-2dc9...	7102123e-2dc9...

```
1 {
2   "magnetometer": {
3     "x": 24.656251907348633,
4     "y": -11.8125,
5     "z": -8.287500381469727
6   },
7   "EventProcessedUtcTime": "2024-02-25T18:54:55.8365188Z",
8   "PartitionId": 0,
9   "EventEnqueuedUtcTime": "2024-02-25T18:54:55.7060000Z",
10  "IoTHub": {
11    "MessageId": null,
12    "CorrelationId": null,
13    "ConnectionDeviceId": "merve-device-cellphone",
14    "ConnectionDeviceGenerationId": "638442159975261828",
15    "EnqueuedTime": "2024-02-25T18:54:55.5860000Z"
16  },
17  "id": "39ac4a5a-2d5a-46d4-a7e9-9818ad3bd7f9",
18  "_rid": "w6puALZP0gECAAAAAAAAAA==",
19  "_self": "dbs/w6puAA==/colls/w6puALZP0gE=/docs/w6puALZP0gECAAAAAAAAAA==/",
20  "_etag": "\"8900d16e-0000-0c00-0000-65db8d020000\"",
21  "_attachments": "attachments/",
22  "_ts": 1708887298
23 }
```

SELECT * FROM c

Edit Filter

id	/id
7875c41b-a6eb...	7875c41b-a6eb...
39ac4a5a-2d5a...	39ac4a5a-2d5a...
a27b079d-69d9...	a27b079d-69d9...
05b6b0f6-83be...	05b6b0f6-83be...
46e28f43-8155...	46e28f43-8155...
d54d7b39-1b9c...	d54d7b39-1b9c...
6f86e357-3848...	6f86e357-3848...
dbab0fb9-0507...	dbab0fb9-0507...
33d006dc-7fda...	33d006dc-7fda...
be8c13f9-e987...	be8c13f9-e987...
1b173157-ea77...	1b173157-ea77...
bef31a69-3a7f...	bef31a69-3a7f...
edace8cd-7d01...	edace8cd-7d01...
3a7073e0-ff3a...	3a7073e0-ff3a...
6d5c7bae-7203...	6d5c7bae-7203...
5a3858ef-5336...	5a3858ef-5336...
7102123e-2dc9...	7102123e-2dc9...

```
1 {
2   "accelerometer": {
3     "x": 0.2749500274658203,
4     "y": 0.019050000235438347,
5     "z": 9.829950332641602
6   },
7   "EventProcessedUtcTime": "2024-02-25T18:54:55.7723447Z",
8   "PartitionId": 0,
9   "EventEnqueuedUtcTime": "2024-02-25T18:54:55.5810000Z",
10  "IoTHub": {
11    "MessageId": null,
12    "CorrelationId": null,
13    "ConnectionDeviceId": "merve-device-cellphone",
14    "ConnectionDeviceGenerationId": "638442159975261828",
15    "EnqueuedTime": "2024-02-25T18:54:55.4900000Z"
16  },
17  "id": "a27b079d-69d9-4cbe-bcdc-a9d3ca456532",
18  "_rid": "w6puALZP0gEDAAAAAAAAA==",
19  "_self": "dbs/w6puAA=/colls/w6puALZP0gE=/docs/w6puALZP0gEDAAAAAAAAA==/",
20  "_etag": "\"8900d26e-0000-0c00-0000-65db8d020000\"",
21  "_attachments": "attachments/",
22  "_ts": 1708887298
23 }
```

SELECT * FROM c

Edit Filter

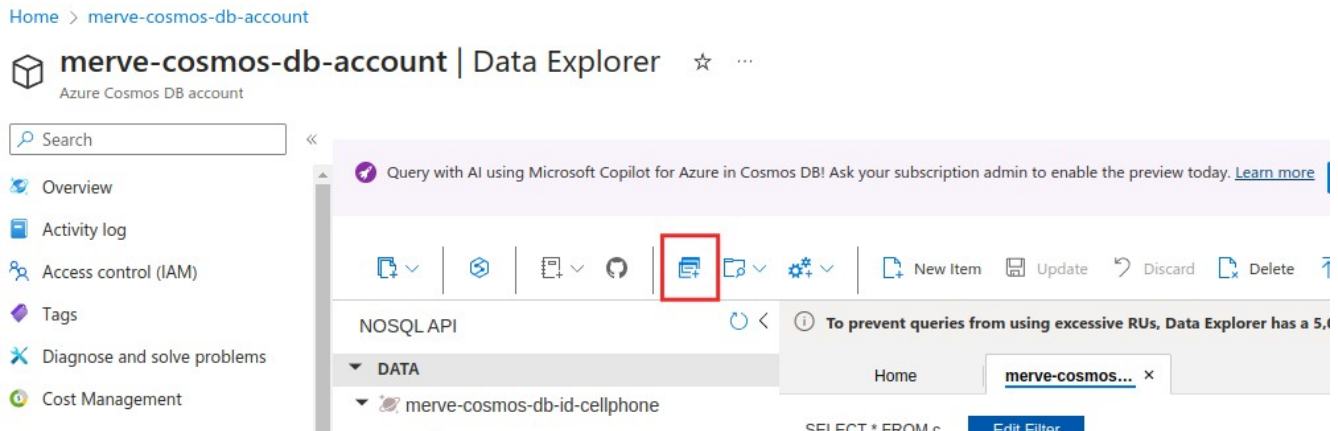
id	/id
7875c41b-a6eb...	7875c41b-a6eb...
39ac4a5a-2d5a...	39ac4a5a-2d5a...
a27b079d-69d9...	a27b079d-69d9...
05b6b0f6-83be...	05b6b0f6-83be...
46e28f43-8155...	46e28f43-8155...
d54d7b39-1b9c...	d54d7b39-1b9c...
6f86e357-3848...	6f86e357-3848...
dbab0fb9-0507...	dbab0fb9-0507...
33d006dc-7fda...	33d006dc-7fda...
be8c13f9-e987...	be8c13f9-e987...
1b173157-ea77...	1b173157-ea77...
bef31a69-3a7f...	bef31a69-3a7f...
edace8cd-7d01...	edace8cd-7d01...
3a7073e0-ff3a...	3a7073e0-ff3a...
6d5c7bae-7203...	6d5c7bae-7203...
5a3858ef-5336...	5a3858ef-5336...
7102123e-2dc9...	7102123e-2dc9...

```
1 {
2   "battery": 49,
3   "EventProcessedUtcTime": "2024-02-25T18:54:57.5448169Z",
4   "PartitionId": 0,
5   "EventEnqueuedUtcTime": "2024-02-25T18:54:57.4710000Z",
6   "IoTHub": {
7     "MessageId": null,
8     "CorrelationId": null,
9     "ConnectionDeviceId": "merve-device-cellphone",
10    "ConnectionDeviceGenerationId": "638442159975261828",
11    "EnqueuedTime": "2024-02-25T18:54:57.3850000Z"
12  },
13  "id": "05b6b0f6-83be-4b47-84d2-01874bd61294",
14  "_rid": "w6puALZP0gEEAAAAAAAAA==",
15  "_self": "dbs/w6puAA=/colls/w6puALZP0gE=/docs/w6puALZP0gEEAAAAAAAAA==/",
16  "_etag": "\"8900d36e-0000-0c00-0000-65db8d030000\"",
17  "_attachments": "attachments/",
18  "_ts": 1708887299
19 }
```

5.13. Refinando la exploración de los datos

Seguimos en el servicio de Cosmos DB, en Data Explorer:

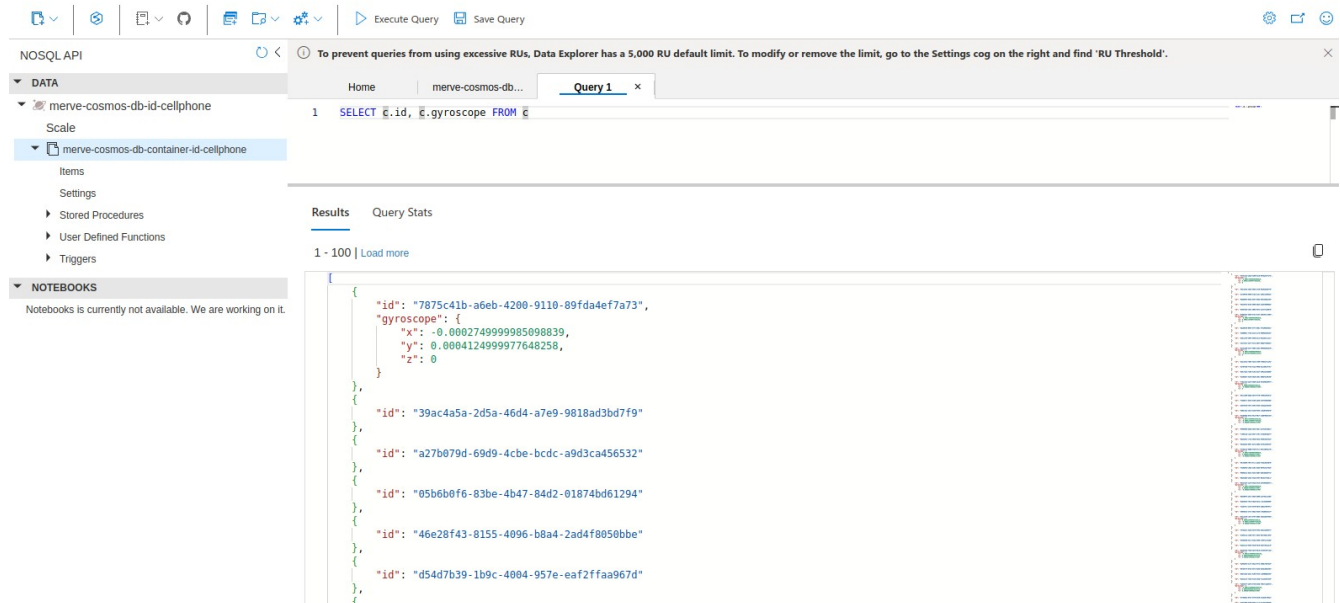
Hacemos click en el icono “New SQL Query”



Introducimos la siguiente consulta: **SELECT c.id, c.gyroscope FROM c**

Hacemos click en “Execute Query”.

Si todo ha ido bien, veremos solo los datos de ID y giroscopio cuando se reciba el mensaje.



5.15. Detener app de datos y el Job de Stream Analytics Jobs

Para finalizar, pulsamos sobre Stop para detener la ejecución del Job en la página de Overview de Stream Analytics Jobs.

The screenshot shows the Azure portal interface for a Stream Analytics job named 'merve-stream-analytics-job'. The left sidebar contains navigation links: Overview, Activity log, Access control (IAM), Tags, Diagnose and solve problems, Job topology, Inputs, Functions, Query, and Outputs. The main content area has a top bar with a search box and action buttons: 'Stop job' (highlighted with a red box), 'Delete', 'Move', 'Refresh', and 'Share feedback'. Below this is a 'Running' status indicator. The 'Essentials' section lists job details: Resource group (merve-resource-group), Location (West Europe), Status (Running), Subscription (Azure for Students), and Subscription ID. On the right, a table provides additional metadata.

Property	Value
Created	Thursday, February 22, 2024 3:51 PM
Started	Sunday, February 25, 2024 7:53 PM
Output watermark	
Cluster	Shared
Hosting environment	Cloud

También cerramos la aplicación para detener la ejecución.

Práctica opcional – Análisis Ciencia de Datos

¿Qué podemos hacer con esos datos?

- Es posible acceder a los valores individuales de cada sensor.
- Se pueden calcular medidas estadísticas como el mínimo, el máximo, la media, la mediana o la desviación estándar para cada sensor.
- Se pueden utilizar visualizaciones, como gráficos y diagramas creados con librerías como matplotlib o seaborn, para presentar los datos de los sensores de forma informativa.

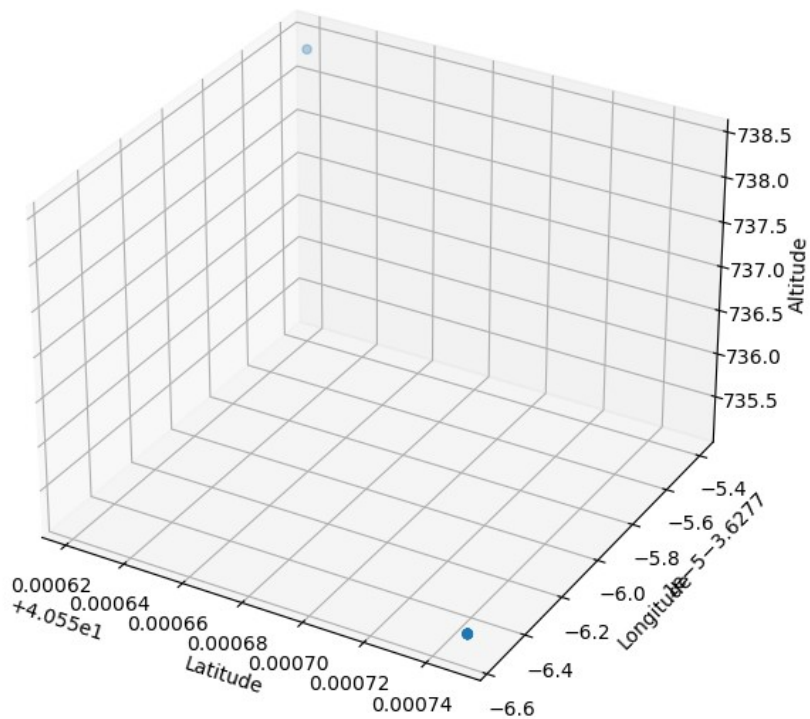
¿Representaciones gráficas?

Adjunto algunos gráficos aquí.

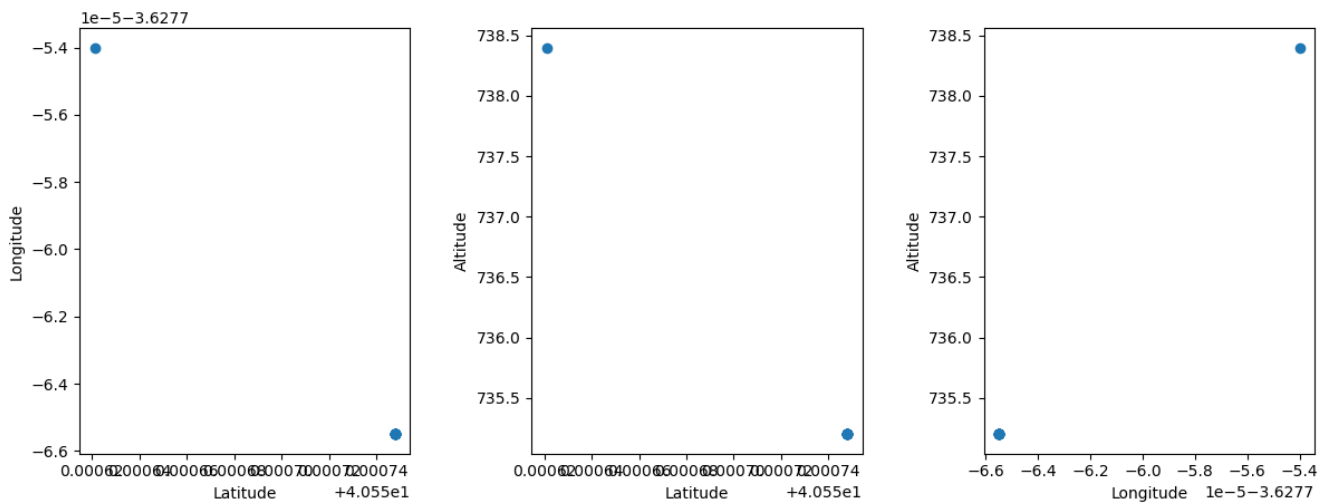
También adjunto a la práctica el archivo de Python con el que he trabajado.

Generamos gráficos de scatter para visualizar los datos de geolocalización en dos y tres dimensiones.

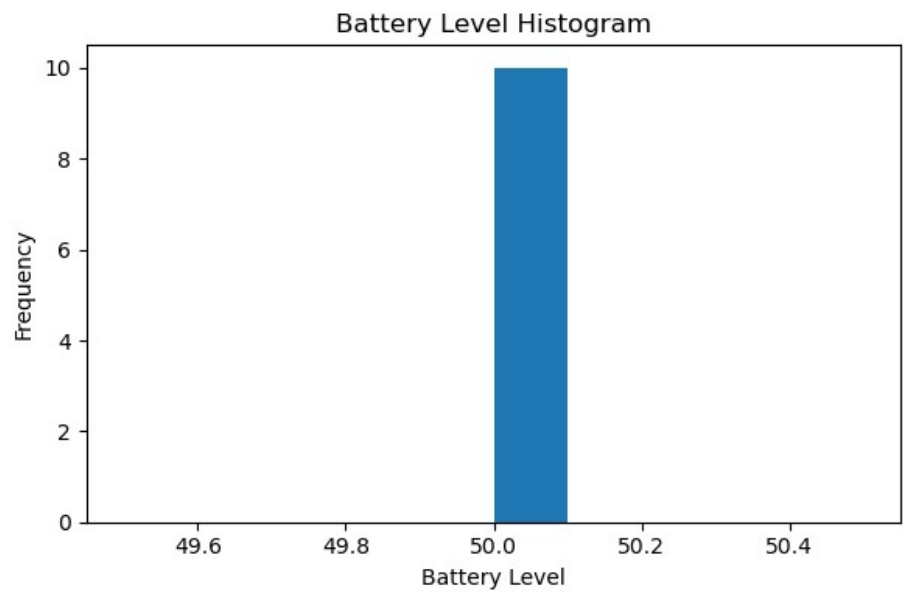
Geolocation 3D Scatter Plot



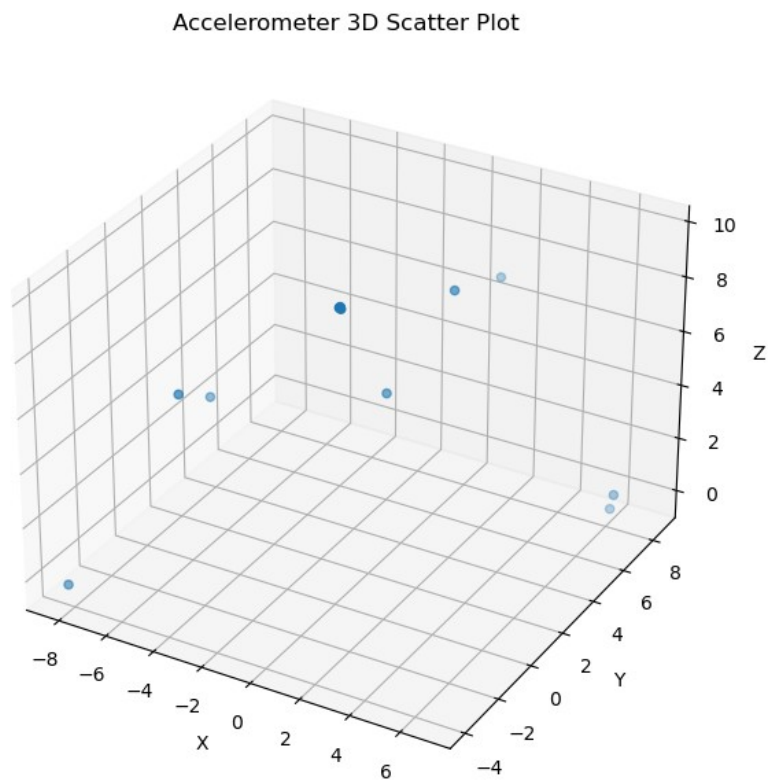
Geolocation 2D Scatter Plots



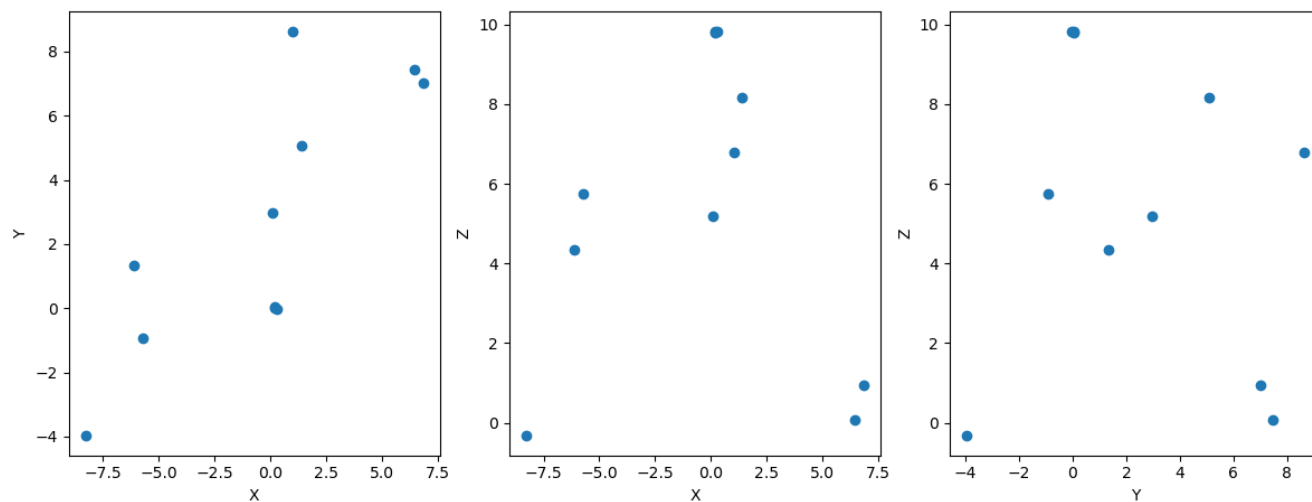
Generamos un gráfico de histograma para visualizar los cambios en el nivel de la batería a partir de los datos de la batería.



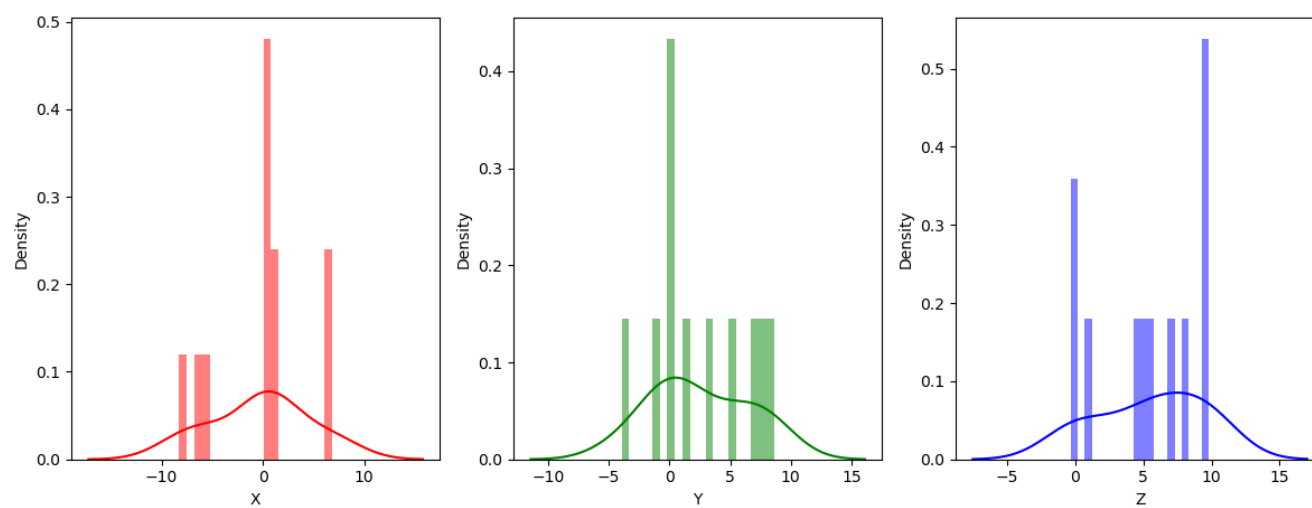
Generamos gráficos de scatter en dos y tres dimensiones para visualizar los cambios de aceleración, gráficos de histogramas y densidad para visualizar la distribución de las lecturas del acelerómetro a lo largo de cada eje (x, y, z) a partir de los datos del accelerometer.



Accelerometer 2D Scatter Plots

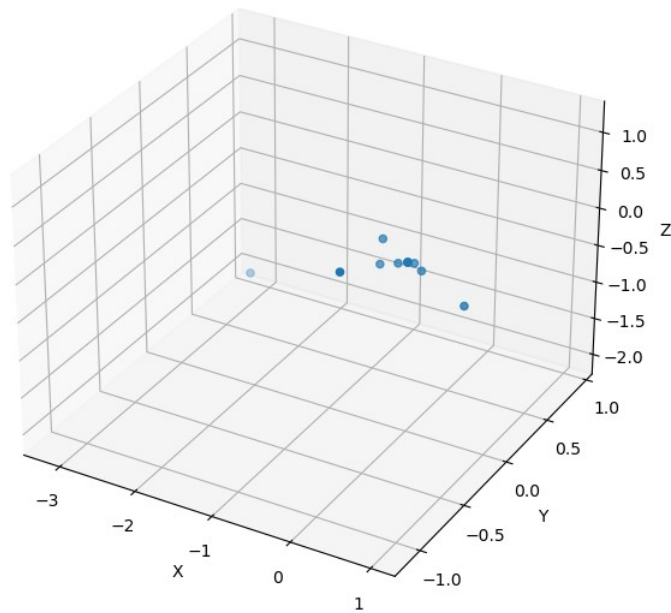


Accelerometer Histograms and Density Plots

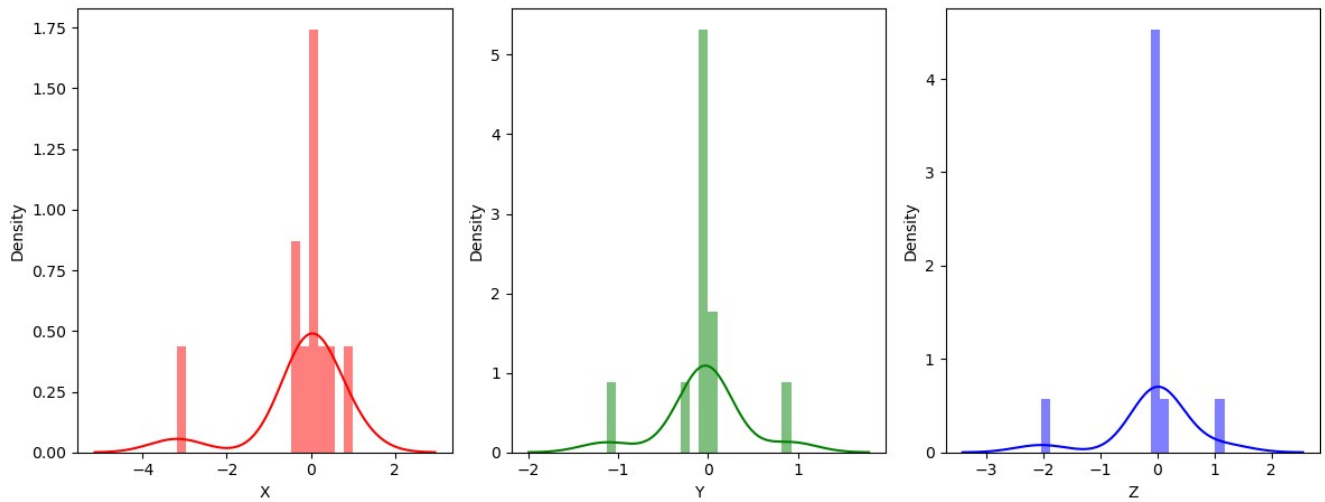


Generamos gráficos de scatter en dos y tres dimensiones para visualizar los cambios de orientación, gráficos de histogramas y densidad para visualizar la distribución de las lecturas del giroscopio a lo largo de cada eje (x, y, z) a partir de los datos del giroscopio.

Gyroscope 3D Scatter Plot

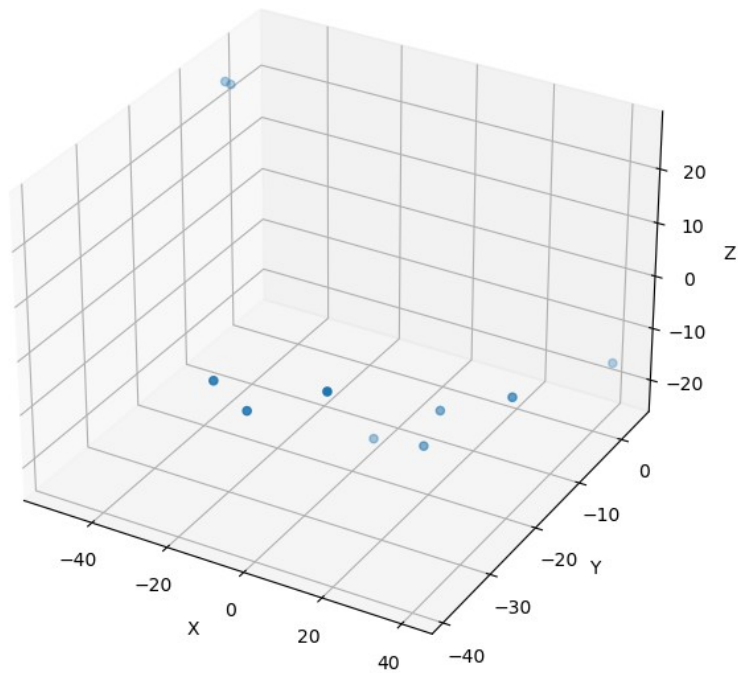


Gyroscope Histograms and Density Plots

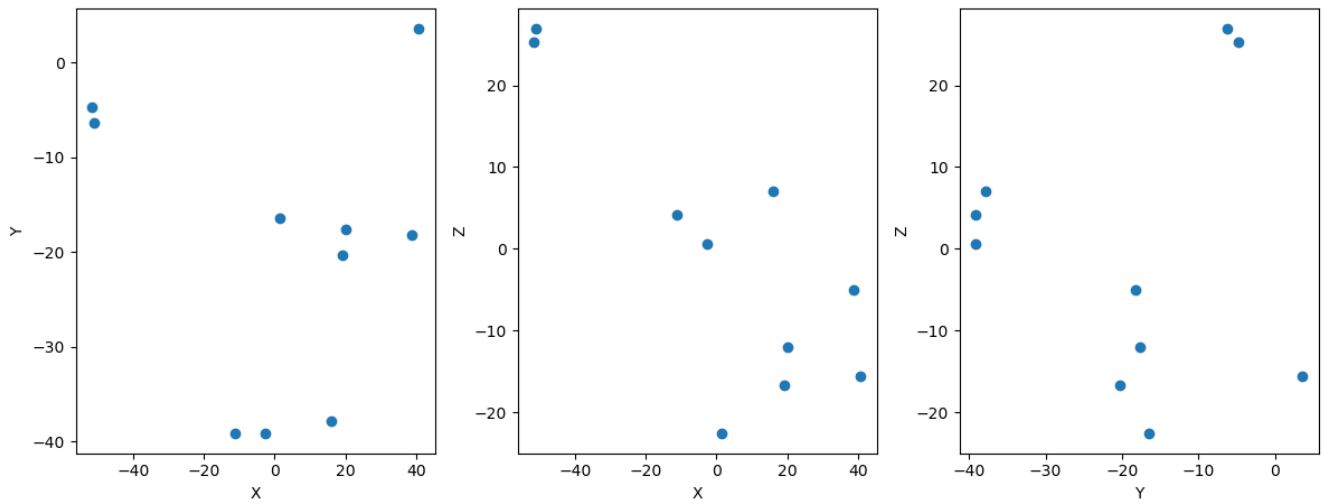


Generamos gráficos de scatter en dos y tres dimensiones para visualizar los cambios en la intensidad del campo magnético, gráficos de histogramas y densidad para visualizar la distribución de las lecturas del magnetómetro a lo largo de cada eje (x, y, z). a partir de los datos del magnetometer.

Magnetometer 3D Scatter Plot



Magnetometer 2D Scatter Plots



Magnetometer Histograms and Density Plots

