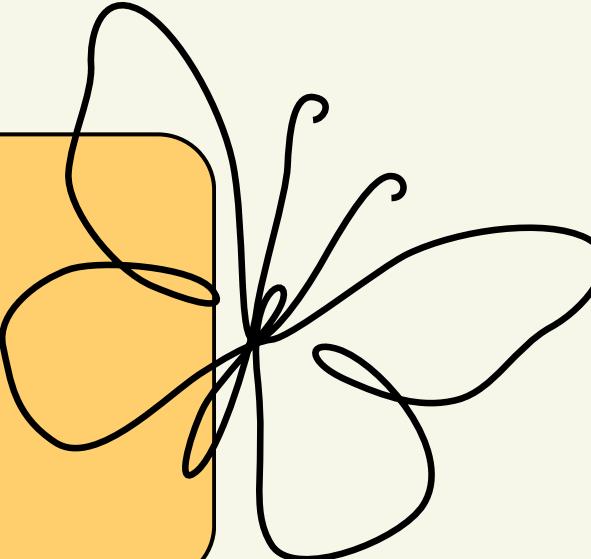
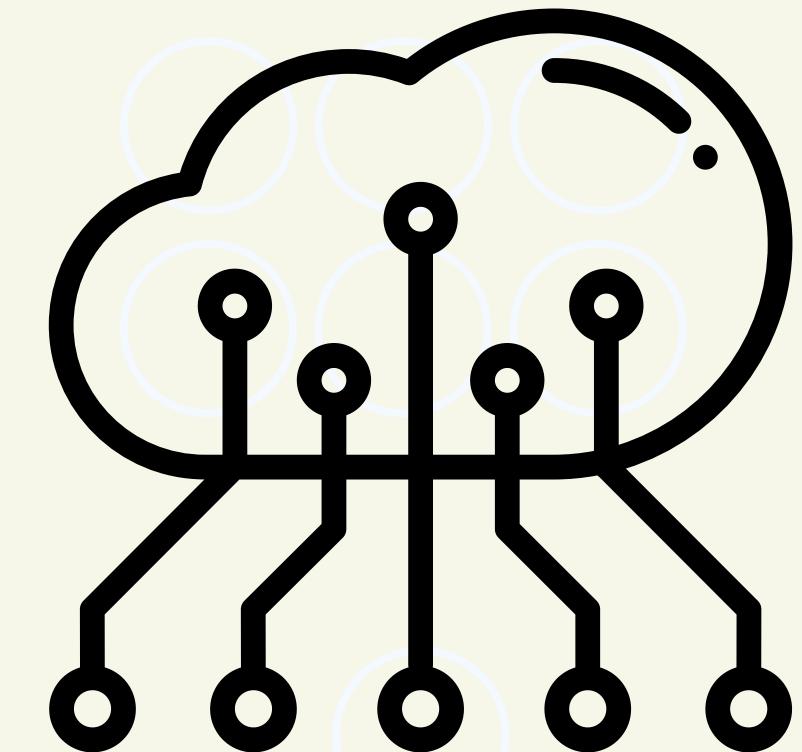




Transformando datos y realidades

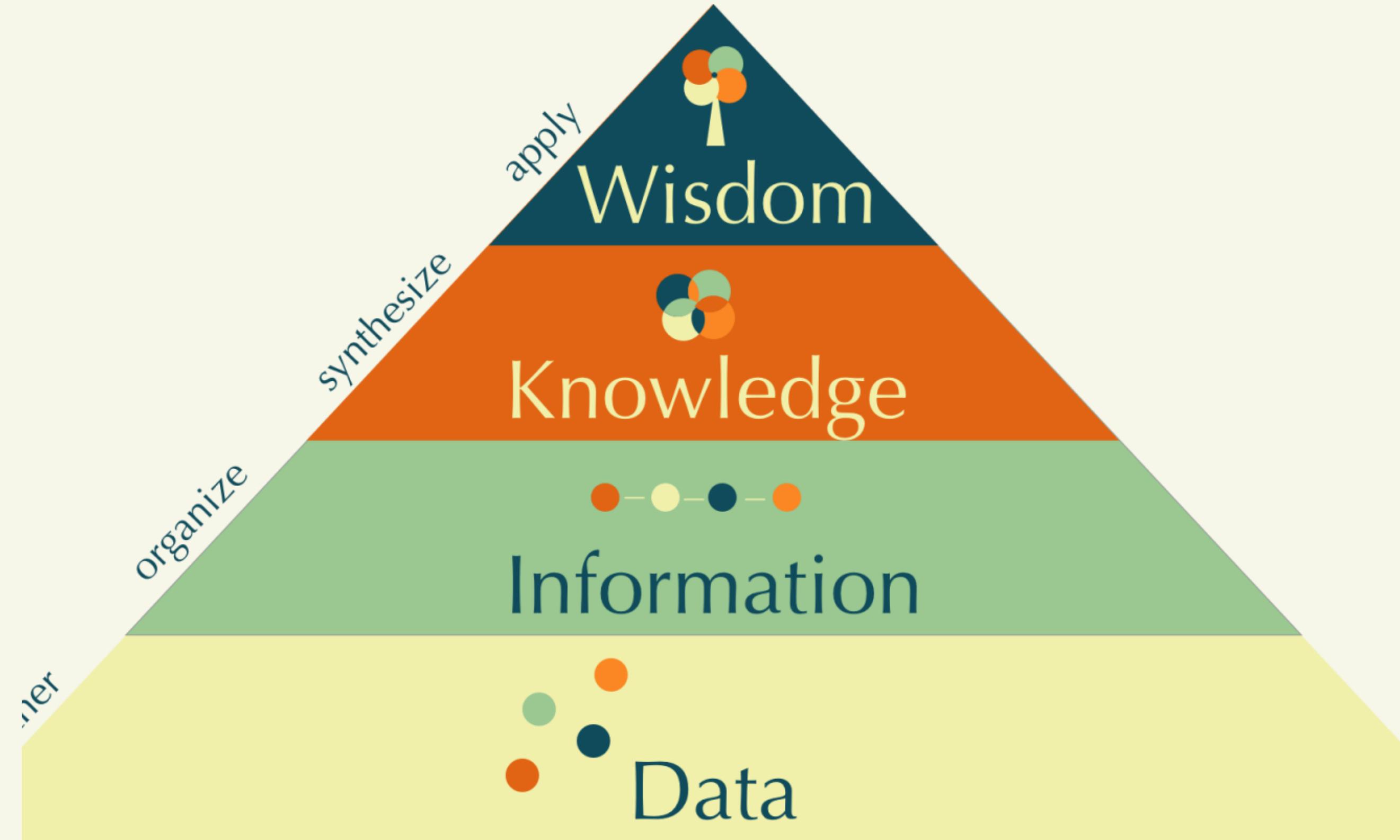


Tu primera experiencia con AWS Glue

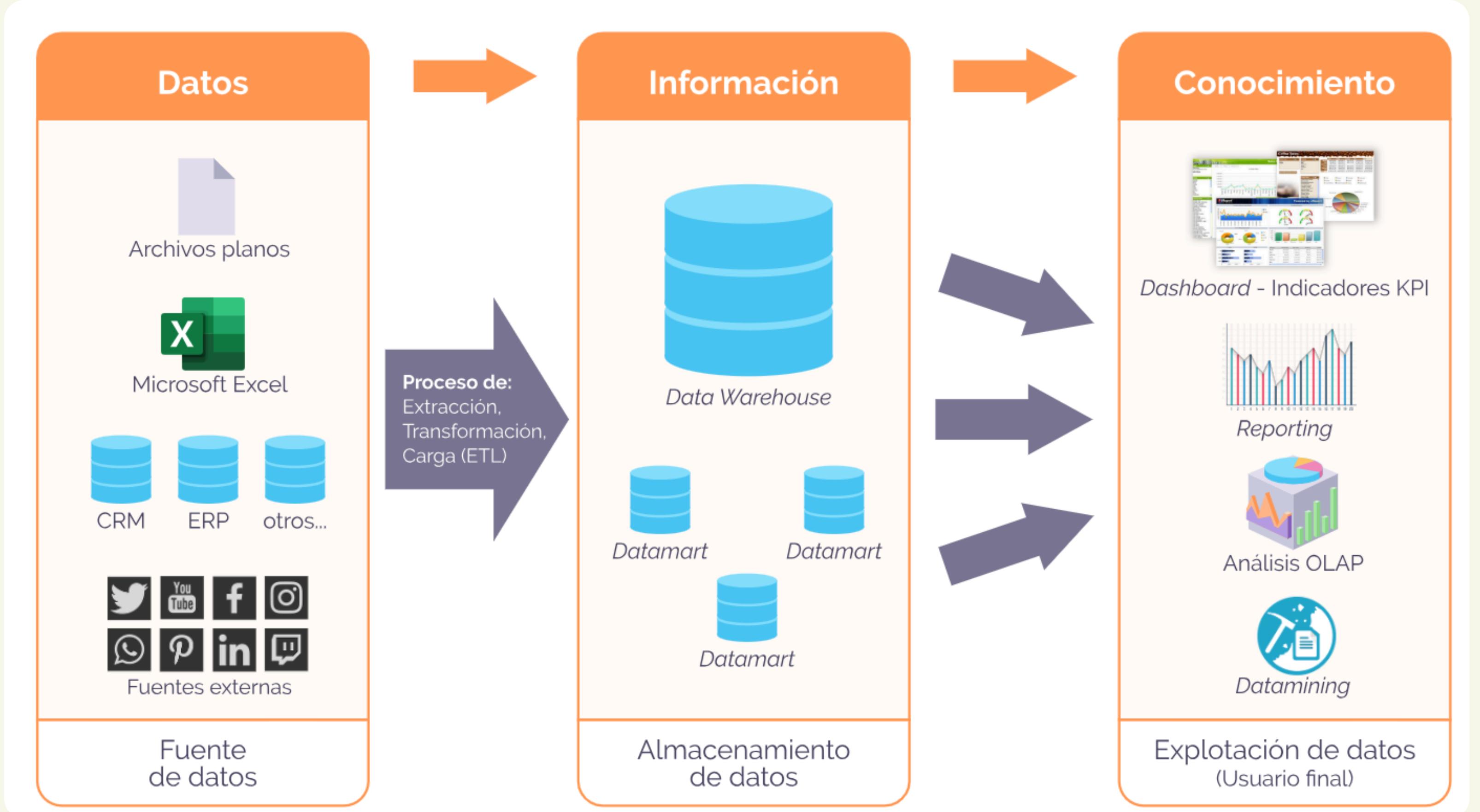


Zaira Chavarin

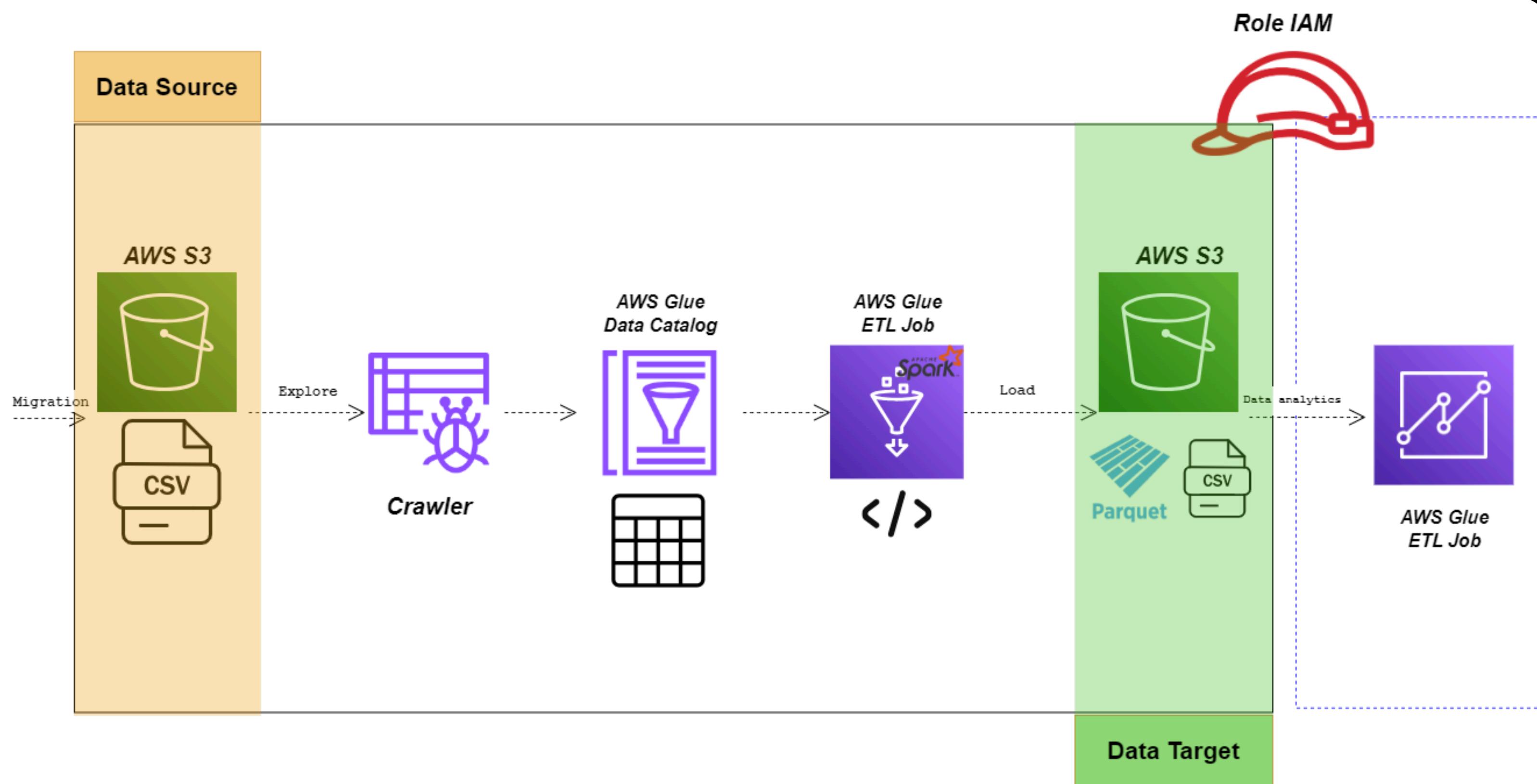
AWS Embajadoras Cloud



Elle Covington, "The DIKW Pyramid and the Process of Conducting an Advanced Review," Research Moment, December 2, 2024,
researchmoment.unl.edu (image adapted from Rowley 2007).



Selección de datos conforme a objetivos





Objetivo

Visibilizar la situación de las mujeres latinoamericanas en la educación y desarrollo profesional dentro de la Ciencia, tecnología, ingeniería y matemáticas, en el último siglo por medio de estadísticas oficiales.

Selección de datos conforme a objetivos



- Porcentaje de personal académico por sexo 2013-2022

Cantidad de personas empleadas en el nivel de educación superior que asumen la docencia, la investigación, el desarrollo tecnológico, la transferencia, la creación y extensión como su principal responsabilidad de acuerdo al sexo.

- Porcentaje de estudiantes en la educación superior por sexo 2013-2022

Porcentaje de estudiantes matriculados en programas CINE 5, 6, 7 y 8 en instituciones de educación superior cualquiera sea su duración en un año académico determinado por sexo en relación al total de estudiantes en la educación superior



- Female share of graduates in other fields than Science, Technology, Engineering and Mathematics programmes, tertiary (%) [2000-2018]





País	Género	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	País	Género	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Argentina	Femenino	0.4898	0.4895	0.4949	0.497	0.4975	0.497	0.4993	0.5017	0.504	0.5093	Brasil	Femenino	0.5713	0.5729	0.5706	0.5708	0.5684	0.569	0.5729	0.5773	0.5827	0.5878
Argentina	Masculino	0.5102	0.5105	0.5051	0.503	0.5025	0.503	0.5007	0.4983	0.496	0.4907	Brasil	Masculino	0.4287	0.4271	0.4294	0.4292	0.4316	0.431	0.4271	0.4227	0.4173	0.4122
Brasil	Femenino	0.4567	0.4584	0.4598	0.4601	0.4631	0.4652	0.4677	0.4682	0.4699	0.4724	Chile	Femenino	0.5193	0.52	0.5193	0.5225	0.5264	0.53	0.5304	0.534	0.5416	0.5381
Brasil	Masculino	0.5433	0.5416	0.5402	0.5399	0.5369	0.5348	0.5323	0.5318	0.5301	0.5276	Chile	Masculino	0.4807	0.48	0.4807	0.4775	0.4736	0.47	0.4696	0.466	0.4584	0.4619
Chile	Femenino	0.4257	0.4272	0.4299	0.4332	0.4354	0.4402	0.4447	0.4452	0.4483	0.453	Colombia	Femenino	0.5271	0.5276	0.5293	0.5288	0.5292	0.5298	0.5269	0.5297	0.534	0.5344
Chile	Masculino	0.5743	0.5728	0.5701	0.5668	0.5646	0.5598	0.5553	0.5548	0.5517	0.547	Colombia	Masculino	0.4729	0.4724	0.4707	0.4712	0.4708	0.4702	0.4731	0.4703	0.466	0.4656
Colombia	Femenino	0.3593	0.3646	0.3679	0.3705	0.3737	0.3828	0.3843	0.3868	0.3983	0.4034	Costa Rica	Femenino	0.5399	0.5429	0.5565	0.5424	0.5474	0.5381	0.5422	0.5492	0.5579	0.559
Colombia	Masculino	0.6407	0.6354	0.6321	0.6295	0.6263	0.6172	0.6157	0.6132	0.6017	0.5966	Costa Rica	Masculino	0.4601	0.4571	0.4435	0.4576	0.4526	0.4619	0.4578	0.4508	0.4421	0.441
Costa Rica	Femenino				0.438	0.4438	0.4411	0.4403	0.4432	0.4395	0.4488	Cuba	Femenino	0.5945	0.5638	0.5679	0.6237	0.5988	0.6102	0.6337	0.6297	0.6365	0.6414
Costa Rica	Masculino				0.2079	0.5556	0.5589	0.5597	0.5568	0.5605	0.5512	Cuba	Masculino	0.4055	0.4362	0.4321	0.3763	0.4012	0.3898	0.3663	0.3703	0.3635	0.3586
Cuba	Femenino	0.5394	0.422	0.5696	0.5789	0.586	0.59	0.5913	0.5913	0.591	0.6026	Ecuador	Femenino	0.5493	0.5425	0.538	0.5316	0.5184	0.5241	0.5247	0.5319	0.4656	0.4637
Cuba	Masculino	0.4606	0.578	0.4304	0.4211	0.414	0.41	0.4087	0.4087	0.409	0.3974	Ecuador	Masculino	0.4507	0.4575	0.462	0.4684	0.4767	0.4759	0.4753	0.4681	0.3875	0.3821
Ecuador	Femenino	0.359	0.3724	0.3821	0.3909	0.3949	0.3997	0.4028	0.4063	0.4153	0.4218	El Salvador	Femenino	0.5335	0.5347	0.5359	0.5376	0.536	0.5381	0.54	0.5393	0.5515	0.4391
Ecuador	Masculino	0.641	0.6276	0.6179	0.6091	0.6051	0.6003	0.5972	0.5937	0.5847	0.5782	El Salvador	Masculino	0.4665	0.4653	0.4641	0.4624	0.464	0.4619	0.46	0.4607	0.4485	0.5609
El Salvador	Femenino	0.3681	0.3657	0.3727	0.3766	0.3832	0.3839	0.385	0.3799	0.3979	0.4041	España	Femenino	0.5355	0.5334	0.5314	0.5326	0.5332	0.5357	0.5366	0.5407	0.5421	0.5443
El Salvador	Masculino	0.6319	0.6343	0.6273	0.6234	0.6168	0.6161	0.615	0.6201	0.6021	0.5959	España	Masculino	0.4645	0.4666	0.4686	0.4674	0.4668	0.4643	0.4634	0.4593	0.4579	0.4557
España	Femenino	0.4069	0.4171	0.4247	0.4288	0.4344	0.4386	0.4443	0.4494	0.4542	0.4574	Honduras	Femenino	0.5726	0.57	0.57	0.5722	0.5682	0.5688	0.5725	0.5627	0.5694	0.5855
España	Masculino	0.5931	0.5829	0.5753	0.5712	0.5656	0.5614	0.5557	0.5506	0.5458	0.5424	Honduras	Masculino	0.4274	0.43	0.43	0.4278	0.4318	0.4312	0.4275	0.4373	0.4306	0.4145
Honduras	Femenino	0.4132	0.3879	0.4083								Méjico	Femenino	0.4932	0.4935	0.493	0.4986	0.5016	0.506	0.5098	0.5154	0.5252	0.5355
Honduras	Masculino	0.5868	0.6121	0.5917								Méjico	Masculino	0.5068	0.5065	0.507	0.5014	0.4984	0.494	0.4902	0.4846	0.4748	0.4645
Méjico	Femenino	0	0.4095	0.4118	0.4145	0.4174	0.421	0.4264	0.5727	0.5644	0.5559	Panamá	Femenino	0.5917	0.6066	0.6046	0.6043	0.6062	0.6071	0.5973	0.6003	0.6054	0.6091
Méjico	Masculino	0	0.5905	0.5882	0.5855	0.5826	0.579	0.5736	0.4273	0.4356	0.4441	Panamá	Masculino	0.4083	0.3934	0.3954	0.3957	0.3938	0.3929	0.4027	0.3997	0.3946	0.3909
Panamá	Femenino	0.4735	0.471	0.4803	0.4984	0.4823	0.488	0.4904	0.4871	0.4804	0.5001	Paraguay	Femenino							0.5328	0.5586	0.5708	0.5647
Panamá	Masculino	0.5265	0.529	0.5197	0.5016	0.5177	0.512	0.5096	0.5129	0.5196	0.4999	Paraguay	Masculino							0.4672	0.4414	0.4292	0.4353
Perú	Femenino					0.3325	0.3292	0.3379	0.3387	0.352	0.3579	Perú	Femenino				0.5174	0.519	0.5224	0.5234	0.5366	0.5383	
Perú	Masculino					0.6675	0.6708	0.6621	0.6613	0.648	0.6421	Portugal	Masculino				0.4826	0.481	0.4776	0.4766	0.4634	0.4617	
Portugal	Femenino	0.4404	0.4398	0.444	0.4445	0.4428	0.4476	0.4511	0.458	0.458	0.4621	Portugal	Femenino	0.5303	0.5328	0.5327	0.5306	0.5323	0.5348	0.5379	0.5379	0.5356	0.536
Portugal	Masculino	0.5596	0.5602	0.556	0.5555	0.5572	0.5524	0.5489	0.542	0.542	0.5379	Puerto Rico	Femenino	0.5824	0.5804	0.5787	0.5814	0.584	0.5881	0.5928	0.608	0.6071	

Exploración de datos

Country Name	Country Code	Year	Value	Disaggregation
Argentina	ARG	2010	0.43463	female, Science, Technology, Engineering and Mathematics (STEM)
Argentina	ARG	2009</td		

The screenshot shows the AWS IAM service interface. On the left, there's a sidebar with 'Servicios' and a 'IAM' section. The 'Roles' tab is selected. Below it, there are tabs for 'Grupos', 'Usuarios', 'Roles', 'Políticas', and 'Analizador de acceso'. The main area displays a list of existing roles: 'admid', 'AWSServiceRoleForElasticLoadBalancing', 'AWSServiceRoleForSupport', 'AWSServiceRoleForTrustedAdvisor', and 'glue-engineer'. The 'glue-engineer' role is highlighted with a purple background.

The right side shows the 'Crear rol' (Create Role) wizard. It's on Step 1: 'Seleccionar entidad de confianza' (Select trust relationship entity). The 'Servicio de AWS' option is selected. Other options include 'Cuenta de AWS', 'Identidad web', 'Federación SAML 2.0', and 'Política de confianza personalizada'.

This screenshot shows the 'Roles' section of the AWS IAM service. The 'glue-engineer' role is highlighted with a purple background. The table lists the following roles:

Nombre del rol	Entidades de confianza	Última actividad
admid	Cuenta: 717279701937	-
AWSServiceRoleForElasticLoadBalancing	balancin	Hace 101 días
AWSServiceRoleForSupport	Servicio de AWS: support (Rol vinculado)	-
AWSServiceRoleForTrustedAdvisor	Servicio de AWS: trustedadvisor (Rol vinculado)	-
glue-engineer	Servicio de AWS: glue	Ayer

**Crea un rol
AWSGlueServiceRole con
permisos para S3 y Glue**

ROLE IAM



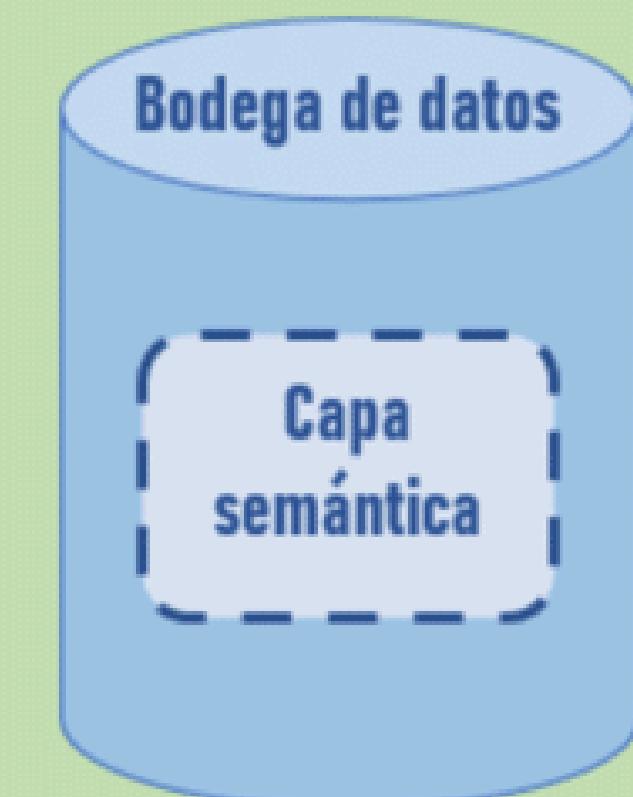
Extracción (Extract)



Transformación (Transform)



Carga (Load)



The screenshot shows the AWS S3 service interface. On the left, there's a sidebar with 'Almacenamiento' and the 'Amazon S3' logo. Below it, a callout box titled 'Creación de un bucket' explains that each object in S3 is stored in a bucket. It includes a 'Crear bucket' button. On the right, the main area shows the 'Crear bucket' wizard. It starts with 'Configuración general' where the region is set to 'EE.UU. Este (Norte de Virginia) us-east-1'. Under 'Tipo de bucket', 'Uso general' is selected, with a note about redundancy across multiple zones. The bucket name 'woman_stem_latam' is entered in the 'Nombre del bucket' field. At the bottom, there's a link to copy configuration from an existing bucket. Below this, a list of existing buckets is shown:

<input type="radio"/> target-woman-stem-latam	EE.UU. Este (Norte de Virginia) us-east-1	Ver analizador para us-east-1
<input type="radio"/> woman-stem-latam	EE.UU. Este (Norte de Virginia) us-east-1	Ver analizador para us-east-1

Crea dos Buckets en Amazon S3 de uso general para guardar tus objetos tanto de origen como de destino

Extracción y carga de datos



The screenshot shows the AWS S3 console interface. The top navigation bar includes the AWS logo, a search bar, and account information: Estados Unidos (Norte de Virginia) and demo-glue @ 7172-7970-1937. Below the navigation is a breadcrumb trail: Amazon S3 > Buckets > woman-stem-latam. The main content area has tabs for Objetos, Metadatos, Propiedades, Permisos, Métricas, Administración, and Puntos de acceso, with Objetos selected. A sub-header 'Objetos (0)' is shown. Below it are buttons for Copiar URI de S3, Copiar URL, Descargar, Abrir, Eliminar, Acciones, Crear carpeta, and Cargar. A note states: 'Los objetos son las entidades fundamentales que se almacenan en Amazon S3. Puede utilizar el inventario de Amazon S3 para obtener una lista de todos los objetos de su bucket.' and 'Para que otras personas obtengan acceso a sus objetos, tendrá que concederles permisos de forma explícita.' A search bar 'Buscar objetos por prefijo' is present. The table below is empty, showing columns for Nombre, Tipo, Última modificación, Tamaño, and Clase de almacenamiento. A message at the bottom says 'No hay objetos' and 'No tiene objetos en este bucket.' with a 'Cargar' button.

The screenshot shows the 'Cargar' (Upload) page within the AWS S3 console. The top navigation bar and breadcrumb trail are identical to the previous screenshot. The main content area is titled 'Cargar' with a sub-header 'Información'. It instructs users to 'Agregue los archivos y las carpetas que desea cargar en S3. Para cargar un archivo de más de 160 GB, utilice la CLI de AWS, los SDK de AWS o la API REST de Amazon S3.' A note about large files is present. Below is a section titled 'Archivos y carpetas (2 total, 6.9 KB)' with a sub-header 'Archivos y carpetas'. It lists two files: 'personal_académico_STEM_clean.csv' (text/csv, 3.2 KB) and 'estudiantes_STEM_clean.csv' (text/csv, 3.7 KB). Buttons for Eliminar, Agregar archivos, and Agregar carpeta are available. A note says 'Se cargarán todos los archivos y las carpetas de esta tabla.'

The screenshot shows the AWS S3 console after a successful upload. The top navigation bar and breadcrumb trail are identical. A green notification bar at the top left says '✓ Se ha realizado la carga correctamente' and 'Para obtener más información, consulte la tabla Archivos y carpetas.' Below is a table titled 'Archivos y carpetas (2 total, 6.9 KB)' with a sub-header 'Archivos y carpetas'. It lists the same two files as the previous screenshot. The table includes columns for Nombre, Carpeta, Tipo, Tamaño, Estado, and Error. Both files have a status of 'Realizado correctamente' with a green checkmark icon. A close button 'X' is visible in the top right corner of the notification bar.

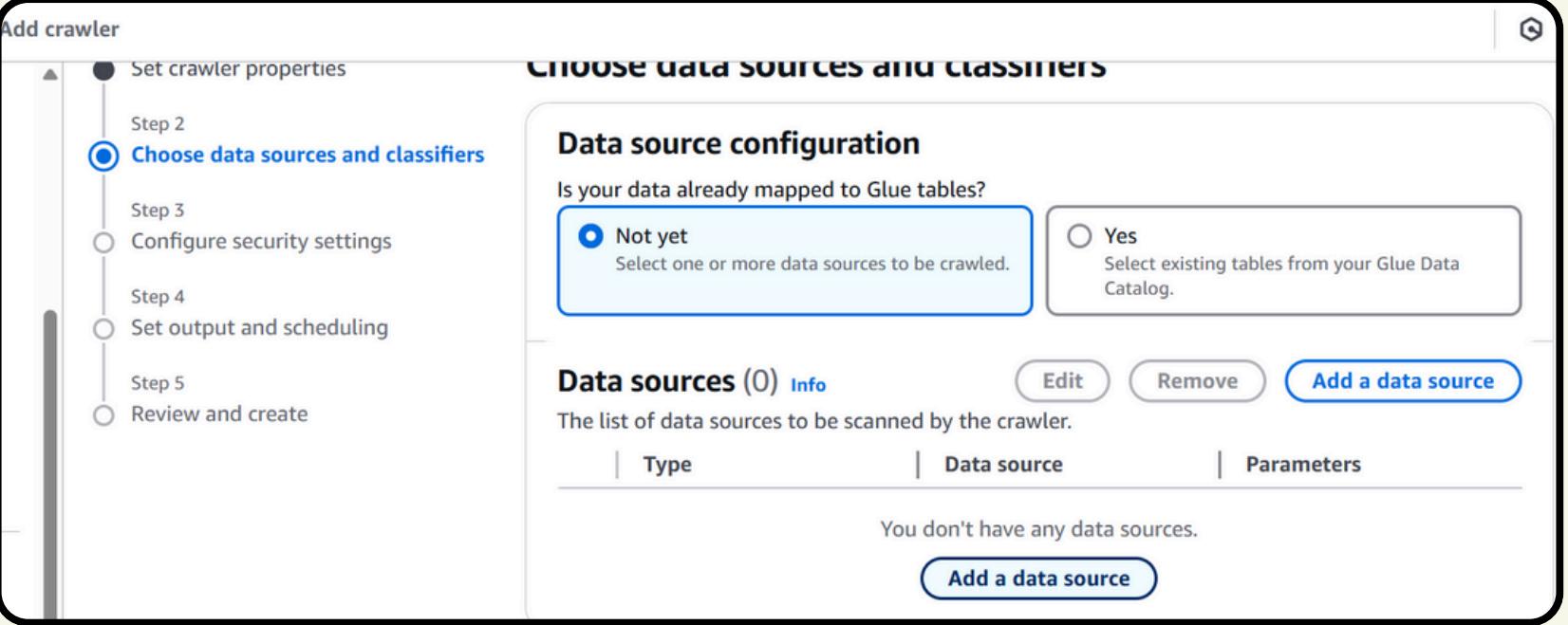
Entra al bucket creado de origen y carga tus objetos, en este caso tus datasets

Extracción y carga de datos

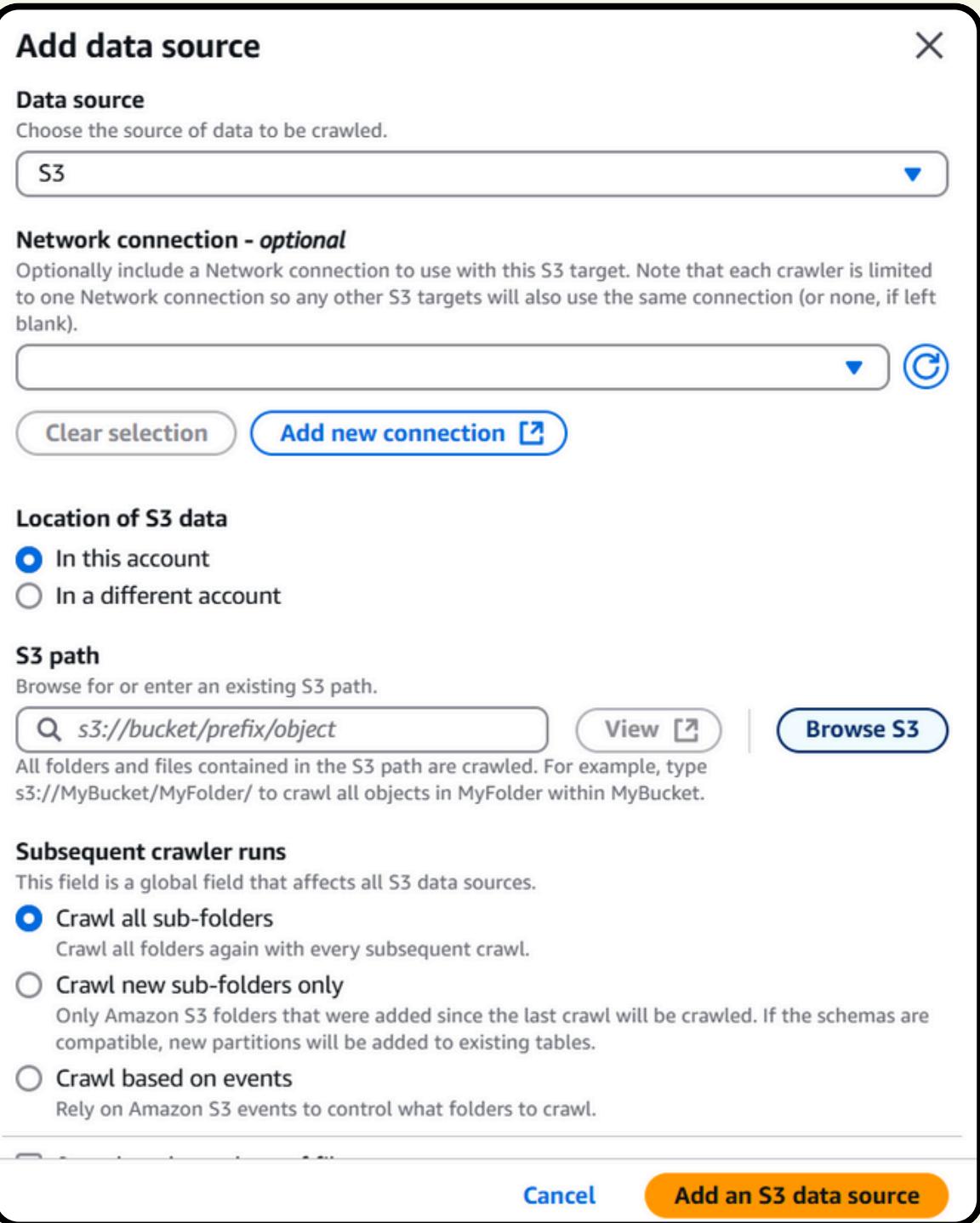
The screenshot shows the AWS Glue console interface. On the left, there's a sidebar with navigation links like AWS Glue, Getting started, ETL jobs, Visual ETL, Notebooks, Job run monitoring, Data Catalog tables, Data connections, Workflows (orchestration), Zero-ETL integrations, and a Data Catalog section with Databases, Tables, Stream schema registries, Schemas, Connections, and Crawlers. The Crawlers link is highlighted with a purple box. The main area is titled "Crawlers" and describes what a crawler does. It shows a table header for "Crawlers (0) Info" with columns: Name, State, Schedule, Last run, Last run ..., Log, and Table cha...". Below the table, it says "No resources" and "No resources to display." At the top right of the main area, there are buttons for "Action", "Run", and "Create crawler". A modal window titled "Set crawler properties" is open, showing a step-by-step process: Step 1 (Set crawler properties, currently selected), Step 2 (Choose data sources and classifiers), Step 3 (Configure security settings), Step 4 (Set output and scheduling), and Step 5 (Review and create). The "Crawler details" section has a "Name" field set to "women-stem-latam" and a "Description - optional" field with placeholder text "Enter a description". A note states "Descriptions can be up to 2048 characters long." At the bottom of the modal, there's a "Tags - optional" section with the note "Use tags to organize and identify your resources."

Ingresa a AWS GLUE para crear y nombrar un Crawler. Esto nos permitirá rastrear nuestros datos en el bucket e identificar su esquema y estructura

Extracción



The screenshot shows the 'Add crawler' wizard at Step 2: 'Choose data sources and classifiers'. It includes a sidebar with steps 1-5. The main area shows 'Data source configuration' with two options: 'Not yet' (selected) and 'Yes'. Below is a table for 'Data sources' with one entry: 's3://woman-stem-latam/estudiante...'.



This dialog box is titled 'Add data source'. It has a 'Data source' dropdown set to 'S3'. Under 'Network connection - optional', there's a 'Clear selection' button and an 'Add new connection' button. In the 'Location of S3 data' section, 'In this account' is selected. The 'S3 path' field contains 's3://bucket/prefix/object'. The 'Subsequent crawler runs' section offers three options: 'Crawl all sub-folders' (selected), 'Crawl new sub-folders only', and 'Crawl based on events'.

Agrega la ruta de buckets origen para ratrear las bases de datos

Extracción

Configure security settings

IAM role [Info](#)

Existing IAM role

glue-engineer ▼ View ↗

Create new IAM role Update chosen IAM role

Only IAM roles created by the AWS Glue console and have the prefix "AWSGlueServiceRole-" can be updated.

Set output and scheduling

Output configuration [Info](#)

Target database

Choose a database ▼

Clear selection Add database ↗

Agregamos permisos para el rol IAM previamente creado y creamos una base de datos en AWS Glue Data Catalog

Create a database

Create a database in the AWS Glue Data Catalog.

Database details

Name

women-stem-latam

Database name is required, in lowercase characters, and no longer than 255 characters.

Description - optional

Enter text

Descriptions can be up to 2048 characters long.

Database settings

Location - optional

Set the URI location for use by clients of the Data Catalog.

Databases (1)				Last updated (UTC) April 29, 2025 at 01:57:35		Edit	Delete	Add database
A database is a set of associated table definitions, organized into a logical group.								
Filter databases								
<input type="checkbox"/> Name	▲	Description	▼	Location URI	▼	Created on (UTC)	▼	▼
<input type="checkbox"/> women-stem-latam	-	-	-	-	-	April 29, 2025 at 01:57:31		

Set output and scheduling

Output configuration [Info](#)

Target database

women-stem-latam ▼

Clear selection Add database ↗

Table name prefix - optional

Type a prefix added to table names

Extracción

Review and create

Step 1: Set crawler properties

Set crawler properties

Name: women-stem-latam | Description: - | Edit

Tags: -

Step 2: Choose data sources and classifiers

Data sources (1) Info
The list of data sources to be scanned by the crawler.

Type	Data source	Parameters
S3	s3://woman-stem-latam	Recrawl all

Step 3: Configure security settings

Configure security settings

IAM role: AWSGlueServiceRole-EngineerDataAnalyst | Security configuration: - | Edit

Lake Formation configuration

Step 4: Set output and scheduling

Set output and scheduling

Database: women-stem-latam | Table prefix - optional: - | Edit

Maximum table threshold - optional: - | Schedule: On demand

Crawlers

One crawler successfully created
The following crawler is now created: "woman-stem-latam"

Crawlers (1) Info
Last updated (UTC)
April 29, 2025 at 04:26:21

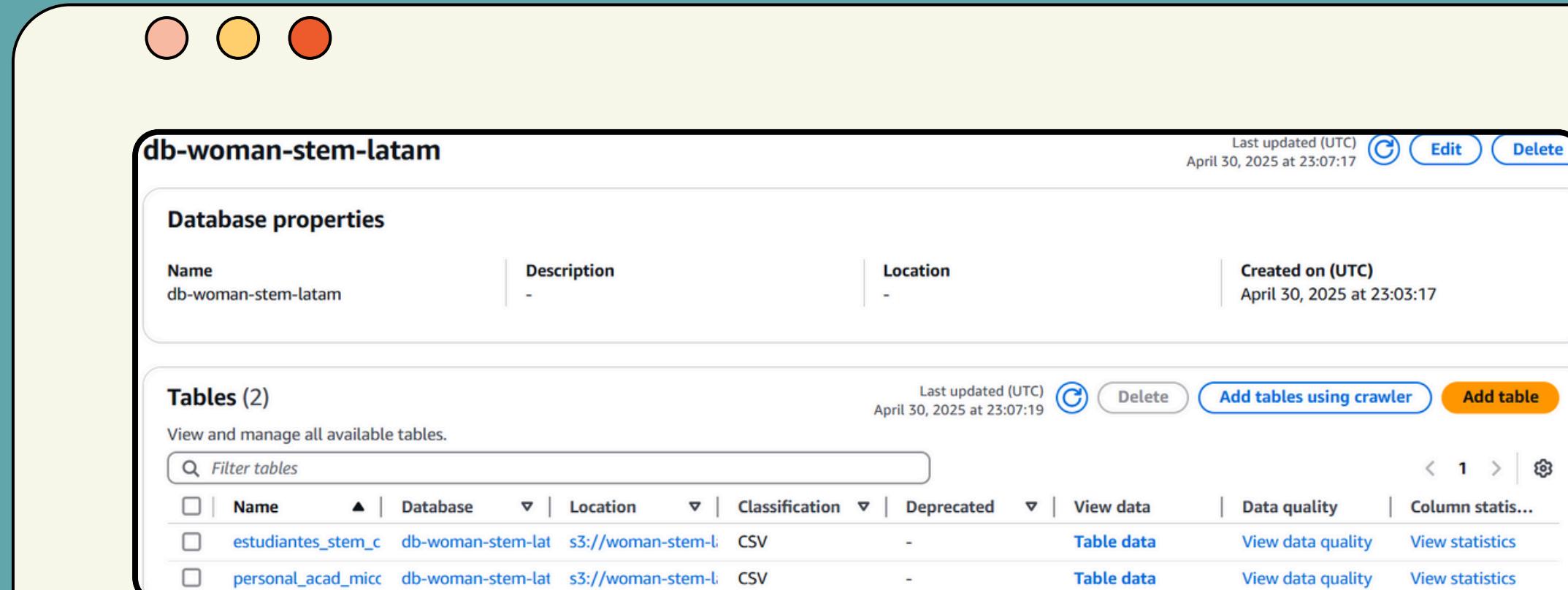
Action	Run	Create crawler

View and manage all available crawlers.

Filter crawlers	< 1 >	⚙️				
Name	State	Schedule	Last run	Last run ...	Log	Table cha...
woman-ste...	Ready	-	-	-	-	-

Verificamos las configuraciones del rastreador y finalizamos la creación del crawler

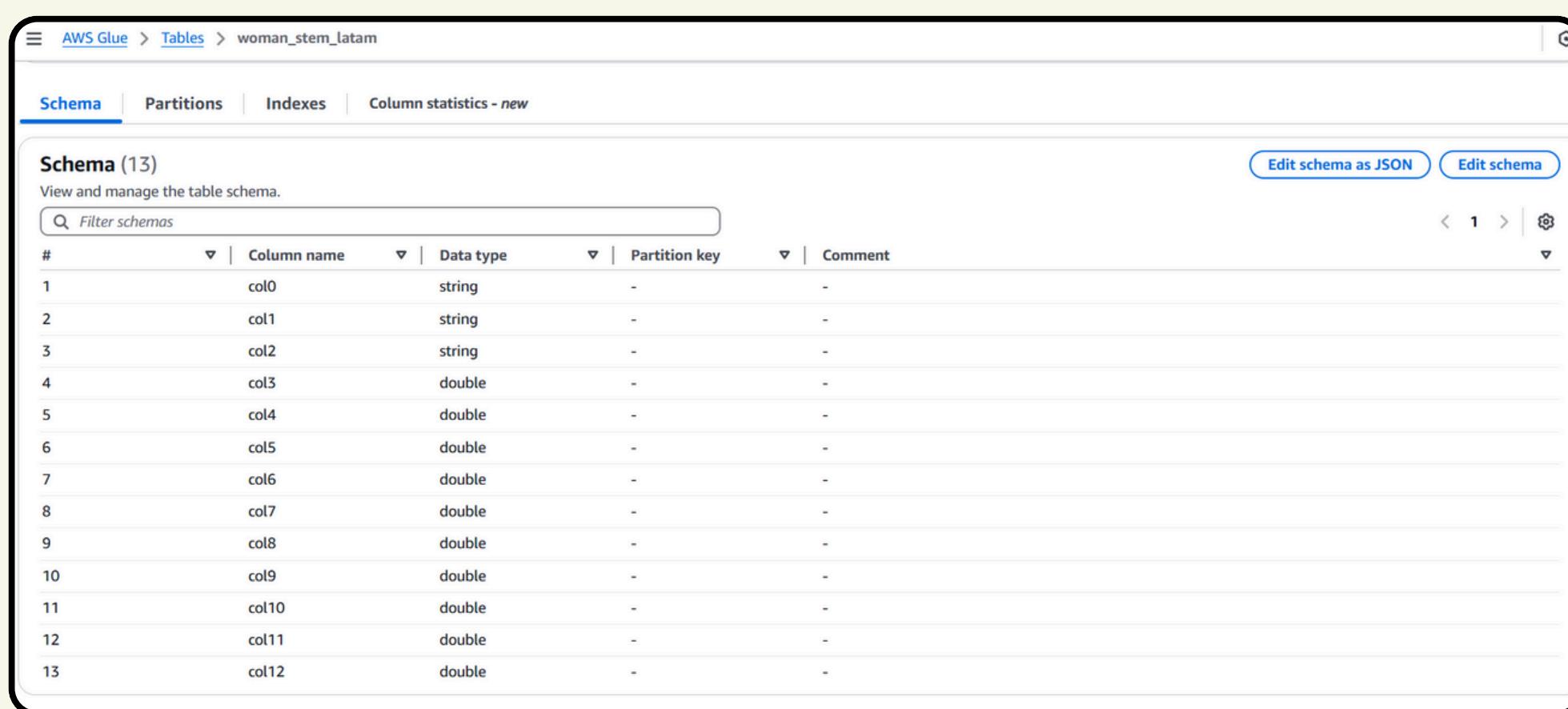
Extracción y transformación



The screenshot shows the AWS Glue Data Catalog interface. At the top, there's a header for the database "db-woman-stem-latam". Below it, the "Database properties" section displays the name "db-woman-stem-latam", a blank "Description" field, an empty "Location" field, and the creation date "April 30, 2025 at 23:03:17". Above the database properties, there are three buttons: "Edit", "Delete", and a refresh icon. The main area is titled "Tables (2)" and contains a table with two entries:

Name	Database	Location	Classification	Deprecated	View data	Data quality	Column stats...
estudiantes_stem_c	db-woman-stem-lat	s3://woman-stem-l-	CSV	-	Table data	View data quality	View statistics
personal_acad_micc	db-woman-stem-lat	s3://woman-stem-l-	CSV	-	Table data	View data quality	View statistics

Below this, there's a "Filter tables" input field and a navigation bar with buttons for "Add tables using crawler" and "Add table".



The screenshot shows the "Schema" tab for the table "woman_stem_latam". It displays the schema details with 13 columns:

#	Column name	Data type	Partition key	Comment
1	col0	string	-	-
2	col1	string	-	-
3	col2	string	-	-
4	col3	double	-	-
5	col4	double	-	-
6	col5	double	-	-
7	col6	double	-	-
8	col7	double	-	-
9	col8	double	-	-
10	col9	double	-	-
11	col10	double	-	-
12	col11	double	-	-
13	col12	double	-	-

At the top of this interface, there are navigation links: "AWS Glue > Tables > woman_stem_latam". Below the schema table, there are tabs for "Partitions", "Indexes", and "Column statistics - new".

Entramos a Databases en Data Catalog para revisar el esquema de nuestras bases de datos

Transformación

The screenshot shows the AWS Glue Studio interface. In the top left, the AWS Glue navigation bar includes links for Getting started, ETL jobs (which is selected and highlighted in purple), Visual ETL, Notebooks, Job run monitoring, Data Catalog tables, Data connections, Workflows (orchestration), Zero-ETL integrations (New), and Data Catalog (with sub-links for Databases, Tables, Stream schema registries, Schemas, Connections, and Crawlers). A search bar labeled 'Buscar' is also present.

In the center, a modal window titled 'Create job' is open, showing options for 'Script', 'Notebook', or 'Script editor'. The 'Script' tab is selected, with 'Spark' chosen as the engine. Under 'Options', 'Start fresh' is selected. A file upload input field is available for 'Upload script', with a note stating 'Limited to Python (*.py, *.py3) files only.' Buttons for 'Cancel' and 'Create script' are at the bottom, with 'Create script' being orange.

Below the modal, the main workspace shows an 'Untitled job' with a 'Script' tab selected. The script content is a Python code snippet:

```
1 import sys
2 from awsglue.transforms import *
3 from awsglue.utils import getResolvedOptions
4 from pyspark.context import SparkContext
5 from awsglue.context import GlueContext
6 from awsglue.job import Job
7
8 ## @params: [JOB_NAME]
9 args = getResolvedOptions(sys.argv, ['JOB_NAME'])
10
11 sc = SparkContext()
12 glueContext = GlueContext(sc)
13 spark = glueContext.spark_session
14 job = Job(glueContext)
15 job.init(args['JOB_NAME'], args)
16 job.commit()
```

The status bar at the bottom indicates 'Python Ln 1, Col 1' with 0 errors and 0 warnings.

**Ingresamos ETL jobs
para crear nuestro
script en spark**

Transformación



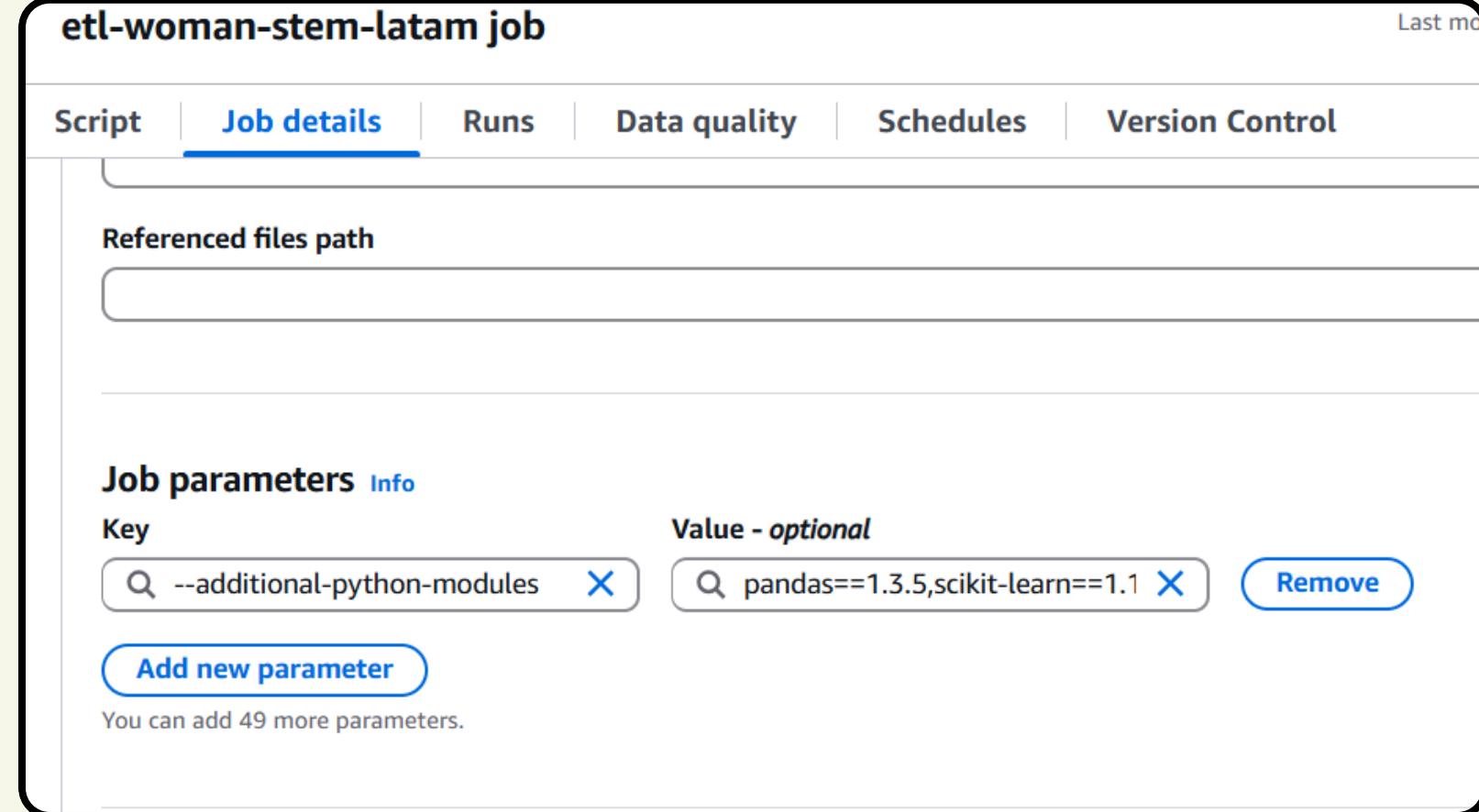
Inicio del job y contexto Spark

- Importa librerías de AWS Glue y PySpark, además de pandas y `IterativeImputer` de scikit-learn.
- Recupera el nombre del job (`JOB_NAME`) y levanta el `SparkContext` y el `GlueContext`, que vinculan tu código con el clúster de Glue.
- Inicializa y, más adelante, cierra (`job.commit()`) el trabajo en Glue.

Importamos librerías, inicializamos sesión y establecemos parámetros de lectura

Parámetros y lectura de datos

- Define nombres de base de datos, tablas y bucket de salida en Amazon S3.
- Carga las tablas desde el catálogo de Glue como `DynamicFrames`, luego las convierte a Spark DataFrames (`.toDF()`).



The screenshot shows the 'Job details' tab of the AWS Glue console for a job named 'etl-woman-stem-latam job'. It displays two job parameters:

Key	Value - optional
--additional-python-modules	pandas==1.3.5,scikit-learn==1.1

There are 'Add new parameter' and 'Remove' buttons below the list. A note at the bottom says 'You can add 49 more parameters.'



Missing completely at random (MACAR)	Mising at random (MAR)	Not missing at random (NMAR)
La pérdida no está relacionada con las características observadas	La pérdida está relacionada solo con las características observadas	La pérdida está relacionada con características no observadas y quizás con características observadas
Eliminación, media mediana o moda, Hot-deck o nearest-neighbor , Maximum Likelihood (ML)	Imputación Múltiple (MICE), EM (Expectation-Maximization), Full Information Maximum Likelihood (FIML), Inverse Probability Weighting (IPW)	Modelos de selección (Heckman, Diggle-Kenward), Patrón-mezcla (Pattern-mixture), Modelado bayesiano con “missingness mechanism”

Transformación MICE en pandas

- Convierte esos fragmentos de Spark a pandas **DataFrames** para usar **IterativeImputer**, la implementación de **MICE**.
- La función **imputar_mice(df_pdf)**:
 - a. Crea un imputador con **random_state=0** para resultados reproducibles.
 - b. Ajusta y transforma el DataFrame, devolviendo un pandas nuevo con los valores imputados.

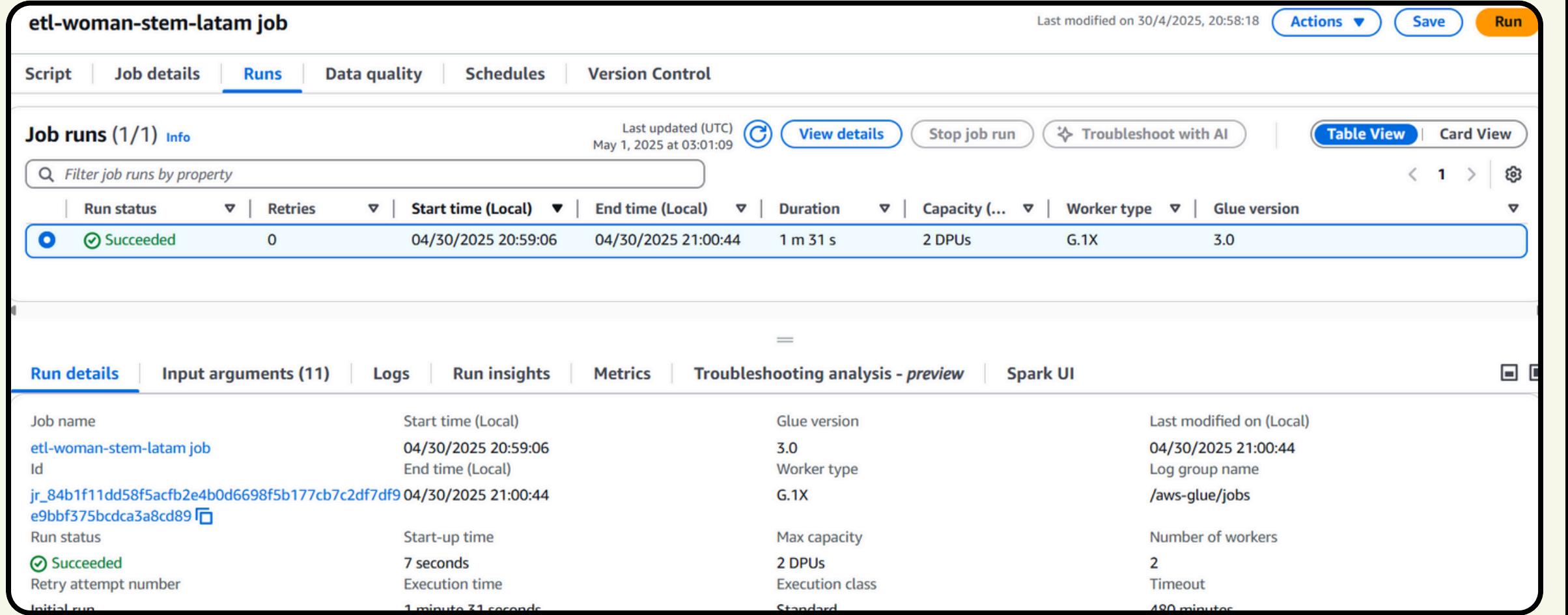
Tratamiento de datos nulos en extremos del dataset con MICE

Guardar resultados

- Escribe ambos DataFrames (estudiantes y personal) en formato Parquet o en CSV en tu bucket S3, sobrescribiendo carpetas de destino.

Cierre del job

- Finalmente, `job.commit()` marca a Glue que el proceso ha terminado correctamente.



The screenshot shows the AWS Glue Job Editor interface. At the top, there's a header with the job name 'etl-woman-stem-latam job', the last modified date ('Last modified on 30/4/2025, 20:58:18'), and action buttons ('Actions ▾', 'Save', 'Run'). Below the header, there are tabs: 'Script', 'Job details', 'Runs' (which is selected), 'Data quality', 'Schedules', and 'Version Control'. Under the 'Runs' tab, it says 'Job runs (1/1)' and 'Info'. It shows a single run with the following details:

Run status	Retries	Start time (Local)	End time (Local)	Duration	Capacity (DPU)	Worker type	Glue version
Succeeded	0	04/30/2025 20:59:06	04/30/2025 21:00:44	1 m 31 s	2 DPU	G.1X	3.0

Below the run table, there are several tabs: 'Run details', 'Input arguments (11)', 'Logs', 'Run insights', 'Metrics', 'Troubleshooting analysis - preview', and 'Spark UI'. The 'Run details' tab is active and shows the following configuration parameters:

Job name	Start time (Local)	Glue version	Last modified on (Local)
etl-woman-stem-latam job	04/30/2025 20:59:06	3.0	04/30/2025 21:00:44
Id	End time (Local)	Worker type	Log group name
jr_84b1f11dd58f5acfb2e4b0d6698f5b177cb7c2df7df9 e9bbf375bcdca3a8cd89	04/30/2025 21:00:44	G.1X	/aws-glue/jobs
Run status	Start-up time	Max capacity	Number of workers
Succeeded	7 seconds	2 DPU	2
Retry attempt number	Execution time	Execution class	Timeout
Initial run	1 minute 31 seconds	Standard	480 minutes

Guardamos el job y lo corremos

Buckets de uso general

Buckets de directorio

Buckets de uso general (3) [Información](#) [Todas las regiones de AWS](#)

Copiar ARN Vaciar Eliminar Crear bucket

Los buckets son contenedores de datos almacenados en S3.

Buscar buckets por nombre

Nombre	Región de AWS	Analizador de acceso de IAM	Fecha de creación
aws-glue-assets-717279701937-us-east-1	EE.UU. Este (Norte de Virginia) us-east-1	Ver analizador para us-east-1	30 Apr 2025 8:51:16 PM CST
target-woman-stem-latam	EE.UU. Este (Norte de Virginia) us-east-1	Ver analizador para us-east-1	30 Apr 2025 8:40:02 PM CST
woman-stem-latam	EE.UU. Este (Norte de Virginia) us-east-1	Ver analizador para us-east-1	28 Apr 2025 7:13:33 PM CST

Amazon S3 > Buckets > target-woman-stem-latam > estudiantes_mice/

Objetos Propiedades

Objetos (4)

Copiar URI de S3 Copiar URL Descargar Abrir Eliminar Acciones Cargar

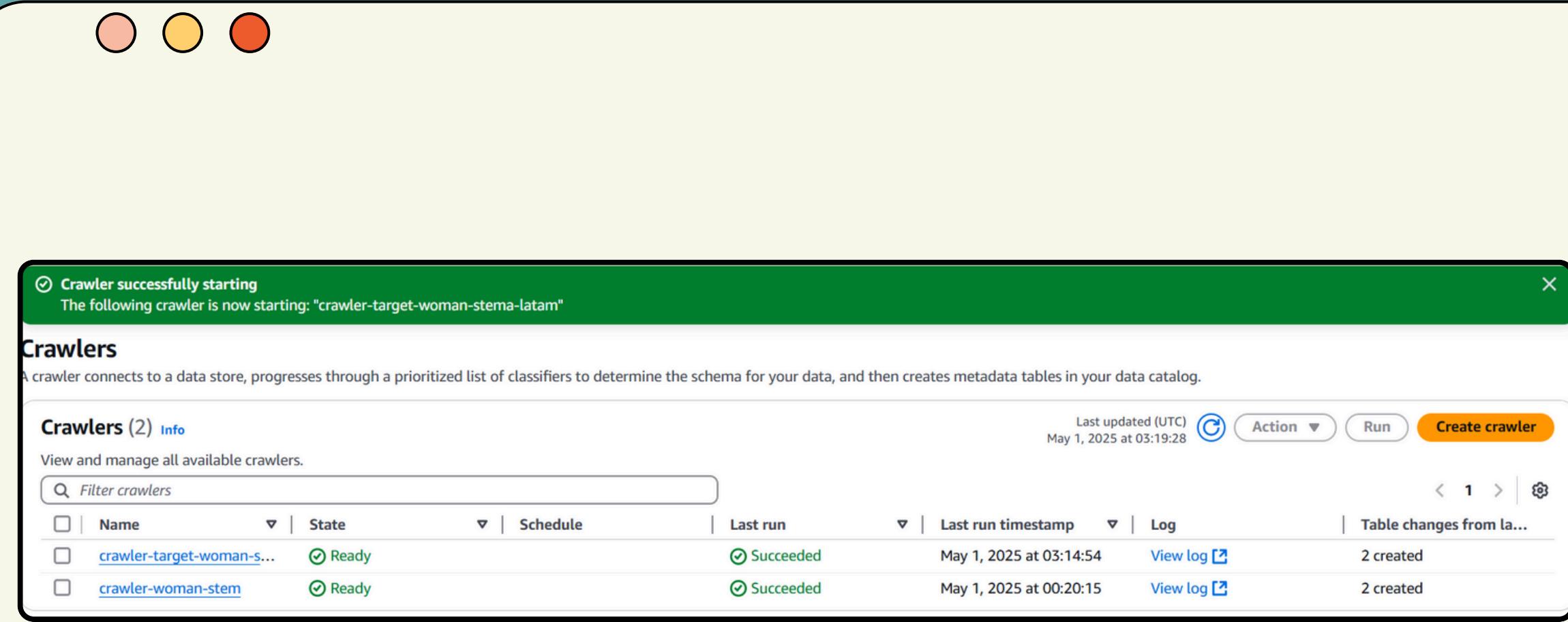
Los objetos son las entidades fundamentales que se almacenan en Amazon S3. Puede utilizar el [inventario de Amazon S3](#) para obtener una lista de todos los objetos de su bucket. Para que otras personas obtengan acceso a sus objetos, tendrá que concederles permisos de forma explícita. [Más información](#)

Buscar objetos por prefijo

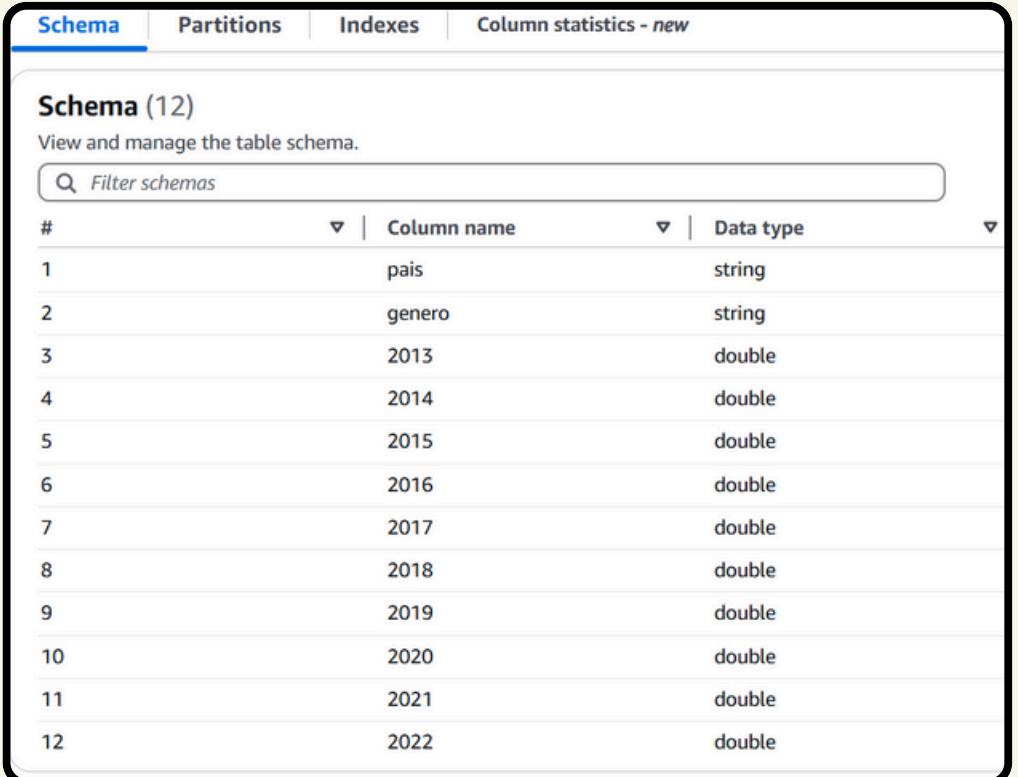
Nombre	Tipo	Última modificación	Tamaño	Clase de almacenamiento
part-00000fea249ce-4c19-49d3-80a5-66651b037c16-c000.snappy.parquet	parquet	30 Apr 2025 9:00:32 PM CST	3.7 KB	Estándar
part-00001fea249ce-4c19-49d3-80a5-66651b037c16-c000.snappy.parquet	parquet	30 Apr 2025 9:00:32 PM CST	3.7 KB	Estándar
part-00002fea249ce-4c19-49d3-80a5-66651b037c16-c000.snappy.parquet	parquet	30 Apr 2025 9:00:32 PM CST	3.7 KB	Estándar
part-00003fea249ce-4c19-49d3-80a5-66651b037c16-c000.snappy.parquet	parquet	30 Apr 2025 9:00:32 PM CST	3.8 KB	Estándar

Verificamos el contenido de nuestra transformación cargada en el bucket

Carga

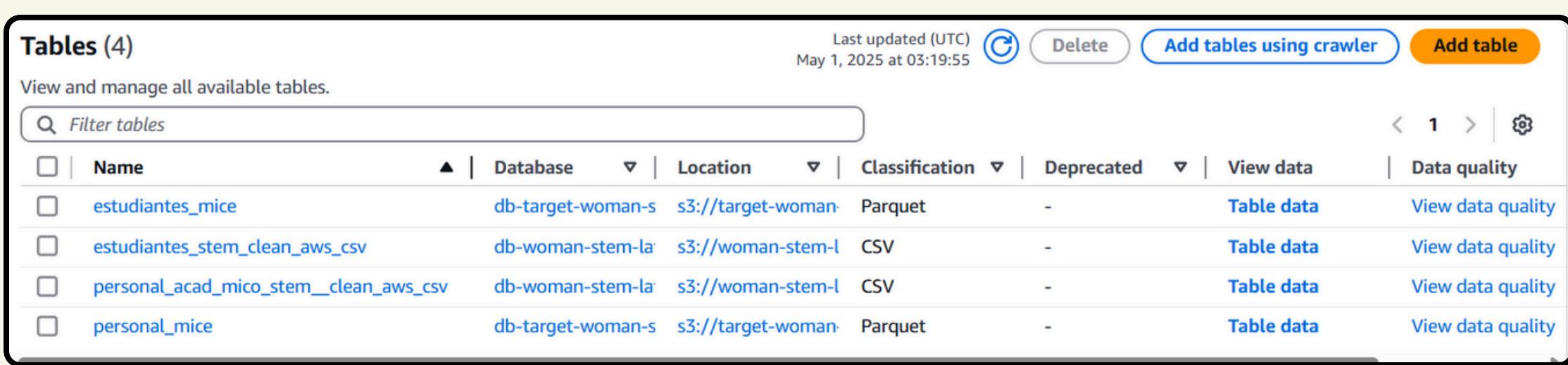


The screenshot shows the AWS Glue Crawler interface. A modal window at the top left indicates "Crawler successfully starting" for the crawler named "crawler-target-woman-stem-latam". The main "Crawlers" section lists two crawlers: "crawler-target-woman-s..." and "crawler-woman-stem", both in a "Ready" state with "Succeeded" last runs. The interface includes filters, sorting, and actions like "Run" and "Create crawler".



The screenshot shows the AWS Glue Schema view for a table. The "Schema (12)" section displays the following columns:

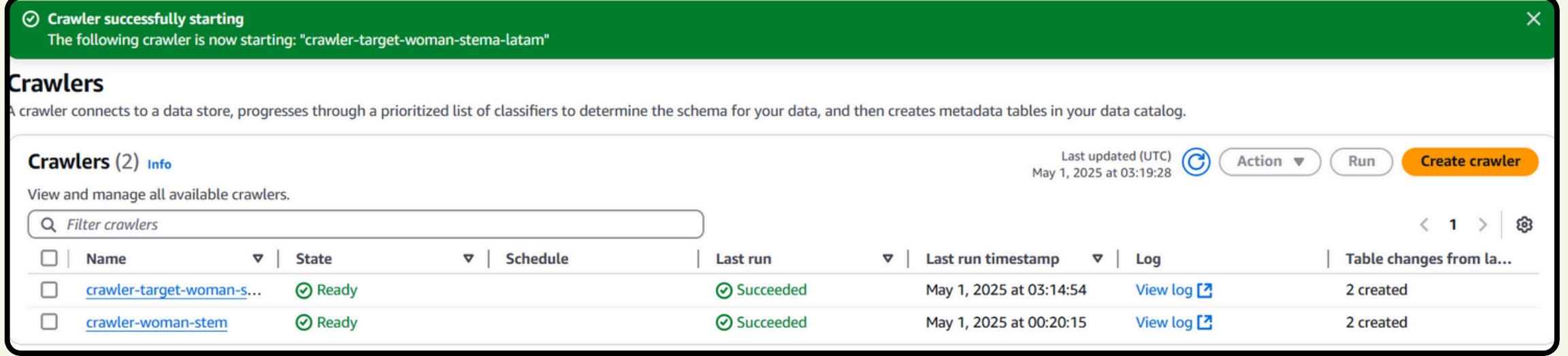
#	Column name	Data type
1	pais	string
2	genero	string
3	2013	double
4	2014	double
5	2015	double
6	2016	double
7	2017	double
8	2018	double
9	2019	double
10	2020	double
11	2021	double
12	2022	double



The screenshot shows the AWS Glue Tables view. It lists four tables: "estudiantes_mice", "estudiantes_stem_clean_aws_csv", "personal_acad_mico_stem_clean_aws_csv", and "personal_mice". Each table is associated with a database ("db-target-woman-s...", "db-woman-stem-la...", "db-woman-stem-la...", "db-target-woman-s..."), location ("s3://target-woman-", "s3://woman-stem-l-", "s3://woman-stem-l-", "s3://target-woman-"), classification (Parquet, CSV, CSV, Parquet), and deprecated status (-). Actions like "Delete", "Add tables using crawler", and "Add table" are available.

Creamos un nuevo crawler para verificar el esquema de nuestras tablas

Carga



Crawler successfully starting
The following crawler is now starting: "crawler-target-woman-stem-latam"

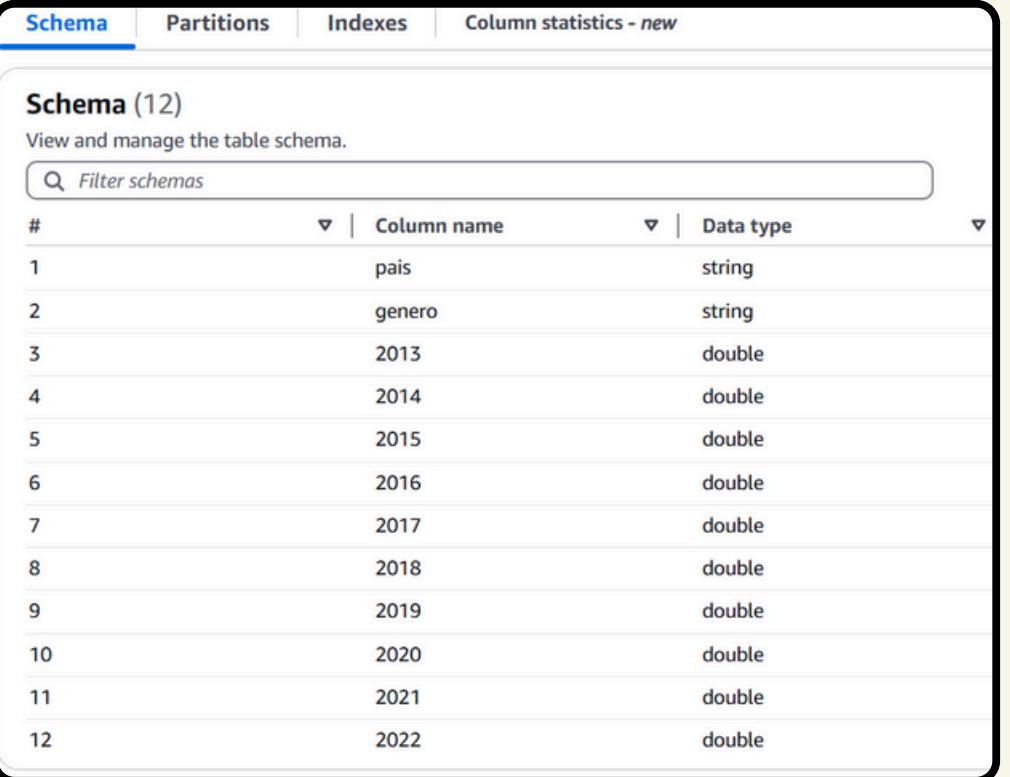
Crawlers
A crawler connects to a data store, progresses through a prioritized list of classifiers to determine the schema for your data, and then creates metadata tables in your data catalog.

Crawlers (2) Info
View and manage all available crawlers.

Name	State	Last run	Last run timestamp	Log	Table changes from la...
crawler-target-woman-s...	Ready	Succeeded	May 1, 2025 at 03:14:54	View log	2 created
crawler-woman-stem	Ready	Succeeded	May 1, 2025 at 00:20:15	View log	2 created

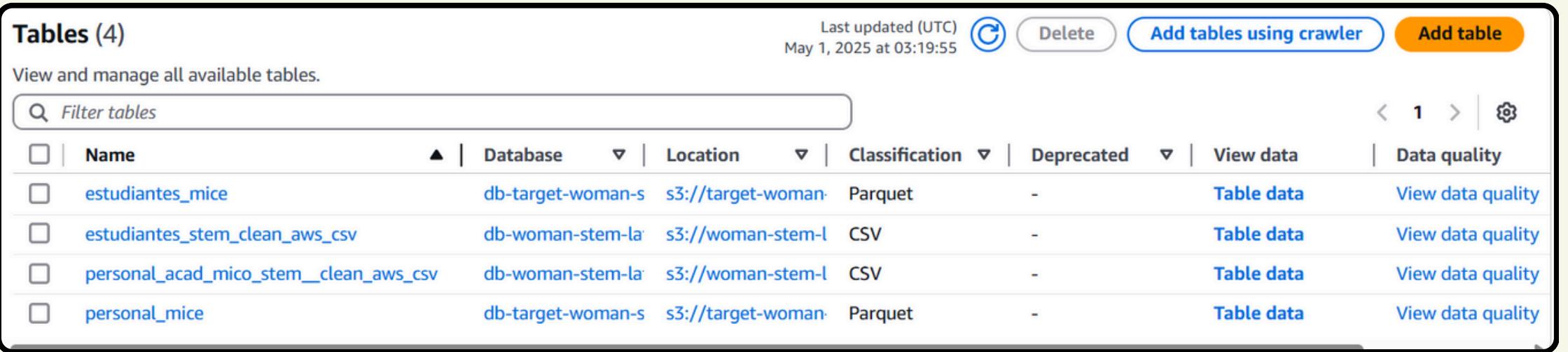
Last updated (UTC)
May 1, 2025 at 03:19:28

Action Run Create crawler



Schema (12)
View and manage the table schema.

#	Column name	Data type
1	pais	string
2	genero	string
3	2013	double
4	2014	double
5	2015	double
6	2016	double
7	2017	double
8	2018	double
9	2019	double
10	2020	double
11	2021	double
12	2022	double



Tables (4)
View and manage all available tables.

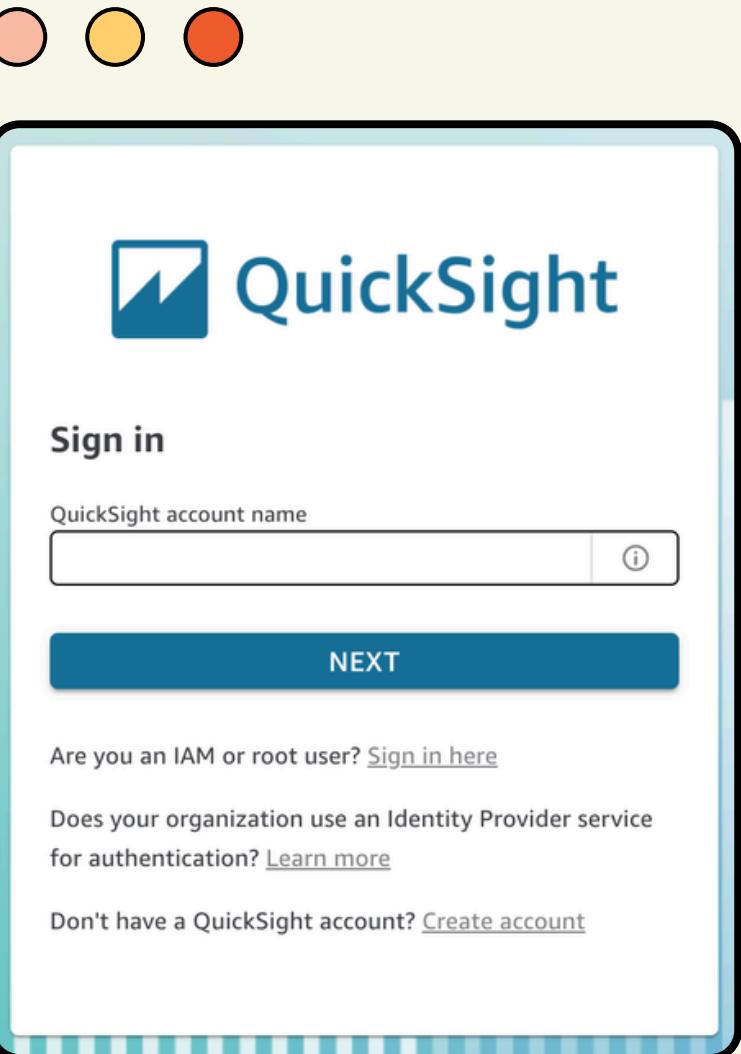
Name	Database	Location	Classification	Deprecated	View data	Data quality
estudiantes_mice	db-target-woman-s	s3://target-woman-	Parquet	-	Table data	View data quality
estudiantes_stem_clean_aws_csv	db-woman-stem-la	s3://woman-stem-l	CSV	-	Table data	View data quality
personal_acad_mico_stem_clean_aws_csv	db-woman-stem-la	s3://woman-stem-l	CSV	-	Table data	View data quality
personal_mice	db-target-woman-s	s3://target-woman-	Parquet	-	Table data	View data quality

Last updated (UTC)
May 1, 2025 at 03:19:55

Delete Add tables using crawler Add table

Creamos un nuevo crawler para verificar el esquema de nuestras tablas

Carga

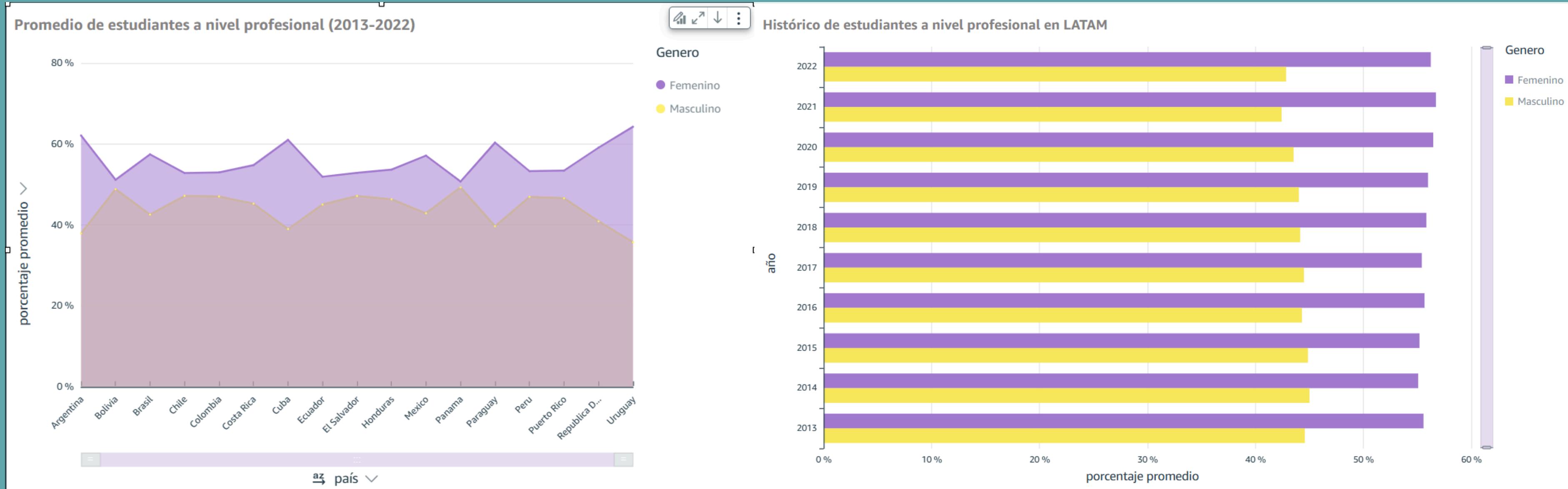


```
qs-manifest.json > ...
1
2  {
3    "fileLocations": [
4      {
5        "URIprefixes": [
6          "s3://target-woman-stem-latam/estudiantes_mice/"
7        ]
8      },
9      {
10        "URIprefixes": [
11          "s3://target-woman-stem-latam/personal_mice/"
12        ]
13      }
14    ],
15    "globalUploadSettings": {
16      "format": "CSV"
17    }
18 }
```



Ingresamos y creamos una cuenta en QuickSight y un script manifiesto en json para cargar nuestros datasets

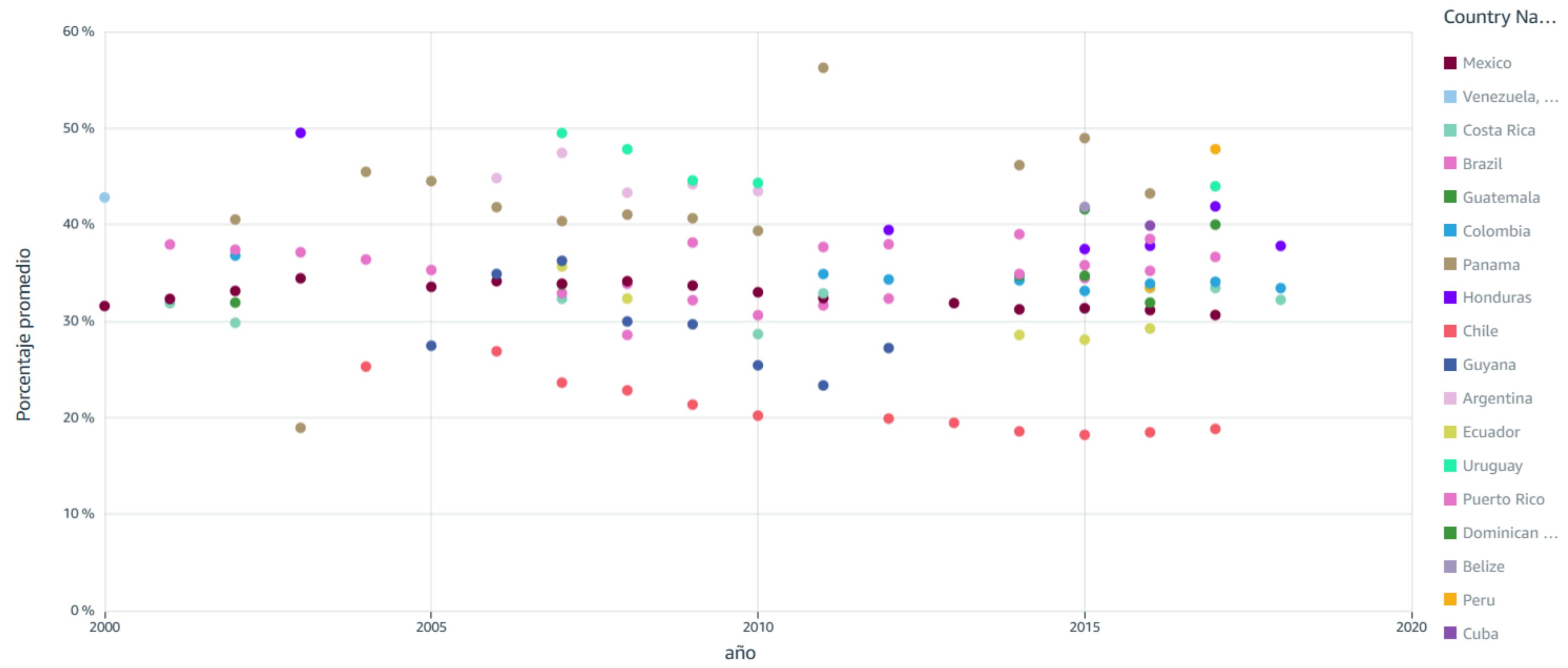
Análisis y visualización



Análisis y visualización

Mujeres egresadas de carreras profesionales STEM

MOSTRANDO HASTA 2500 PUNTOS DE DATOS

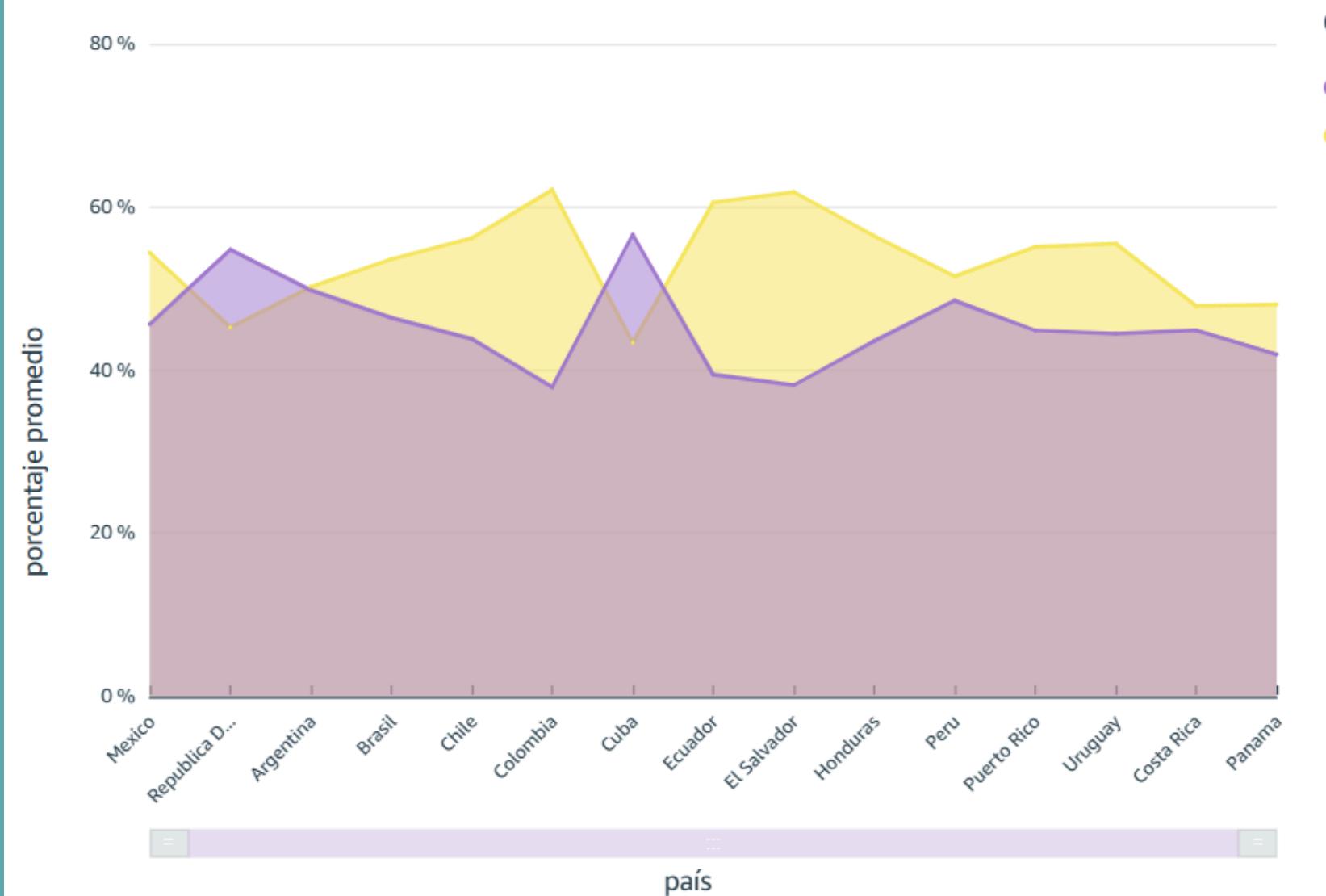


Análisis y visualización

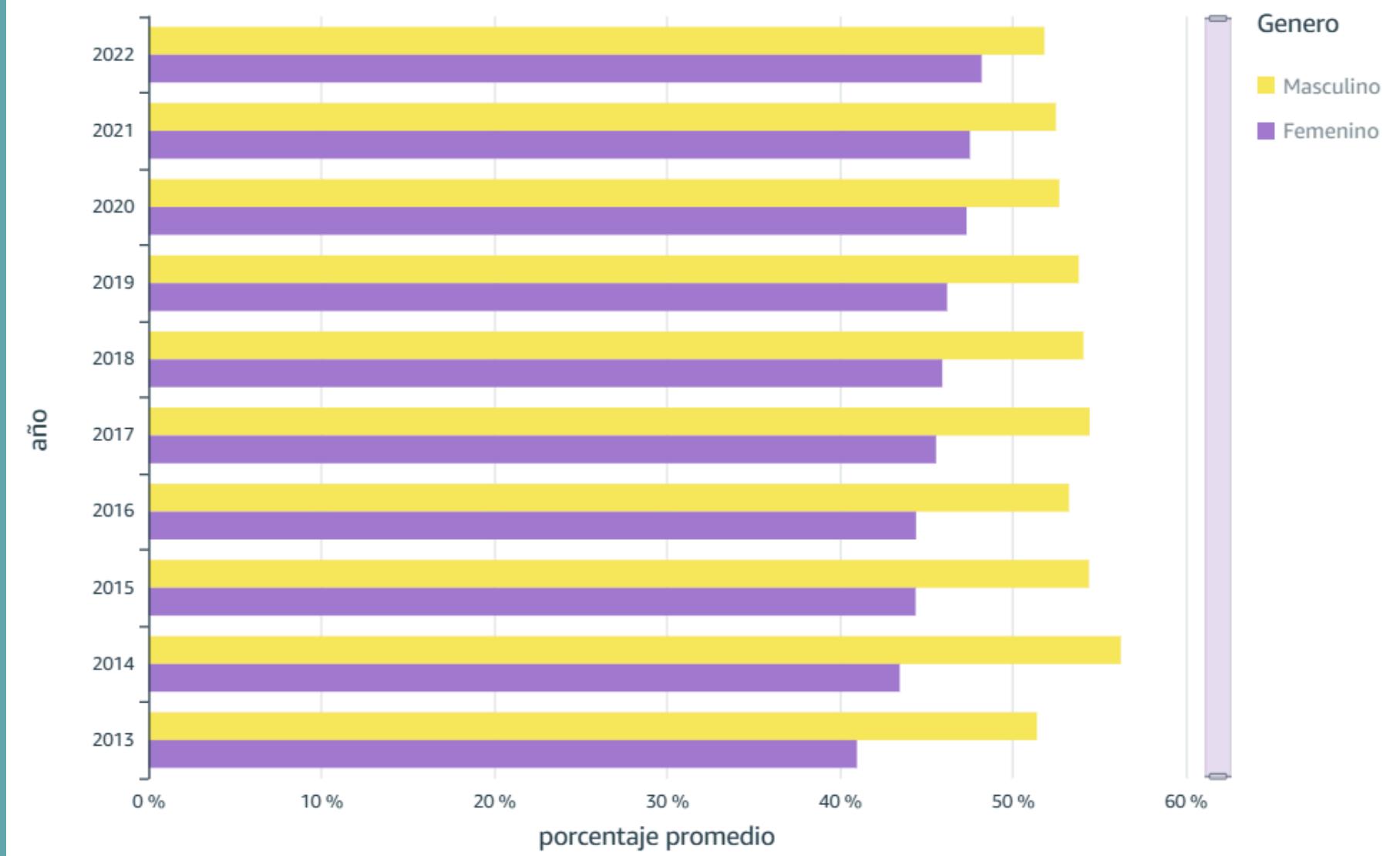


Análisis y visualización

Promedio de personal académico STEM (2013-2022)



Histórico de personal académico STEM en LATAM



Análisis y visualización



A pesar de que las mujeres profesionales han aumentado de manera constante, la proporción de egresadas en carreras STEM se ha mantenido por debajo del 40 % durante casi veinte años.

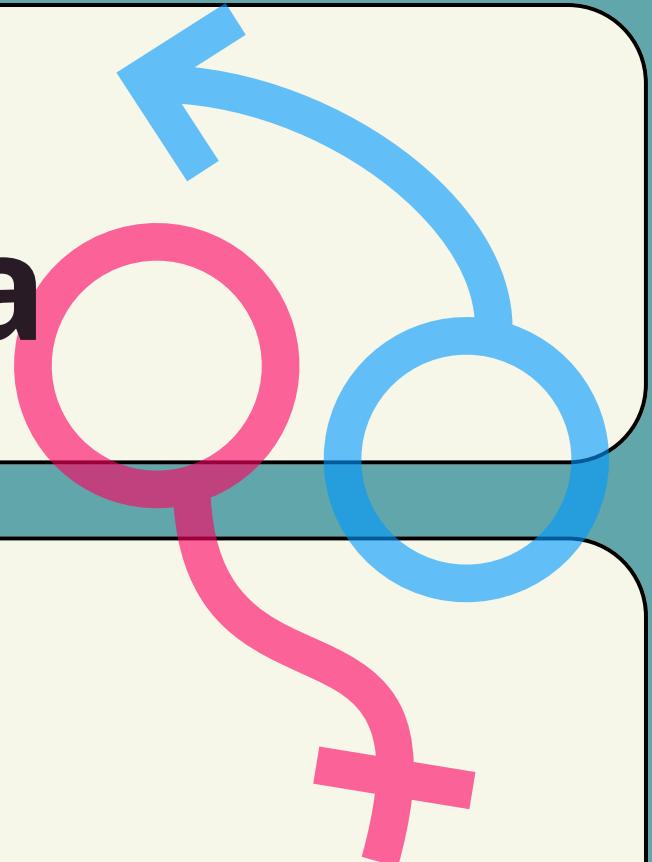
- Solo países como Argentina, Panamá y Uruguay han logrado superar puntualmente esa barrera de manera constante: de hecho, Panamá alcanzó un récord del 56 % en 2011.
- En contraste, Chile presenta el mayor rezago, con tasas de graduación inferiores al 30 % y, en algunos años, incluso por debajo del 20 %.
- Mientras que México, durante casi 20 años ha permanecido entre 31 y 34% de mujeres egresadas en carreras STEM

Estos factores son determinantes para que la participación de las mujeres que asumen la docencia, la investigación y el desarrollo tecnológico estén por debajo de del 50%





Contextualización del problema



“Más allá de la educación, la evidencia da cuenta de brechas de género aún más amplias al analizar el mercado laboral. Los datos sobre empleo en el sector STEM en ALC son limitados, pero por ejemplo para el caso del sector de Tecnologías de la Información y las Comunicaciones (TIC) se constata que sólo 3 de cada 10 empleados son mujeres, con variaciones significativas entre países.” (UNDP, 2024)

A los 6 años, las niñas ya asocian la inteligencia con los varones. Entre los 11 y 15 años, muchas pierden el interés en STEM por falta de modelos a seguir y estereotipos de género por lo que tan sólo el 0.5% de las adolescentes expresan interés en carreras tecnológicas y científicas(Bian et alt, 2017 y UNIFEC, 2020)



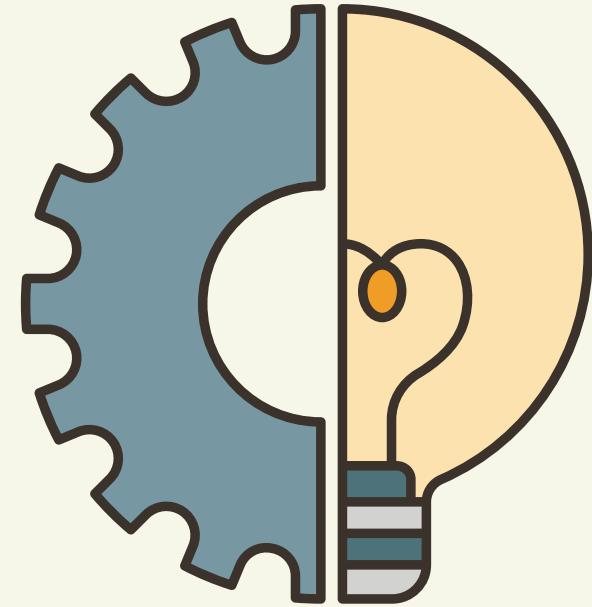
Lo conozco, decidio y lo transformo

Sector educativo

- Estimular el interés desde la niñez: talleres y clubes STEM desde primaria.
- Currículos inclusivos: incorporar ejemplos y referentes femeninos en áreas STEM.
- Mentoría y becas: programas que acompañen a niñas y jóvenes durante toda la formación, así como espacios en tecnología donde prioricen la participación femenina.

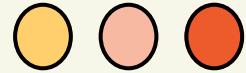
Mundo laboral

- Igualdad salarial y transparencia
- Cultura inclusiva, políticas de cero acoso y discriminación, y talleres de sensibilización contra estereotipos
- Horarios adaptables, permisos parentales equitativos y teletrabajo.
- Redes y espacios de apoyo y comités de ética en pro de la diversidad

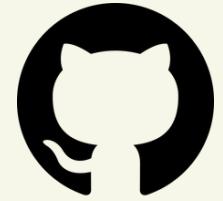


Nivel social

- Autoconciencia y formación
- Si eres líder, ofrece mentoría a mujeres jóvenes
- Allyship activo: si eres testigo, no normalices exclusión a mujeres ni chistes sexistas.
- Networking inclusivo y diverso
- Comparte recursos, conocimientos, oportunidades de manera equitativa
- Busca referentes de mujeres en STEM y reconócelas



Repositorio en GitHub



[/zai-zu/etl aws women stem.git](https://github.com/zai-zu/etl aws women stem.git)



[/in/zaira-chavarin-miranda/](https://www.linkedin.com/in/zaira-chavarin-miranda/)

[comunidad-de-embajadoras-cloud](#)

¡Gracias!



 **AWS Workshops**



 **AWS Training**



 **AWS re/Start**



 **AWS Educate**



 **AWS Skill Builder**