ALTA DATABRICKS

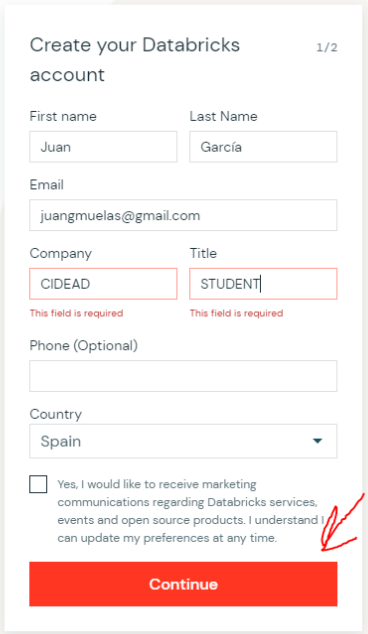
databricks

Try Databricks free

Test-drive the full Databricks platform free for 14 days on your choice of AWS, Microsoft Azure or Google Cloud.

- Simplify data ingestion and automate ETL
  Ingest data from hundreds of sources. Use a simple declarative approach to build data pipelines.
- Collaborate in your preferred language
  Code in Python, R, Scala and SQL with coauthoring, automatic versioning, Git integrations and RBAC.
- 12x better price/performance than cloud data warehouses
  See why over 7,000 customers worldwide rely on Databricks for all their workloads from BI to AI.

Nielsen Grab hyperloop edmunds



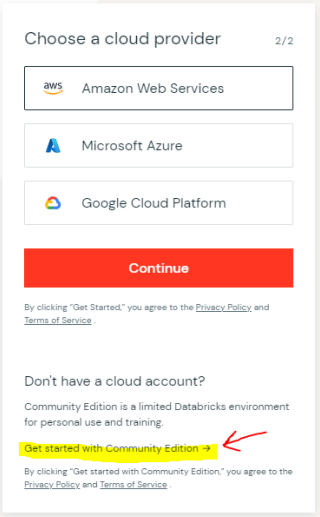
databricks

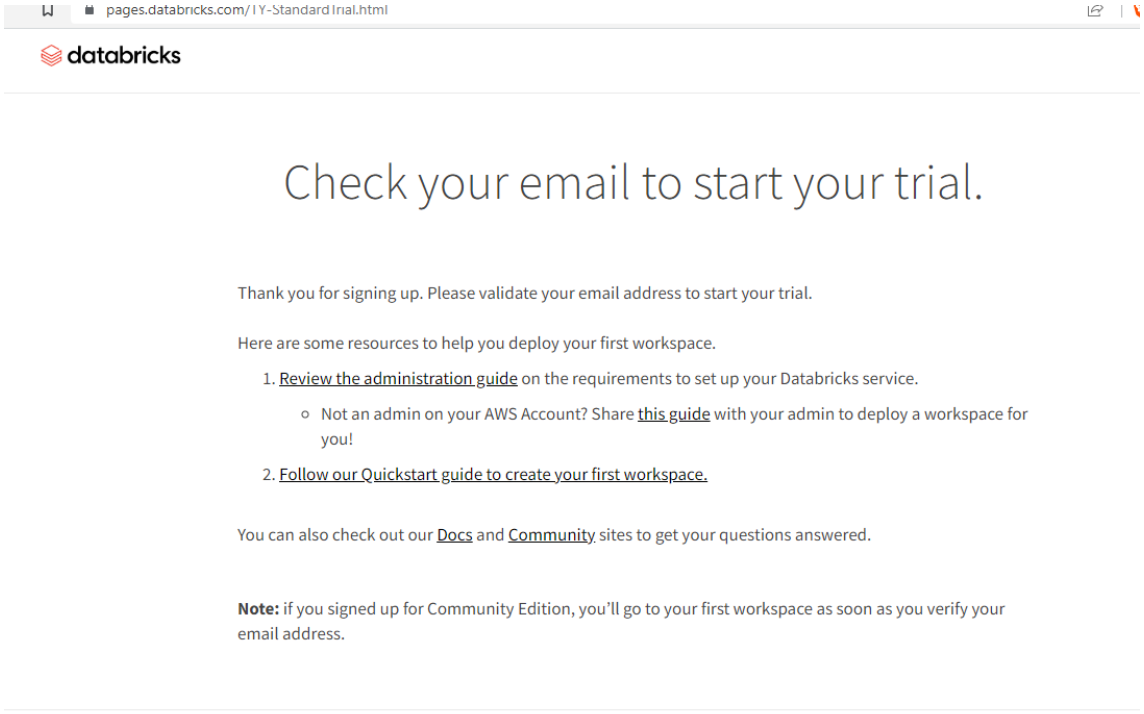
Try Databricks free

Test-drive the full Databricks platform free for 14 days on your choice of AWS, Microsoft Azure or Google Cloud.

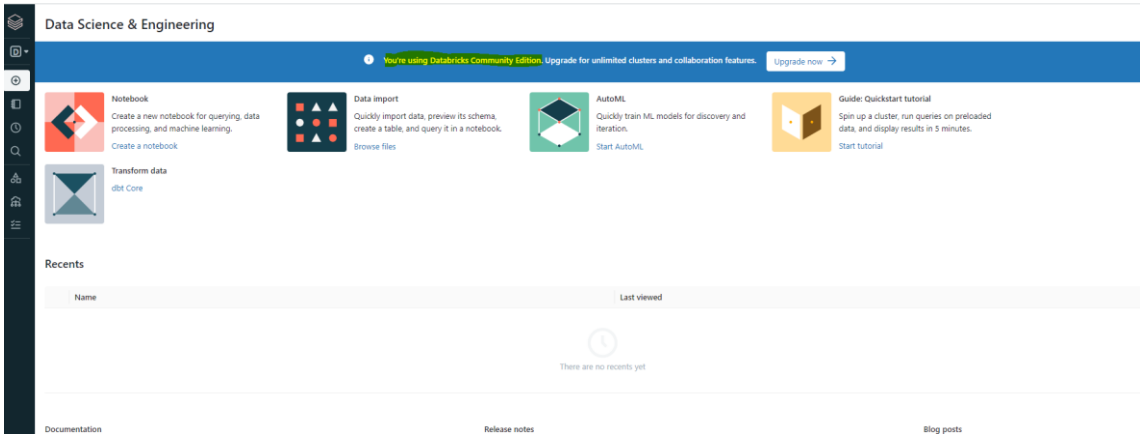
- Simplify data ingestion and automate ETL
  Ingest data from hundreds of sources. Use a simple declarative approach to build data pipelines.
- Collaborate in your preferred language
  Code in Python, R, Scala and SQL with coauthoring, automatic versioning, Git integrations and RBAC.
- 12x better price/performance than cloud data warehouses
  See why over 7,000 customers worldwide rely on Databricks for all their workloads from BI to AI.

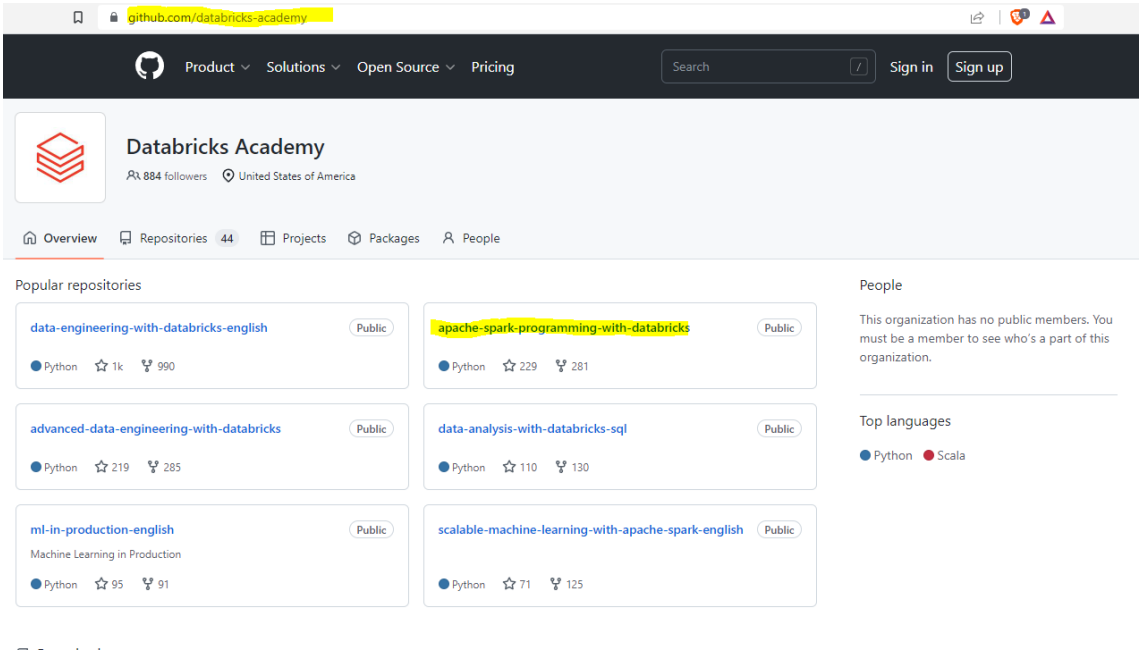
Nielsen Grab hyperloop edmunds

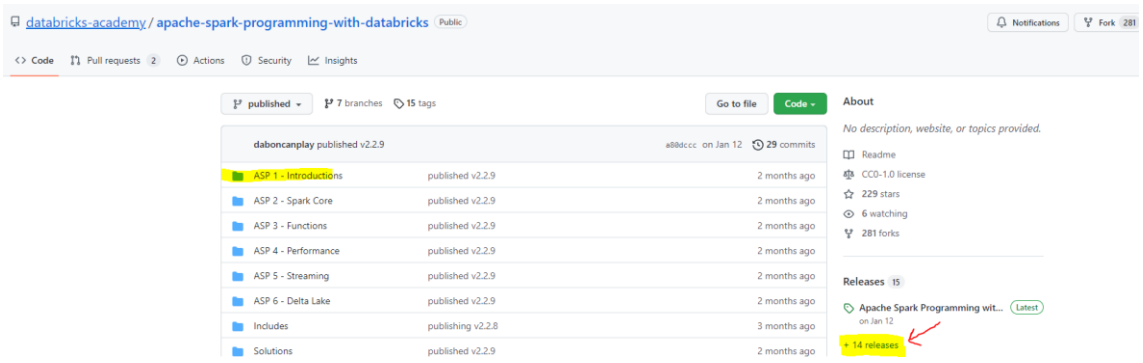




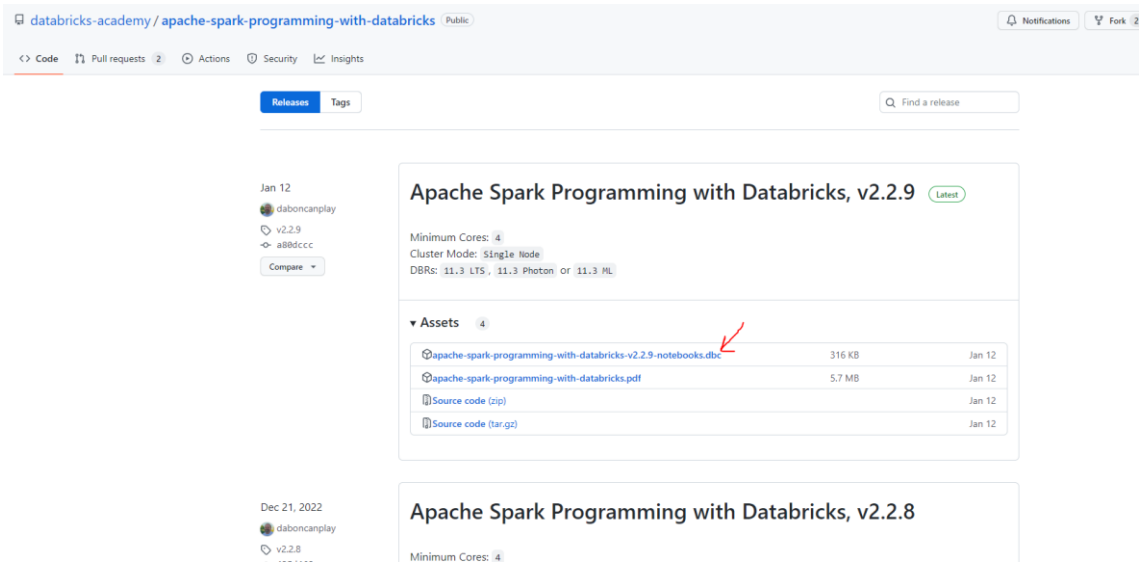
Tras recibir el correo, verificamos con una contraseña y nos pasa directamente a la versión Community.



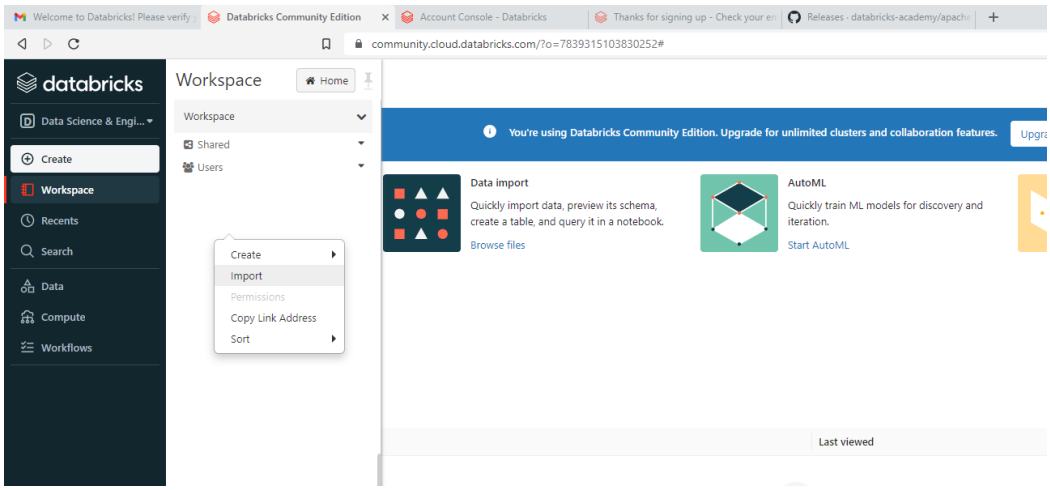




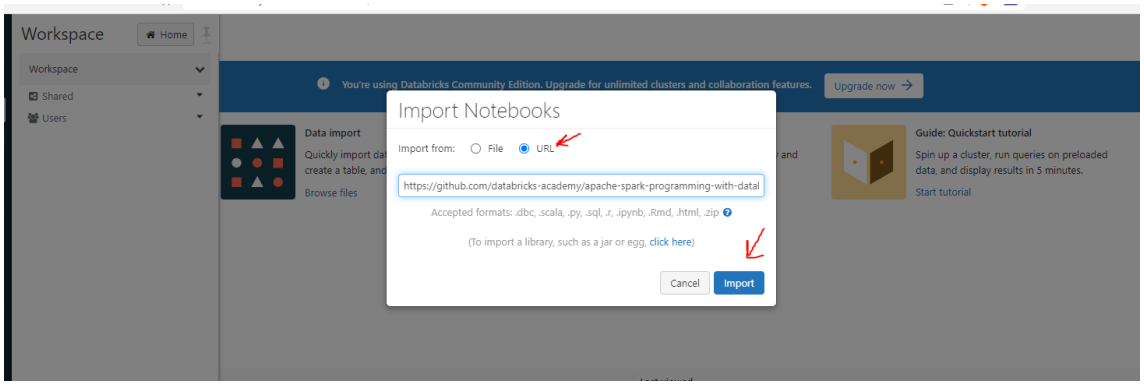
Copiamos el enlace si no lo queremos descargar



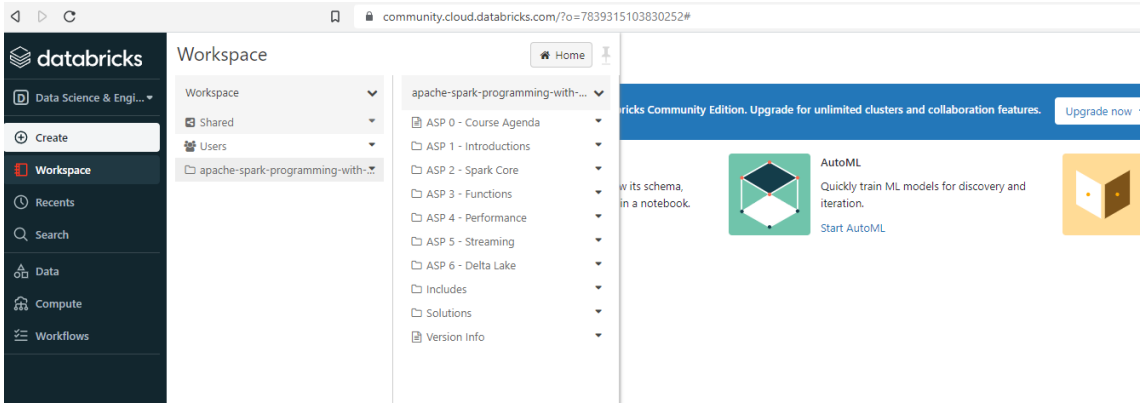
https://github.com/databricks-academy/apache-spark-programming-with-databricks/releases/download/v2.2.9/apache-spark-programming-with-databricks-v2.2.9-notebooks.dbc



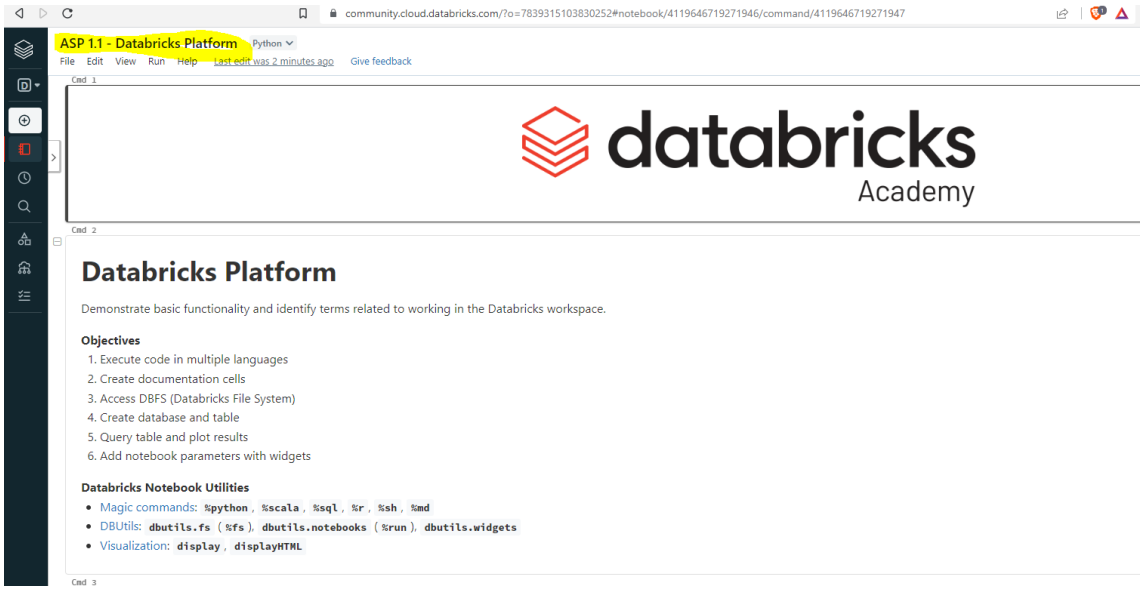
En Workspace, botón derecho: importar. Y pegamos nuestro enlace.



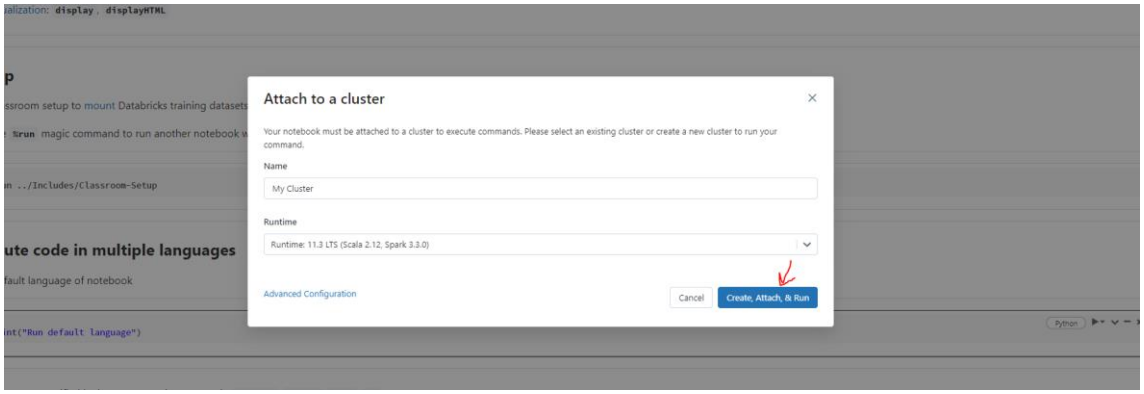
Tras unos momentos, podemos verlo:



Podemos ya abrir el primero de los archivos sobre el que trabajar.

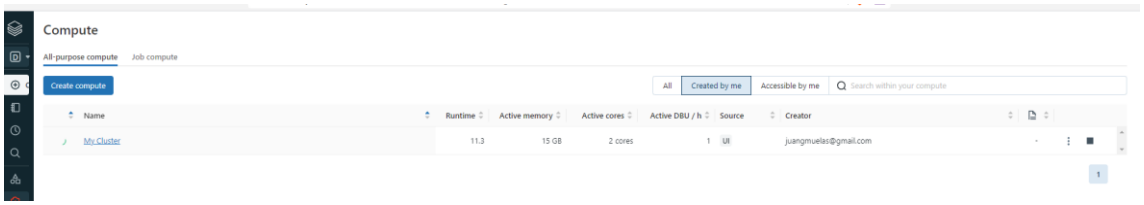


Necesitamos trabajar con un cluster, que se puede crear desde la pestaña “compute”, o el mismo databricks intentará crear uno si se intenta ejecutar una celda (Ctrl+intro). Sino hay ninguno nos “acompañará” en la creación.



En la versión community, los cluster dejan de funcionar a los 20 minutos de inacción, y no es posible volver a arrancarlos. Hay que crear otro nuevo y no hay más problema.

Vemos como carga



Para poder usar sql necesitamos que lo reconozca desde Python

Cmd 33

```
files = dbutils.fs.ls(DA.paths.events)
display(files)
```

(3) Spark Jobs

Table +

	path	name	size	modificationTime
1	dbfs:/mnt/dbacademy-datasets/apache-spark-programming-with-databricks/v03/ecommerce/events/events.delta/_delta_log/	_delta_log/	0	0
2	dbfs:/mnt/dbacademy-datasets/apache-spark-programming-with-databricks/v03/ecommerce/events/events.delta/part-00000-eb68ecaf-f8e1-4820-9513-24e158ed1e22-c000.snappy.parquet	part-00000-eb68ecaf-f8e1-4820-9513-24e158ed1e22-c000.snappy.parquet	75373205	1677761150000
3	dbfs:/mnt/dbacademy-datasets/apache-spark-programming-with-databricks/v03/ecommerce/events/events.delta/part-00001-e9be20a6-591a-4c06-9284-36d33f8bb378-c000.snappy.parquet	part-00001-e9be20a6-591a-4c06-9284-36d33f8bb378-c000.snappy.parquet	75384788	1677761155000
4	dbfs:/mnt/dbacademy-datasets/apache-spark-programming-with-databricks/v03/ecommerce/events/events.delta/part-00002-5793eed4-8dea-4287-abe1-a8ed30032f86-c000.snappy.parquet	part-00002-5793eed4-8dea-4287-abe1-a8ed30032f86-c000.snappy.parquet	75393846	1677761159000
5	dbfs:/mnt/dbacademy-datasets/apache-spark-programming-with-databricks/v03/ecommerce/events/events.delta/part-00003-3c9024f7-5419-45b5-873d-4756e510a797-c000.snappy.parquet	part-00003-3c9024f7-5419-45b5-873d-4756e510a797-c000.snappy.parquet	75295715	1677761164000

5 rows | 3.51 seconds runtime

Command took 3.51 seconds -- by juangmuelas@gmail.com at 2/3/2023, 13:55:05 on My Cluster

Cmd 34

But, Wait!

I cannot use variables in SQL commands.

With the following trick you can!

Declare the python variable as a variable in the spark context which SQL commands can access:

Cmd 35

```
spark.conf.set("whatever.events", DA.paths.events)
```

Command took 0.08 seconds -- by juangmuelas@gmail.com at 2/3/2023, 13:55:47 on My Cluster

Cmd 36

Podemos usar la creación de widget para filtrar en nuestras búsquedas

File Edit View Run Help Last edit was 31 minutes ago Give feedback

state

CA ← 2

Run the query below and then plot results by selecting the bar chart icon.

Cmd 47

```
%sql
SELECT traffic_source, SUM(ecommerce.purchase_revenue_in_usd) AS total_revenue
FROM events
GROUP BY traffic_source
```

Cmd 48

Add notebook parameters with widgets

Use widgets to add input parameters to your notebook.

Create a text input widget using SQL.

Cmd 49

```
%sql
CREATE WIDGET TEXT state DEFAULT "CA"
```

1

OK

Command took 0.18 seconds -- by juangmuelas@gmail.com at 2/3/2023, 13:59:42 on My Cluster

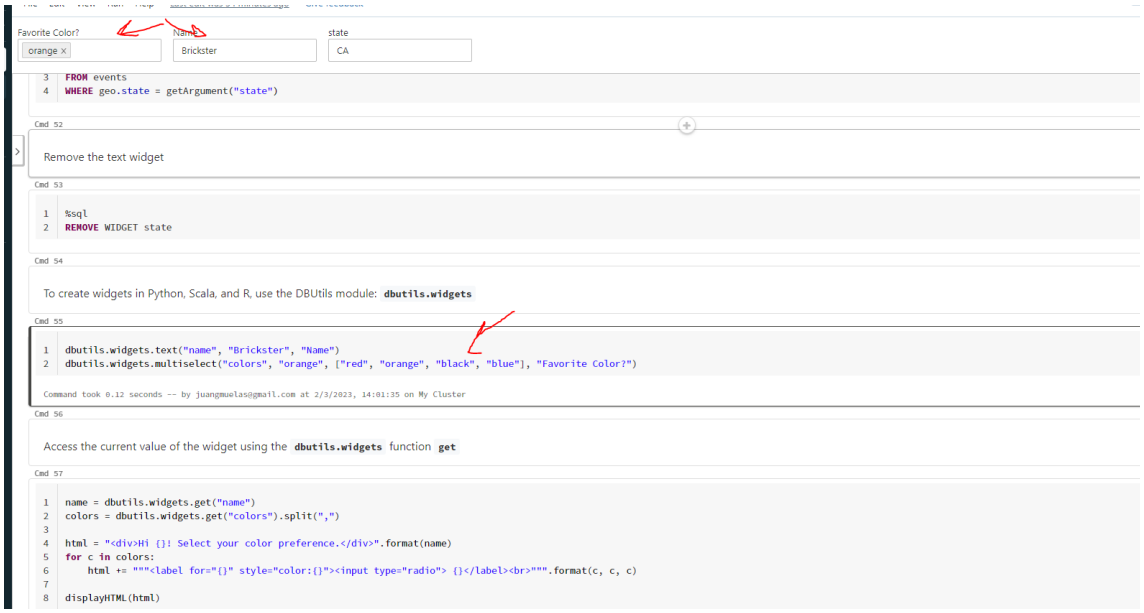
Cmd 50

Access the current value of the widget using the function `getArgument`

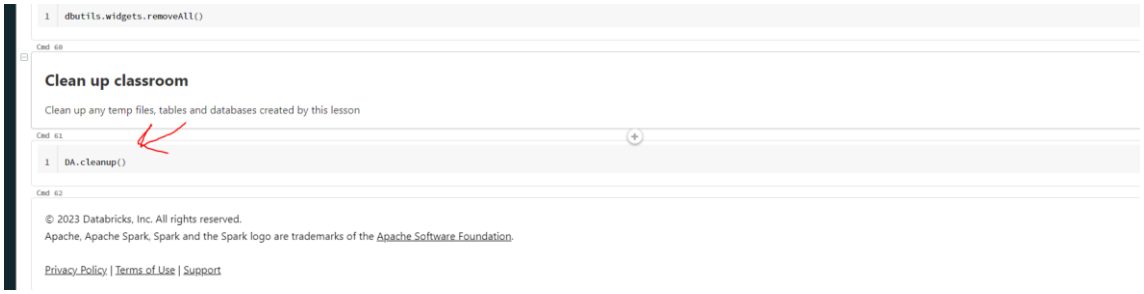
Cmd 51

```
%sql
SELECT *
FROM events
WHERE geo.state = getArgument("state")
```

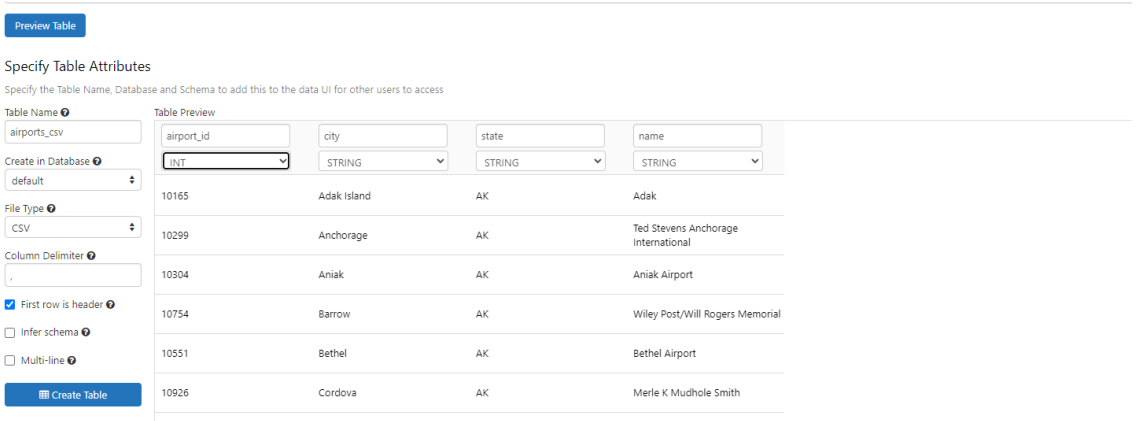
Cmd 52

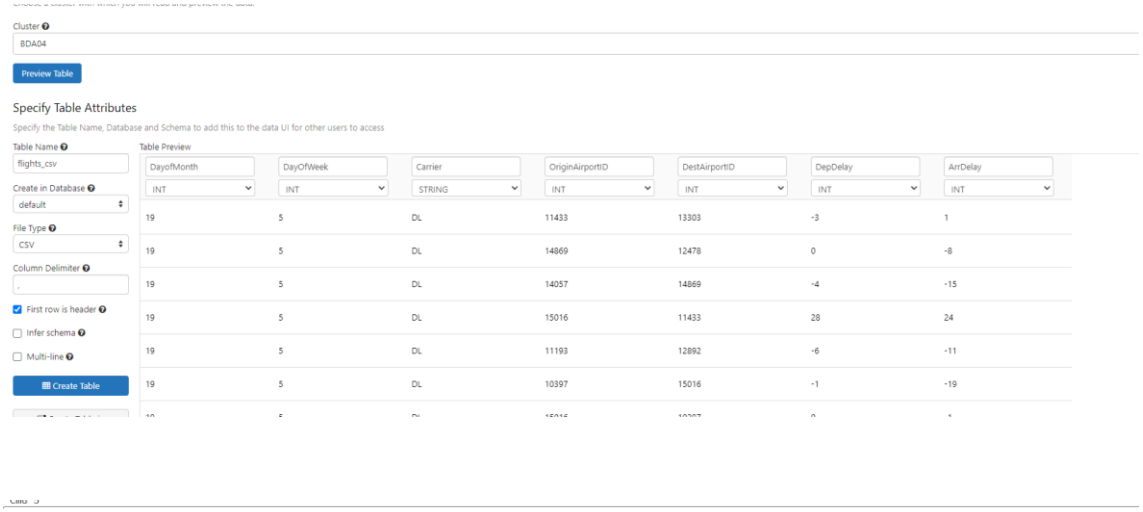


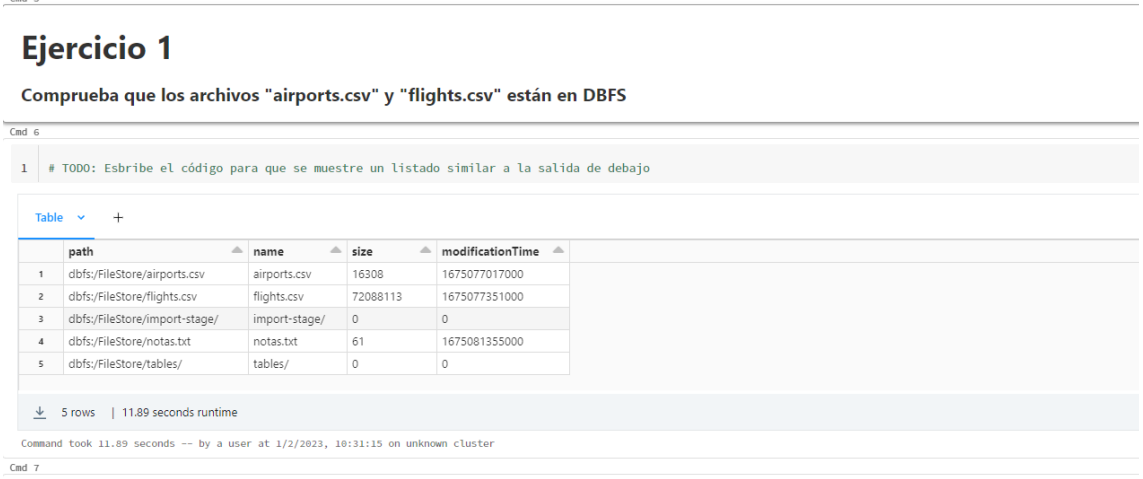
Accedemos a los datos mediante get().



Todos acaban con cleanup() para borrar todo lo creado con el libro.







mv("/mnt/my-folder/a", "s3n://bucket/b")

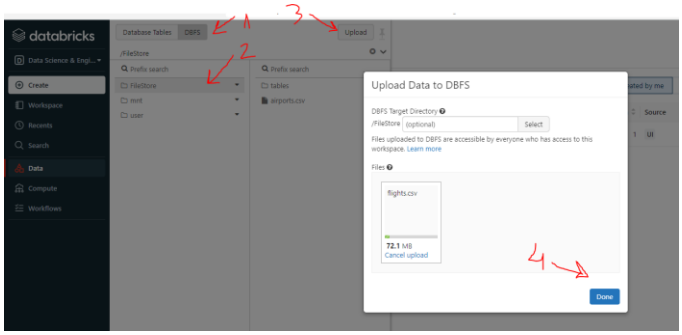
mv("/FileStore/tables/airports_csv", " FileStore/tables/airports_csv ")

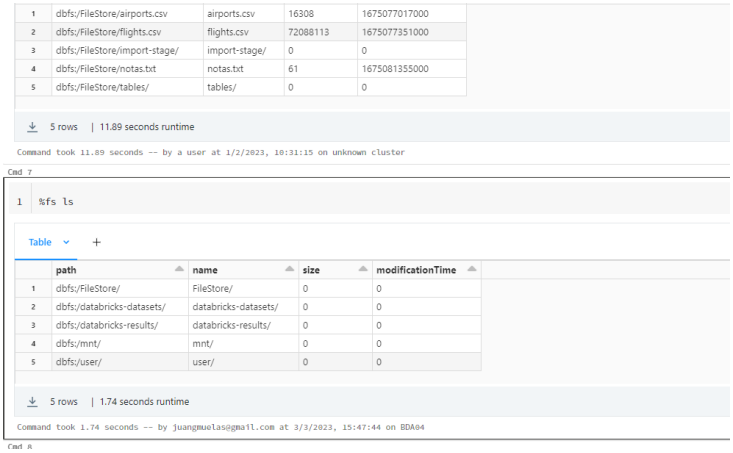
https://www.youtube.com/watch?v=IOHuO-sbykk

databricks fs mv dbfs:/tmp/my-file.txt dbfs:/parent/child/grandchild/my-file.txt

HABILITAR DBFS EN SETTINGS! (hacer un refresh para que se hagan los cambios)

Luego ya Podemos subir los archivos.





1	dbfs:/FileStore/airports.csv	airports.csv	16308	1675077017000
2	dbfs:/FileStore/flights.csv	flights.csv	72088113	1675077351000
3	dbfs:/FileStore/import-stage/	import-stage/	0	0
4	dbfs:/FileStore/notas.txt	notas.txt	61	1675081355000
5	dbfs:/FileStore/tables/	tables/	0	0

5 rows | 11.89 seconds runtime

Command took 11.89 seconds -- by a user at 1/2/2023, 10:31:15 on unknown cluster

Cmd 7

```
1  %fs ls
```

Table +

	path	name	size	modificationTime
1	dbfs:/FileStore/	FileStore/	0	0
2	dbfs:/databricks-datasets/	databricks-datasets/	0	0
3	dbfs:/databricks-results/	databricks-results/	0	0
4	dbfs:/mnt/	mnt/	0	0
5	dbfs:/user/	user/	0	0

5 rows | 1.74 seconds runtime

Command took 1.74 seconds -- by juangmuelas@gmail.com at 3/3/2023, 15:47:44 on BDA04

Cmd 8

`%fs ls FileStore`

O también mediante:

```
files = dbutils.fs.ls("dbfs:/FileStore")
display (files)
```

Si hace falta borrar algún fichero subido de más:

```
dbutils.fs.rm("dbfs:/FileStore/flights-1.csv")
```

Pruebo si funcionan las tablas subidas:

```
%sql
select * from airports order by airport_id desc limit 5
```

```
display(spark
        .table("flights")
        .select("*")
        .orderBy("carrier", ascending=False)
        .limit (5)
        )
```

Crea los dataframes airports_df y flights_df a partir de los ficheros anteriores y muestra las primeras filas y su esquema y comprueba que es el esquema es correcto.

```
# Escribe el código para crear airports_df y flights_df
airports_df = spark.table("airports")
flights_df = spark.table("flights")
```

```
# Escribe el código para que muestre las primeras filas(airports_df)
display(airports_df)
```

```
# Para mostrar el esquema de airports_df
airports_df.printSchema()
```

```
# Escribe el código para que muestre las primeras filas(flights_df)
display(flights_df)
```

```
# Para mostrar el esquema de flights_df
flights_df.printSchema()
```

Ejercicio 2

Usando los dataframes anteriores muestra las cinco compañías que más vuelos retrasados tienen (las celdas tiene que ser de tipo Python).

- El campo Carrier contiene la compañía aérea.
- Vamos a considerar que un vuelo llega con retraso cuando el vuelo llega más de 15 minutos tarde (campo ArrDelay > 15).
- El nombre del campo que contine la cuenta de vuelos retrasados se llamará delayed_flights.

```
display(spark.sql("SELECT carrier, COUNT(*) as delayed_flights FROM
flights_temp WHERE arrdelay > 15 GROUP BY carrier ORDER BY delayed_flights
DESC LIMIT 5"))
```

MEDIANTE PYSPARCK

```
display(flights_df
        .where("arrdelay >15") #filter
        .groupBy("carrier")
        .count()
        .withColumnRenamed("count", "delayed_flights")
        .orderBy("delayed_flights", ascending= False)
        .limit(5)
       )
```

Ejercicio 3

Almacena los dataframes airports_df y flights_df en sendas tablas temporales y realiza el ejercicio anterior usando una celda de tipo SQL.

```
# Almacena airports_df en la tabla airports y flights_df en la tabla flights
airports_df.createOrReplaceTempView("airports")
flights_df.createOrReplaceTempView("flights")
```

```
%sql
SELECT carrier, COUNT(*) as delayed_flights FROM flights WHERE arrdelay > 15
GROUP BY carrier
ORDER BY delayed_flights DESC LIMIT 5
```

Ejercicio 4

Usando los dataframes airports_df y flights_df muestra los 5 AEROPUERTOS DE DESTINO que mejor recuperación de tiempo en vuelo tienen (las celdas tienen que ser de tipo Python).

- Se considera que se ha recuperado el tiempo de un vuelo cuando habiendo salido con retraso (DepDelay > 15), llega sin retraso (ArrDelay <= 15).
- Se trata de que muestres los nombres de los 5 aeropuertos de llegada que han recuperado el tiempo en un mayor porcentaje de vuelos que salieron retrasados.

```
display(spark.sql(
  """ SELECT airports.name as Airport, COUNT(CASE WHEN arrdelay <= 15 THEN 1
END) / COUNT(*) as percent_recovered
FROM airports,flights WHERE flights.depdelay > 15 AND airports.airport_id =
flights.DestAirportID GROUP BY airports.name ORDER BY percent_recovered DESC
LIMIT 5 """
)
)
```

```
from pyspark.sql.functions import count, when, col
#SELECT airports.name as Airport, COUNT(CASE WHEN arrdelay <= 15 THEN 1 END)
/ COUNT(*) as percent_recovered
#FROM airports,flights WHERE flights.depdelay > 15 AND airports.airport_id =
flights.DestAirportID GROUP BY airports.name ORDER BY percent_recovered DESC
LIMIT 5

subquery = (flights_df
            .join(airports_df.select("airport_id", "name"),
col("DestAirportID") == col("airport_id"))
            .filter(col("depdelay") > 15)
            .groupBy("name")
            .agg(count(when(col("arrdelay") <= 15, 1)).alias("recovered"),
count("*").alias("total"))
            .select("name", (col("recovered") /
col("total")).alias("percent_recovered"))
           )
display(subquery.orderBy("percent_recovered", ascending=False).limit(5))
```

O Tambien:

```
display(flights_df
        .join(airports_df.select("airport_id", "name"), col("DestAirportID")
== col("airport_id"))
        .filter(col("depdelay") > 15)
        .groupBy("name")
        .agg(count(when(col("arrdelay") <= 15, 1)).alias("recovered"),
count("*").alias("total"))
        .select("name", (col("recovered") /
col("total")).alias("percent_recovered"))
        .orderBy("percent_recovered", ascending=False)
        .limit(5)
       )
```

Ejercicio 5

Sube el fichero notas.txt a DBFS y calcula la nota media de cada alumno usando Spark (celdas en Python).

Nota: El fichero notas.txt no tiene estructura de tabla y no vas a poderlo procesar como un Dataframe. Lo recomendable es usar transformaciones y acciones con RDD. En la guía de programación de RDD puedes aprender los conceptos básicos.

Nota2: La implementación debe tener en cuenta que el fichero notas.txt es un simple ejemplo de un fichero más grande que contendría millones de filas. Sin embargo el número de alumnos será de unos cientos.

```
# Comprobamos que notas.txt está en DBFS
files = dbutils.fs.ls("dbfs:/FileStore")
display (files)

# Mostramos el contenido
lines = sc.textFile("dbfs:/FileStore/notas.txt")
f = lines.collect()
for x in f:
  print (x)
```

```
# Leemos el archivo
texts = sc.textFile("dbfs:/FileStore/notas.txt")

# Separamos lineas
lines = texts.map(lambda s: s.split())
# muestra este formato: ['pedro', '6', '7']
# Separamos datos en tupla
students= lines.map(lambda x: (x[0], list(map(int, x[1:]))))
#for element in students.collect():
#  print(element)
#print(students)
# muestra este formato: ('pedro', [6, 7])

# Convertimos los pares en una lista con el nombre y la nota
list_pairs = students.flatMapValues(lambda x: [(x[i],) for i in
range(len(x))])
#for element in list_pairs.collect():
#  print(element)
#print(list_pairs)
# muestra este formato: ('pedro', (6,)('pedro', (7,))

# En el reduce recogemos los datos por nombre y valores
union_data = list_pairs.reduceByKey(lambda x, y: x + y)
#for element in union_data .collect():
#  print(element)
#print(union_data )
# muestra este formato:('pedro', (6, 7, 8, 1, 3))

# Sumamos los datos de las notas y los dividimos entre su longitud para la
media
sums = union_data.map(lambda x: (x[0], float(sum(x[1]))/len(x[1])))
media = sums.collect()
print(media)
```

https://www.youtube.com/watch?v=VonQnrSxQWA
https://github.com/databricks-academy/apache-spark-programming-with-databricks/releases
https://learn.microsoft.com/es-es/azure/databricks/getting-started/dataframes-python
https://spark.apache.org/docs/latest/api/python/reference/pyspark.sql/api/pyspark.sql.DataFrame.withColumnRenamed.html#pyspark.sql.DataFrame.withColumnRenamed
https://sparkbyexamples.com/spark/using-groupby-on-dataframe/
https://sparkbyexamples.com/pyspark/pyspark-flatmap-transformation/
https://databricks-prod-cloudfront.cloud.databricks.com/public/4027ec902e239c93eaaa8714f173bcfc/3137082781873852/3704545280501166/1264763342038607/latest.html
https://spark.apache.org/docs/latest/sql-ref-syntax-qry-select.html
https://docs.databricks.com/getting-started/dataframes-python.html
https://docs.databricks.com/dev-tools/databricks-utils.html#file-system-utility-dbutilsfs&language-python

https://spark.apache.org/docs/latest/rdd-programming-guide.html#resilient-distributed-datasets-rdds