Migrate to Cloud SQL for PostgreSQL using Database Migration Service

Project Overview

This project involves migrating a PostgreSQL database hosted on a self-managed environment (e.g., on-premises or VM) to **Cloud SQL for PostgreSQL** using **Google Cloud's Database Migration Service (DMS)**. The objective is to leverage managed services on Google Cloud for improved scalability, reliability, and maintenance.

Objectives

- Migrate PostgreSQL database with minimal downtime.
- Validate data consistency and schema integrity.
- Improve scalability and reduce administrative overhead.

Task 1. Prepare the source database for migration

In this task you will add supporting features to the source database which are required in order for **Database Migration Service** to perform a migration. These are:

- Installing and configuring the pglogical database extension.
- Configuring the stand-alone PostgreSQL database to allow access from Cloud Shell and Cloud SQL.
- Adding the pglogicaldatabase extension to the postgres, orders and gmemegen_db databases on the stand-alone server.
- Creating a migration_admin user (with Replication permissions) for database migration and granting the required permissions to schemata and relations to that user.

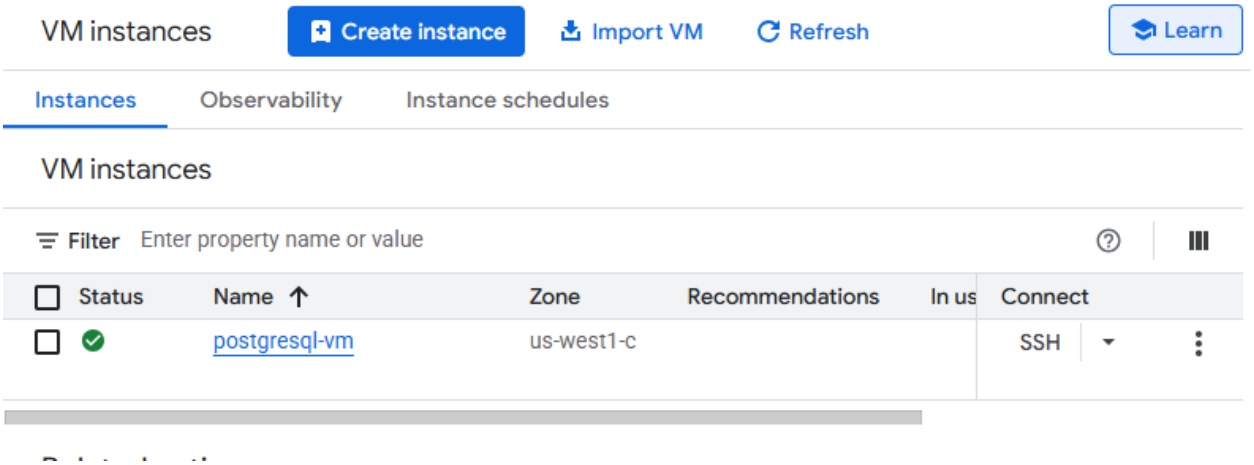
Upgrade the database with the pglogical extension

In this step you will download and add the pglogical database extension to the orders and postgres databases on the postgresql-vm VM Instance.

1. In the Google Cloud console, on the **Navigation menu** (☰), click **Compute Engine** > **VM instances**.
2. In the entry for postgresql-vm, under Connect click **SSH**.
3. If prompted, click **Authorize**.

4. In the terminal in the new browser window, install the pglogical database extension:

sudo apt install postgresql-13-pglogical




```
student-02-ded9db8b7e37@postgresql-vm:~$ sudo apt install postgresql-13-pglogical
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following NEW packages will be installed:
  postgresql-13-pglogical
0 upgraded, 1 newly installed, 0 to remove and 7 not upgraded.
Need to get 434 kB of archives.
After this operation, 1238 kB of additional disk space will be used.
Get:1 http://apt.postgresql.org/pub/repos/apt bullseye-pgdg/main amd64 postgresql-13-pglogical amd64 2.4.5-1.pgd
g110+1 [434 kB]
Fetched 434 kB in 0s (6140 kB/s)
Selecting previously unselected package postgresql-13-pglogical.
(Reading database ... 75799 files and directories currently installed.)
Preparing to unpack .../postgresql-13-pglogical_2.4.5-1.pgdg110+1_amd64.deb ...
Unpacking postgresql-13-pglogical (2.4.5-1.pgdg110+1) ...
Setting up postgresql-13-pglogical (2.4.5-1.pgdg110+1) ...
Processing triggers for postgresql-common (278.pgdg110+1) ...
Building PostgreSQL dictionaries from installed myspell/hunspell packages...
Removing obsolete dictionary files:
student-02-ded9db8b7e37@postgresql-vm:~$
```

5. Download and apply some additions to the PostgreSQL configuration files (to enable pglogical extension) and restart the postgresql service:

```
student-02-ded9db8b7e37@postgresql-vm:~$ sudo su - postgres -c "gsutil cp gs://cloud-training/gsp918/pg_hba_appe
nd.conf ."
sudo su - postgres -c "gsutil cp gs://cloud-training/gsp918/postgresql_append.conf ."
sudo su - postgres -c "cat pg_hba_append.conf >> /etc/postgresql/13/main/pg_hba.conf"
sudo su - postgres -c "cat postgresql_append.conf >> /etc/postgresql/13/main/postgresql.conf"

sudo systemctl restart postgresql@13-main
Copying gs://cloud-training/gsp918/pg_hba_append.conf...
/ [1 files][   68.0 B/   68.0 B]
Operation completed over 1 objects/68.0 B.
Copying gs://cloud-training/gsp918/postgresql_append.conf...
/ [1 files][  543.0 B/  543.0 B]
Operation completed over 1 objects/543.0 B.
student-02-ded9db8b7e37@postgresql-vm:~$
```

6. Launch the **psql** tool:

sudo su – postgres

Psql

```
student-02-ded9db8b7e37@postgresql-vm:~$ sudo su - postgres
postgres@postgresql-vm:~$ psql
psql (13.21 (Debian 13.21-1.pgdg110+1))
Type "help" for help.

postgres=# \c postgres;
You are now connected to database "postgres" as user "postgres".
postgres=# CREATE EXTENSION pglogical;
CREATE EXTENSION
postgres=# CREATE EXTENSION pglogical;
ERROR:  extension "pglogical" already exists
postgres=# \c orders;
You are now connected to database "orders" as user "postgres".
orders=# CREATE EXTENSION pglogical;
CREATE EXTENSION
orders=#
```

```
CREATE EXTENSION
gmemegen_db=# \l
                                  List of databases
    Name     |  Owner   | Encoding | Collate |  Ctype  |   Access privileges
-------------+----------+----------+---------+---------+-----------------------
 gmemegen_db | postgres | UTF8     | C.UTF-8 | C.UTF-8 |
 orders      | postgres | UTF8     | C.UTF-8 | C.UTF-8 |
 postgres    | postgres | UTF8     | C.UTF-8 | C.UTF-8 |
 template0   | postgres | UTF8     | C.UTF-8 | C.UTF-8 | =c/postgres          +
             |          |          |         |         | postgres=CTc/postgres
 template1   | postgres | UTF8     | C.UTF-8 | C.UTF-8 | =c/postgres          +
             |          |          |         |         | postgres=CTc/postgres
(5 rows)

gmemegen_db=#
```

7. Add the pglogical database extension to the postgres, orders and gmemegen_db databases.

\c postgres;

CREATE EXTENSION pglogical;

```
student-02-ded9db8b7e37@postgresql-vm:~$ sudo su - postgres
postgres@postgresql-vm:~$ psql
psql (13.21 (Debian 13.21-1.pgdg110+1))
Type "help" for help.

postgres=# \c postgres;
You are now connected to database "postgres" as user "postgres".
postgres=# CREATE EXTENSION pglogical;
CREATE EXTENSION
postgres=# CREATE EXTENSION pglogical;
ERROR:  extension "pglogical" already exists
postgres=# \c orders;
You are now connected to database "orders" as user "postgres".
orders=# CREATE EXTENSION pglogical;
CREATE EXTENSION
orders=#
```

8. List the PostgreSQL databases on the server:

```
CREATE EXTENSION
gmemegen_db=# \l
                                  List of databases
    Name     |  Owner   | Encoding | Collate |  Ctype  |   Access privileges
-------------+----------+----------+---------+---------+-----------------------
 gmemegen_db | postgres | UTF8     | C.UTF-8 | C.UTF-8 |
 orders      | postgres | UTF8     | C.UTF-8 | C.UTF-8 |
 postgres    | postgres | UTF8     | C.UTF-8 | C.UTF-8 |
 template0   | postgres | UTF8     | C.UTF-8 | C.UTF-8 | =c/postgres          +
             |          |          |         |         | postgres=CTc/postgres
 template1   | postgres | UTF8     | C.UTF-8 | C.UTF-8 | =c/postgres          +
             |          |          |         |         | postgres=CTc/postgres
(5 rows)

gmemegen_db=#
```

Create the database migration user

In this step you will create a dedicated user for managing database migration.

1. In **psql**, enter the commands below to create a new user with the replication role:

```
gmemegen_db=# CREATE USER migration_admin PASSWORD 'DMS_1s_cool!';
ALTER DATABASE orders OWNER TO migration_admin;
ALTER ROLE migration_admin WITH REPLICATION;
CREATE ROLE
ALTER DATABASE
ALTER ROLE
gmemegen_db=#
```

Assign permissions to the migration user

In this step you will assign the necessary permissions to the migration_admin user to enable **Database Migration Service** to migrate your database.

1. In **psql**, grant permissions to the pglogical schema and tables for the postgres database.

```
gmemegen_db=# \c postgres;
You are now connected to database "postgres" as user "postgres".
postgres=# GRANT USAGE ON SCHEMA pglogical TO migration_admin;
GRANT ALL ON SCHEMA pglogical TO migration_admin;

GRANT SELECT ON pglogical.tables TO migration_admin;
GRANT SELECT ON pglogical.depend TO migration_admin;
GRANT SELECT ON pglogical.local_node TO migration_admin;
GRANT SELECT ON pglogical.local_sync_status TO migration_admin;
GRANT SELECT ON pglogical.node TO migration_admin;
GRANT SELECT ON pglogical.node_interface TO migration_admin;
GRANT SELECT ON pglogical.queue TO migration_admin;
GRANT SELECT ON pglogical.replication_set TO migration_admin;
GRANT SELECT ON pglogical.replication_set_seq TO migration_admin;
GRANT SELECT ON pglogical.replication_set_table TO migration_admin;
GRANT SELECT ON pglogical.sequence_state TO migration_admin;
GRANT SELECT ON pglogical.subscription TO migration_admin;
GRANT
GRANT
GRANT
GRANT
GRANT
GRANT
GRANT
GRANT
GRANT
GRANT
GRANT
GRANT
GRANT
postgres=#
```

2. In **psql**, grant permissions to the pglogical schema and tables for the orders database.

```
postgres=# \c orders;
You are now connected to database "orders" as user "postgres".
orders=# GRANT USAGE ON SCHEMA pglogical TO migration_admin;
GRANT ALL ON SCHEMA pglogical TO migration_admin;

GRANT SELECT ON pglogical.tables TO migration_admin;
GRANT SELECT ON pglogical.depend TO migration_admin;
GRANT SELECT ON pglogical.local_node TO migration_admin;
GRANT SELECT ON pglogical.local_sync_status TO migration_admin;
GRANT SELECT ON pglogical.node TO migration_admin;
GRANT SELECT ON pglogical.node_interface TO migration_admin;
GRANT SELECT ON pglogical.queue TO migration_admin;
GRANT SELECT ON pglogical.replication_set TO migration_admin;
GRANT SELECT ON pglogical.replication_set_seq TO migration_admin;
GRANT SELECT ON pglogical.replication_set_table TO migration_admin;
GRANT SELECT ON pglogical.sequence_state TO migration_admin;
GRANT SELECT ON pglogical.subscription TO migration_admin;
GRANT
GRANT
GRANT
GRANT
GRANT
GRANT
GRANT
GRANT
GRANT
GRANT
GRANT
GRANT
GRANT
GRANT
orders=#
```

3. In **psql**, grant permissions to the public schema and tables for the orders database.

```
orders=# GRANT USAGE ON SCHEMA public TO migration_admin;
GRANT ALL ON SCHEMA public TO migration_admin;

GRANT SELECT ON public.distribution_centers TO migration_admin;
GRANT SELECT ON public.inventory_items TO migration_admin;
GRANT SELECT ON public.order_items TO migration_admin;
GRANT SELECT ON public.products TO migration_admin;
GRANT SELECT ON public.users TO migration_admin;
GRANT
GRANT
GRANT
GRANT
GRANT
GRANT
GRANT
orders=#
```

4. In **psql**, grant permissions to the pglogical schema and tables for the gmemegen_db database.

```
orders=# \c gmemegen_db;
You are now connected to database "gmemegen_db" as user "postgres".
gmemegen_db=# GRANT USAGE ON SCHEMA pglogical TO migration_admin;
GRANT ALL ON SCHEMA pglogical TO migration_admin;

GRANT SELECT ON pglogical.tables TO migration_admin;
GRANT SELECT ON pglogical.depend TO migration_admin;
GRANT SELECT ON pglogical.local_node TO migration_admin;
GRANT SELECT ON pglogical.local_sync_status TO migration_admin;
GRANT SELECT ON pglogical.node TO migration_admin;
GRANT SELECT ON pglogical.node_interface TO migration_admin;
GRANT SELECT ON pglogical.queue TO migration_admin;
GRANT SELECT ON pglogical.replication_set TO migration_admin;
GRANT SELECT ON pglogical.replication_set_seq TO migration_admin;
GRANT SELECT ON pglogical.replication_set_table TO migration_admin;
GRANT SELECT ON pglogical.sequence_state TO migration_admin;
GRANT SELECT ON pglogical.subscription TO migration_admin;

GRANT
GRANT
GRANT
GRANT
GRANT
GRANT
GRANT
GRANT
GRANT
GRANT
GRANT
GRANT
GRANT
GRANT
gmemegen_db=#
```

5. In **psql**, grant permissions to the public schema and tables for the gmemegen_db database.

```
gmemegen_db=# GRANT USAGE ON SCHEMA public TO migration_admin;
GRANT ALL ON SCHEMA public TO migration_admin;

GRANT SELECT ON public.meme TO migration_admin;
GRANT
GRANT
GRANT
gmemegen_db=#
```

The source databases are now prepared for migration. The permissions you have granted to the migration_admin user are all that is required for **Database Migration Service** to migrate the postgres, orders and gmemegen_db databases.

Make the migration_admin user the owner of the tables in the orders database, so that you can edit the source data later, when you test the migration.

6. In **psql**, run the following commands:

```
gmemegen_db=# \c orders;
\dt
You are now connected to database "orders" as user "postgres".
                List of relations
 Schema |         Name         | Type  |  Owner
--------+----------------------+-------+----------
 public | distribution_centers | table | postgres
 public | inventory_items      | table | postgres
 public | order_items          | table | postgres
 public | products             | table | postgres
 public | users                | table | postgres
(5 rows)

orders=# ALTER TABLE public.distribution_centers OWNER TO migration_admin;
ALTER TABLE public.inventory_items OWNER TO migration_admin;
ALTER TABLE public.order_items OWNER TO migration_admin;
ALTER TABLE public.products OWNER TO migration_admin;
ALTER TABLE public.users OWNER TO migration_admin;
\dt
ALTER TABLE
ALTER TABLE
ALTER TABLE
ALTER TABLE
ALTER TABLE
                    List of relations
 Schema |         Name         | Type  |      Owner
--------+----------------------+-------+-----------------
 public | distribution_centers | table | migration_admin
 public | inventory_items      | table | migration_admin
 public | order_items          | table | migration_admin
 public | products             | table | migration_admin
 public | users                | table | migration_admin
(5 rows)

orders=#
```

7. Exit **psql** and the postgres user session

```
orders=# \q
postgres@postgresql-vm:~$ exit
logout
student-02-ded9db8b7e37@postgresql-vm:~$
```

Task 2. Create a Database Migration Service connection profile for a stand-alone PostgreSQL database

Get the connectivity information for the PostgreSQL source instance

In this step, you identify the internal IP address of the source database instance that you will migrate to Cloud SQL.

1. In the Google Cloud Console, on the **Navigation menu** (☰), click **Compute Engine** > **VM instances**.
2. Locate the line with the instance called **postgresql-vm**.
3. Copy the value for **Internal IP** (e.g., 10.128.0.2).

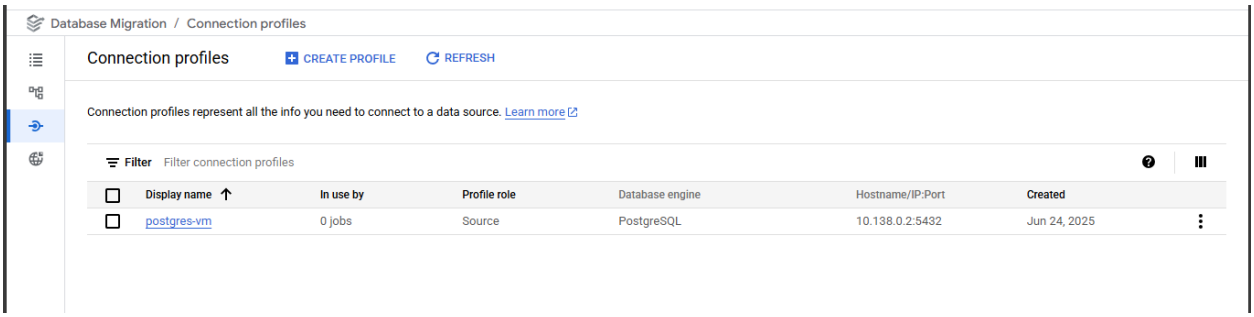
Create a new connection profile for the PostgreSQL source instance

A connection profile stores information about the source database instance (e.g., stand-alone PostgreSQL) and is used by the **Database Migration Service** to migrate data from the source to your destination Cloud SQL database instance. After you create a connection profile, it can be reused across migration jobs.

In this step you will create a new connection profile for the PostgreSQL source instance.

1. In the Google Cloud Console, on the **Navigation menu** (☰), click **VIEW ALL PRODUCTS** under Databases section click on **Database Migration** > **Connection profiles**.
2. Click **+ Create Profile**.
3. For **Profile Role**, select **Source**.
4. For **Database engine**, select **PostgreSQL**.
5. For **Connection profile name**, enter **postgres-vm**.
6. For **Region** select (region).
7. Under **Define connection configurations** click on **DEFINE**

8. For **Hostname or IP address**, enter the internal IP for the PostgreSQL source instance that you copied in the previous task (e.g., 10.128.0.2)
9. For **Port**, enter **5432**.
10. For **Username**, enter **migration_admin**.
11. For **Password**, enter **DMS_1s_cool!** .
12. For all other values leave the defaults.
13. Click **Create**.



Task 3. Create and start a continuous migration job

Create a new continuous migration job

In this step you will create a new continuous migration job.

1. In the Google Cloud Console, on the **Navigation menu** (☰), click **VIEW ALL PRODUCTS** under Databases section click on **Database Migration** > **Migration jobs**.
2. Click **+ Create Migration Job**.
3. For **Migration job name**, enter **vm-to-cloudsql**.
4. For **Source database engine**, select **PostgreSQL**.
5. For **Destination region**, select (region).
6. For **Destination database engine**, select **Cloud SQL for PostgreSQL**.
7. For **Migration job type**, select **Continuous**.

Leave the defaults for the other settings.

8. Click **Save & Continue**.

Define the source instance

In this step, you will define the source instance for the migration.

1. For **Source connection profile**, select **postgres-vm**.

Leave the defaults for the other settings.

2. Click **Save & Continue**.

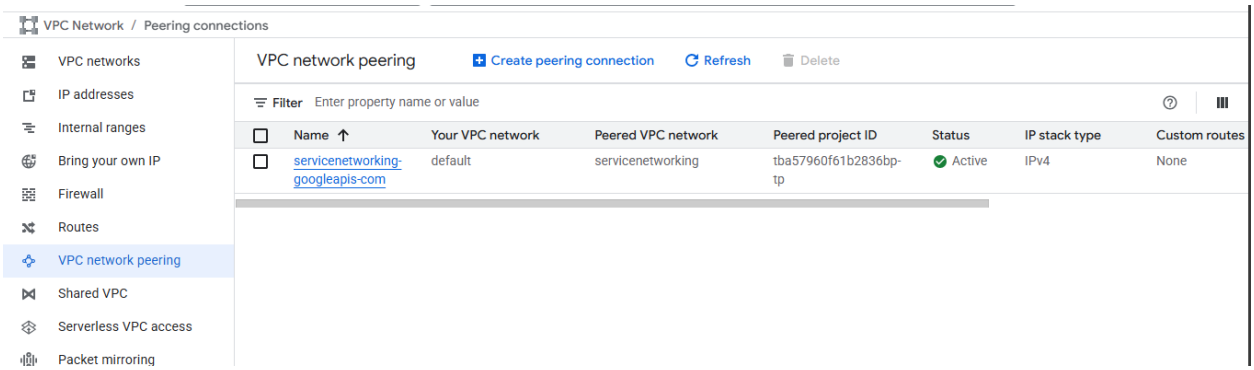
Create the destination instance

In this step, you will create the destination instance for the migration.

1. For **Destination Instance ID**, enter **postgresql-cloudsql**.
2. For **Password**, enter **supersecret!**.
3. For **Choose a Cloud SQL edition**, select **Enterprise** edition.
4. For **Database version**, select **Cloud SQL for PostgreSQL 13**.
5. In **Choose region and zone** section, select **Single zone** and select (zone) as **primary zone**.
6. For **Instance connectivity**, select **Private IP** and **Public IP**.
7. Select **Use an automatically allocated IP range**.

Leave the defaults for the other settings.

8. Click **Allocate & Connect**.



9. For **Machine shapes**. check **1 vCPU, 3.75 GB**
10. For **Storage type**, select **SSD**
11. For **Storage capacity**, select **10 GB**
12. Click **Create & Continue**.

Define the connectivity method

In this step, you will define the connectivity method for the migration.

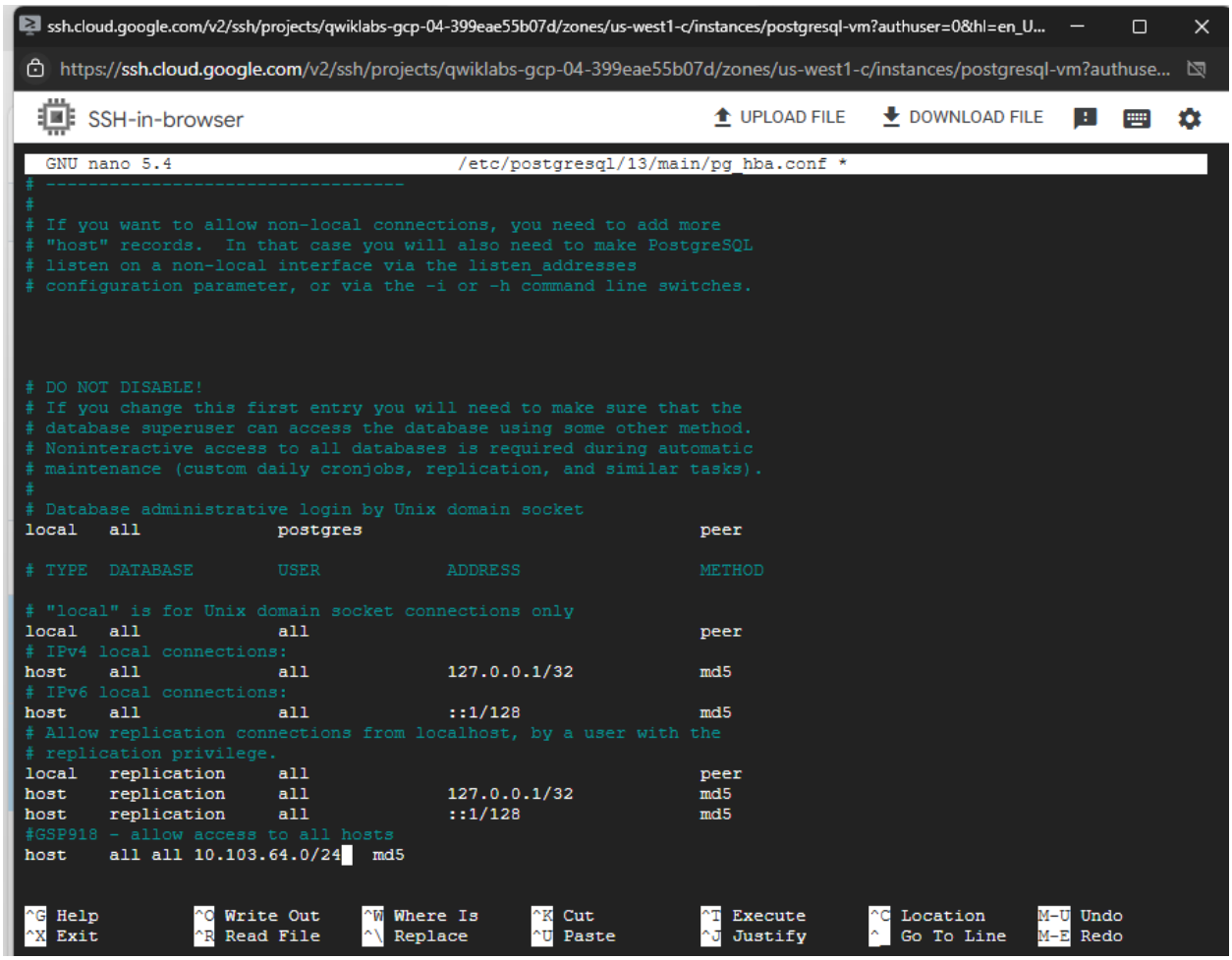
1. For **Connectivity method**, select **VPC peering**.
2. For **VPC**, select **default**.

Allow access to the postgresql-vm instance from automatically allocated IP range

In this step you will edit the pg_hba.conf PostgreSQL configuration file to allow the Database Migration Service to access the stand-alone PostgreSQL database.

1. Get the allocated IP address range. In the Google Cloud Console on the **Navigation menu** (☰), right-click **VPC network** > **VPC network peering** and open it in a new tab.
2. Click on the servicenetworking-googleapis-com entry and then click on **Effective Routes View** at the bottom.
3. From the dropdown for **Network** select **default** and for **Region** select (region). Click **View**.
4. In the **Destination IP range** column ,copy the IP range (e.g. 10.107.176.0/24) next to **peering-route-xxxxx...** route.
5. In the Terminal session on the VM instance, edit the pg_hba.conf file as follows:

```
sudo nano /etc/postgresql/13/main/pg_hba.conf
```



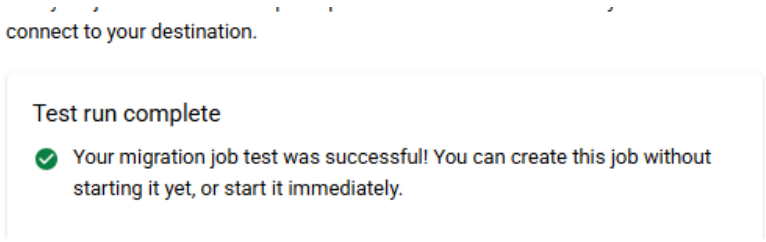
7. Save and exit the nano editor with Ctrl-O, Enter, Ctrl-X
8. Restart the PostgreSQL service to make the changes take effect. In the VM instance Terminal session:

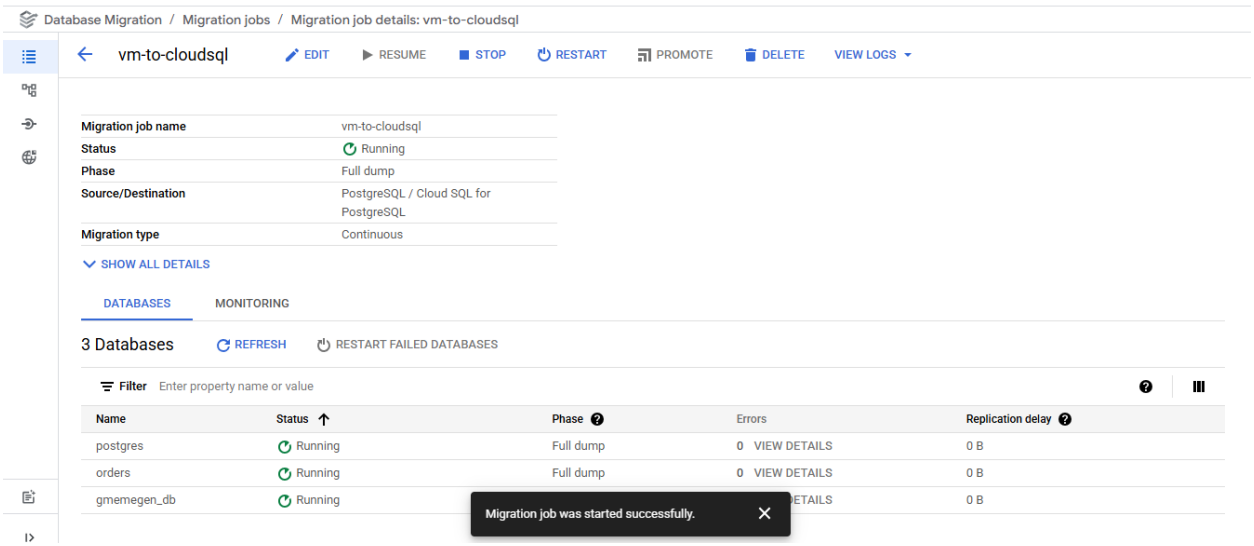
sudo systemctl start postgresql@13-main

Test and start the continuous migration job

In this step, you will test and start the migration job.

1. In the **Database Migration Service** tab you open earlier, review the details of the migration job.
2. Click **Test Job**.
3. After a successful test, click **Create & Start Job**.

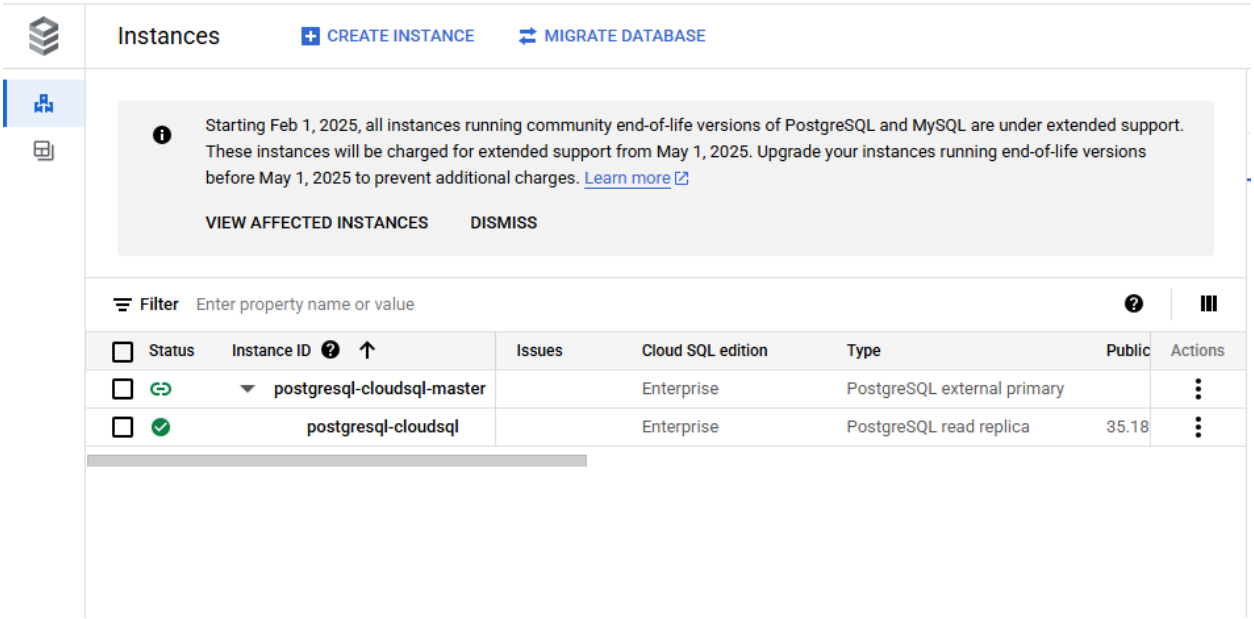




In this step, you will confirm that the continuous migration job is running.

1. In the Google Cloud Console, on the **Navigation menu** (☰), click **Database Migration** > **Migration jobs**.
2. Click the migration job **vm-to-cloudsql** to see the details page.
3. Review the migration job status.
    a. If you have not started the job, the status will show as **Not started**. You can choose to start or delete the job.
    b. After the job has started, the status will show as **Starting** and then transition to **Running Full dump in progress** to indicate that the initial database dump is in progress.
    c. After the initial database dump has been completed, the status will transition to **Running CDC in progress** to indicate that continuous migration is active.

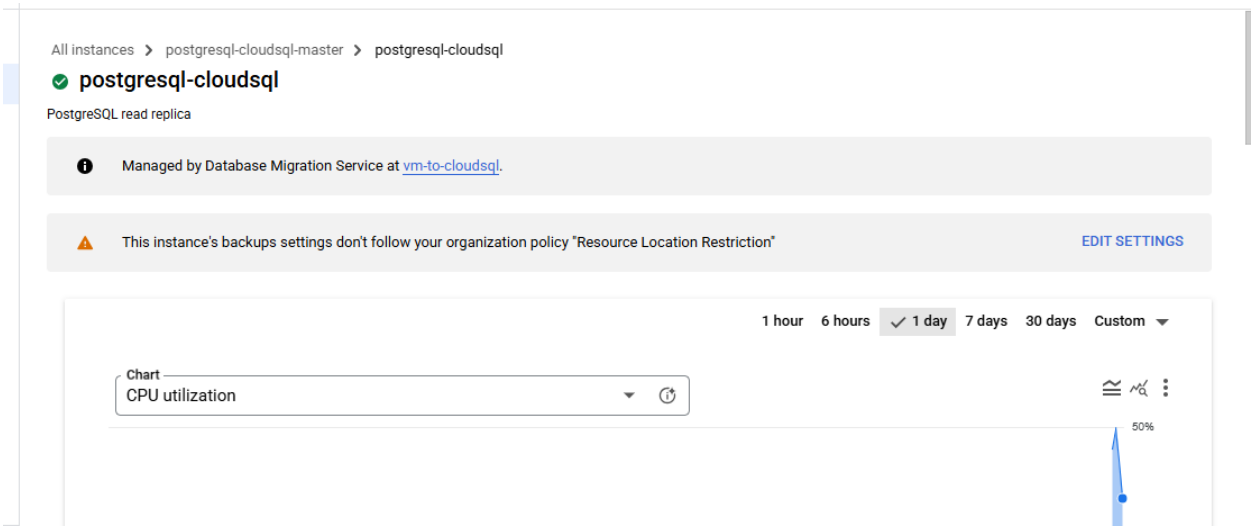
When the job status changes to **Running CDC in progress**, proceed to the next task.



Task 4. Confirm the data in Cloud SQL for PostgreSQL

Check the PostgreSQL databases in Cloud SQL

1. In the Google Cloud Console, on the **Navigation menu** (☰), click **SQL**.
2. Expand the instance ID called **postgresql-cloudsql-master**.
3. Click on the instance **postgresql-cloudsql** (PostgreSQL read replica).
4. In the **Replica Instance** menu, click **Databases**.



Connect to the PostgreSQL instance

1. In the **Replica Instance** menu, click **Overview**.

2. Scroll down to the **Connect to this instance** section and click **Open Cloud Shell**.

3. Run the pre-populated command.

If prompted, click **Authorize** for the API.

4. When prompted for a password, which you previously set, enter:

Supersecret!

```
CLOUD SHELL
Terminal    (qwiklabs-gcp-04-399eae55b07d)

-----------+----------+-------------------------------------------+----
 -89.9711  | 35.1174  | Memphis TN                                |  1
 -87.6847  | 41.8369  | Chicago IL                                |  2
 -95.3698  | 29.7604  | Houston TX                                |  3
 -118.25   | 34.05    | Los Angeles CA                            |  4
 -90.0667  | 29.95    | New Orleans LA                            |  5
 -73.7834  | 40.634   | Port Authority of New York/New Jersey NY/NJ |  6
 -75.1667  | 39.95    | Philadelphia PA                           |  7
 -88.0431  | 30.6944  | Mobile AL                                 |  8
 -79.9333  | 32.7833  | Charleston SC                             |  9
 -81.1167  | 32.0167  | Savannah GA                               | 10
(10 rows)

orders=>
```

Review the data in the Cloud SQL for PostgreSQL instance

1. To select the database in the PostgreSQL interactive console, run the following command:

```
orders=> \c orders;
psql (16.9 (Ubuntu 16.9-1.pgdg24.04+1), server 13.21 (Debian 13.21-1.pgdg110+1))
SSL connection (protocol: TLSv1.3, cipher: TLS_AES_256_GCM_SHA384, compression: off)
You are now connected to database "orders" as user "migration_admin".
orders=> insert into distribution_centers values(-80.1918,25.7617,'Miami FL',11);
INSERT 0 1
orders=>
```

3. Query the distribution_centers table:

```
CLOUD SHELL
Terminal    (qwiklabs-gcp-04-399eae55b07d)

-----------+----------+-----------------------------------------+----
 -89.9711  | 35.1174  | Memphis TN                              |  1
 -87.6847  | 41.8369  | Chicago IL                              |  2
 -95.3698  | 29.7604  | Houston TX                              |  3
 -118.25   | 34.05    | Los Angeles CA                          |  4
 -90.0667  | 29.95    | New Orleans LA                          |  5
 -73.7834  | 40.634   | Port Authority of New York/New Jersey NY/NJ |  6
 -75.1667  | 39.95    | Philadelphia PA                         |  7
 -88.0431  | 30.6944  | Mobile AL                               |  8
 -79.9333  | 32.7833  | Charleston SC                           |  9
 -81.1167  | 32.0167  | Savannah GA                             | 10
(10 rows)

orders=>
```

4. Exit the PostgreSQL interactive console by typing:

\q

Update stand-alone source data to test continuous migration

1. In Cloud Shell, type the following commands to connect to the source PostgreSQL instance:

export VM_NAME=postgresql-vm export PROJECT_ID=$(gcloud config list --format 'value(core.project)') export POSTGRESQL_IP=$(gcloud compute instances describe ${VM_NAME}

--zone=(zone) --format="value(networkInterfaces[0].accessConfigs[0].natIP)") echo $POSTGRESQL_IP psql -h $POSTGRESQL_IP -p 5432 -d orders -U migration_admin

2. When prompted for a password, enter:

DMS_1s_cool!

3. In **psql**, enter the following commands:

\c orders;

insert into distribution_centers values(-80.1918,25.7617,'Miami FL',11);

4. Close the interactive **psql** session:

\q

Connect to the Cloud SQL PostgreSQL database to check that updated data has been migrated

1. In Cloud Shell, type the following commands to connect to the destination Cloud SQL PostgreSQL instance:

```
postgres=> \q
student_02_ded9db8b7e37@cloudshell:~ (qwiklabs-gcp-04-399eae55b07d)$ gcloud sql connect postgresql-cloudsql --user=postgres --quiet
Allowlisting your IP for incoming connection for 5 minutes...done.
Connecting to database with SQL user [postgres].Password:
psql (16.9 (Ubuntu 16.9-1.pgdg24.04+1), server 13.21)
SSL connection (protocol: TLSv1.3, cipher: TLS_AES_256_GCM_SHA384, compression: off)
Type "help" for help.
```

2. When prompted for a password, which you previously set, enter the password for the Cloud SQL instance:

supersecret!

Review data in Cloud SQL for PostgreSQL database

1. In Cloud Shell, select the active database in the PostgreSQL interactive console:

```
\c orders;
```

2. When prompted for a password, which you previously set, enter:

```
supersecret!
```

3. Query the `distribution_centers` table:

```
select * from distribution_centers;
```

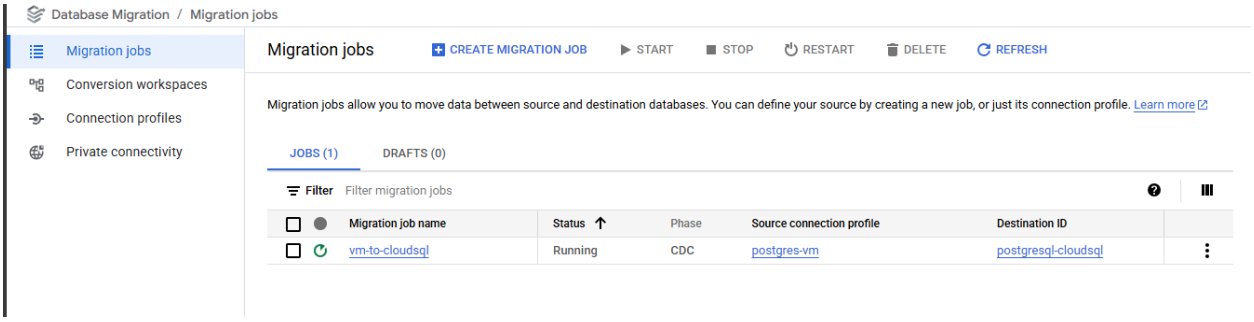
```
CLOUD SHELL
Terminal    (qwiklabs-gcp-04-399eae55b07d)

 -89.9711  | 35.1174  | Memphis TN                                  |  1
 -87.6847  | 41.8369  | Chicago IL                                  |  2
 -95.3698  | 29.7604  | Houston TX                                  |  3
 -118.25   | 34.05    | Los Angeles CA                              |  4
 -90.0667  | 29.95    | New Orleans LA                              |  5
 -73.7834  | 40.634   | Port Authority of New York/New Jersey NY/NJ |  6
 -75.1667  | 39.95    | Philadelphia PA                             |  7
 -88.0431  | 30.6944  | Mobile AL                                   |  8
 -79.9333  | 32.7833  | Charleston SC                               |  9
 -81.1167  | 32.0167  | Savannah GA                                 | 10
 -80.1918  | 25.7617  | Miami FL                                    | 11
(11 rows)

orders=>
```

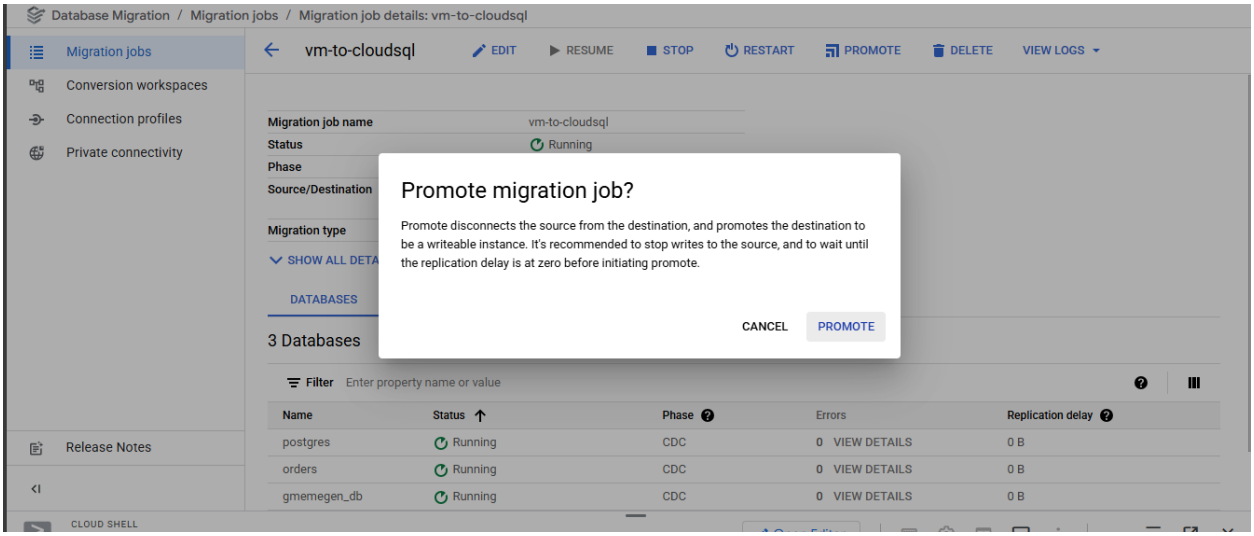
Task 5. Promote Cloud SQL to be a stand-alone instance for reading and writing data

1. In the Google Cloud Console, on the **Navigation menu** (☰), click **VIEW ALL PRODUCTS** under Databases section click on **Database Migration** > **Migration jobs**.

2. Click the migration job name **vm-to-cloudsql** to see the details page.
3. Click **Promote**.

If prompted to confirm, click **Promote**.





Conclusion

The migration was successfully completed with minimal downtime using Google Cloud DMS. Cloud SQL provides better performance monitoring, backups, and reliability. This approach significantly simplifies PostgreSQL database management on GCP.