Lab: Database Design using ERDs

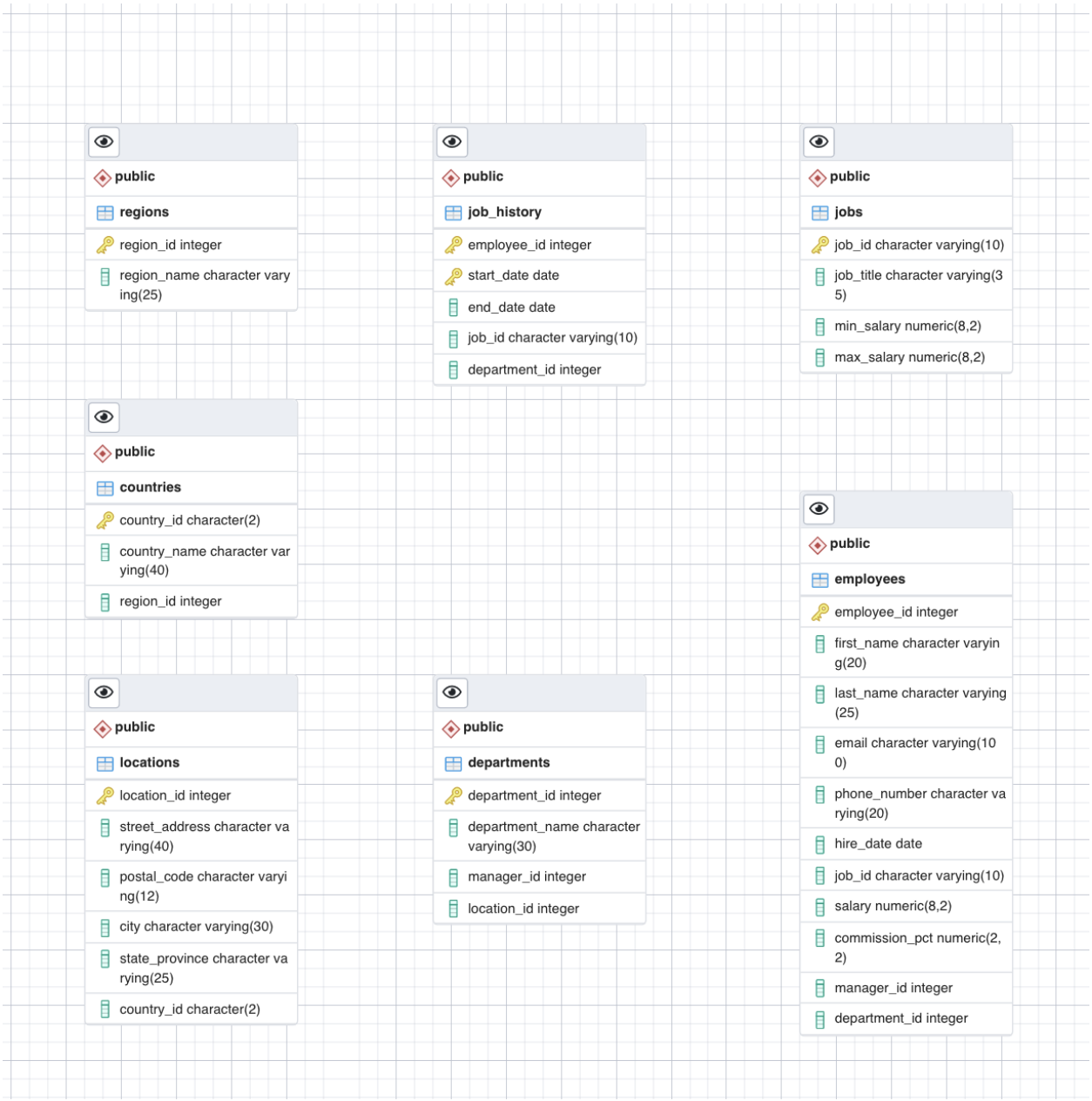
In this lab, you will learn how to design a database by creating an entity relationship diagram (ERD) in the PostgreSQL database service using the pgAdmin graphical user interface (GUI) tool. First, you will create an ERD of a database. Next, you will generate and execute an SQL script to create the database schema from its ERD. Finally, you will load the created database schema with data.

Database used in this lab

The HR database used in this lab comes from the following source: HR Sample Database [Copyright 2021 - Oracle Corporation].

You will use a modified version of the database for the lab. To follow the lab instructions successfully, please use the database provided with the lab, rather than the database from the original source.

The following ERD shows the tables of the HR database:



Objectives

After completing this lab, you will be able to use pgAdmin with PostgreSQL to:

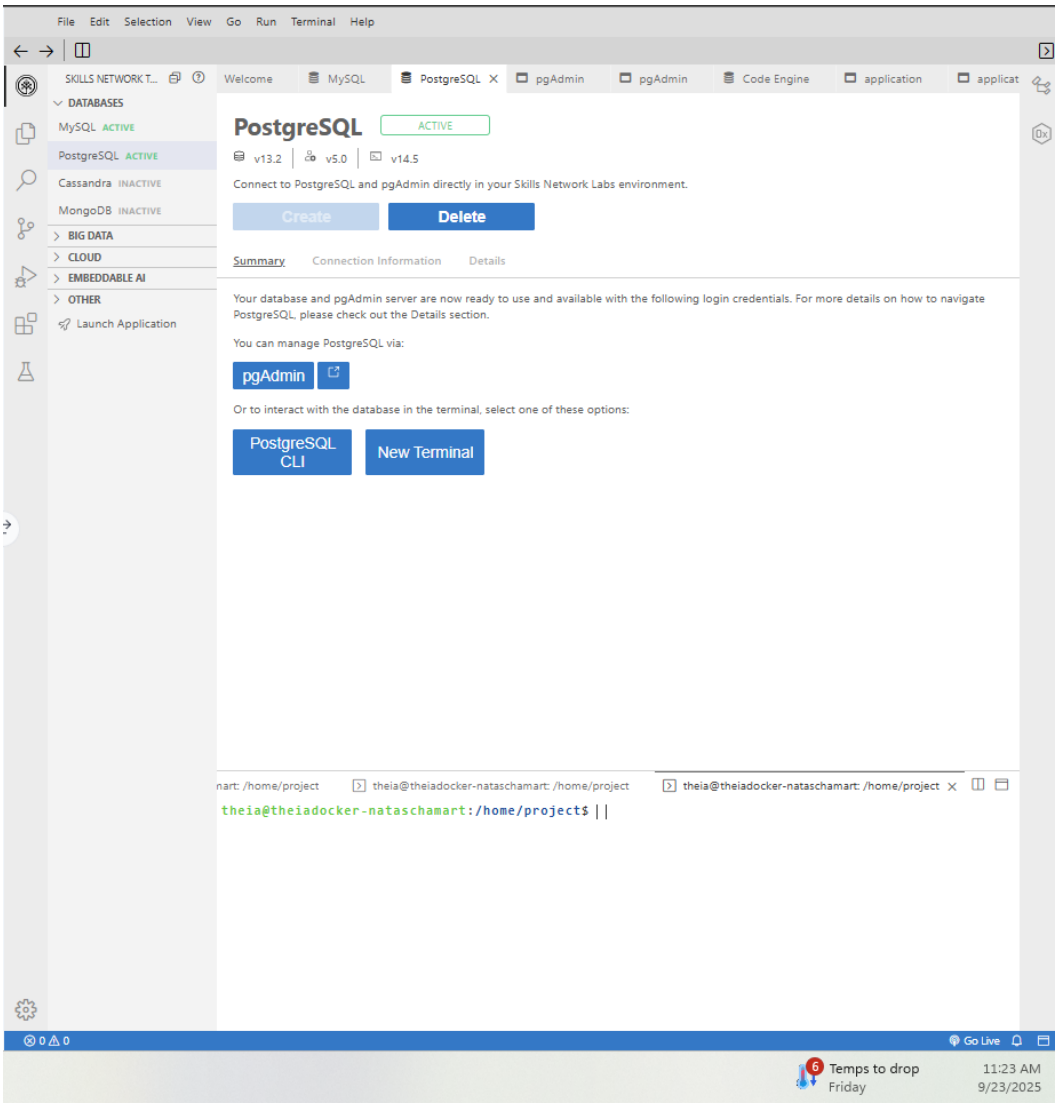
- Create an ERD of a database.
- Generate and execute an SQL script from an ERD to create a schema.
- Load the database schema with data.

Task A: Create an Entity Relationship Diagram (ERD) of a database

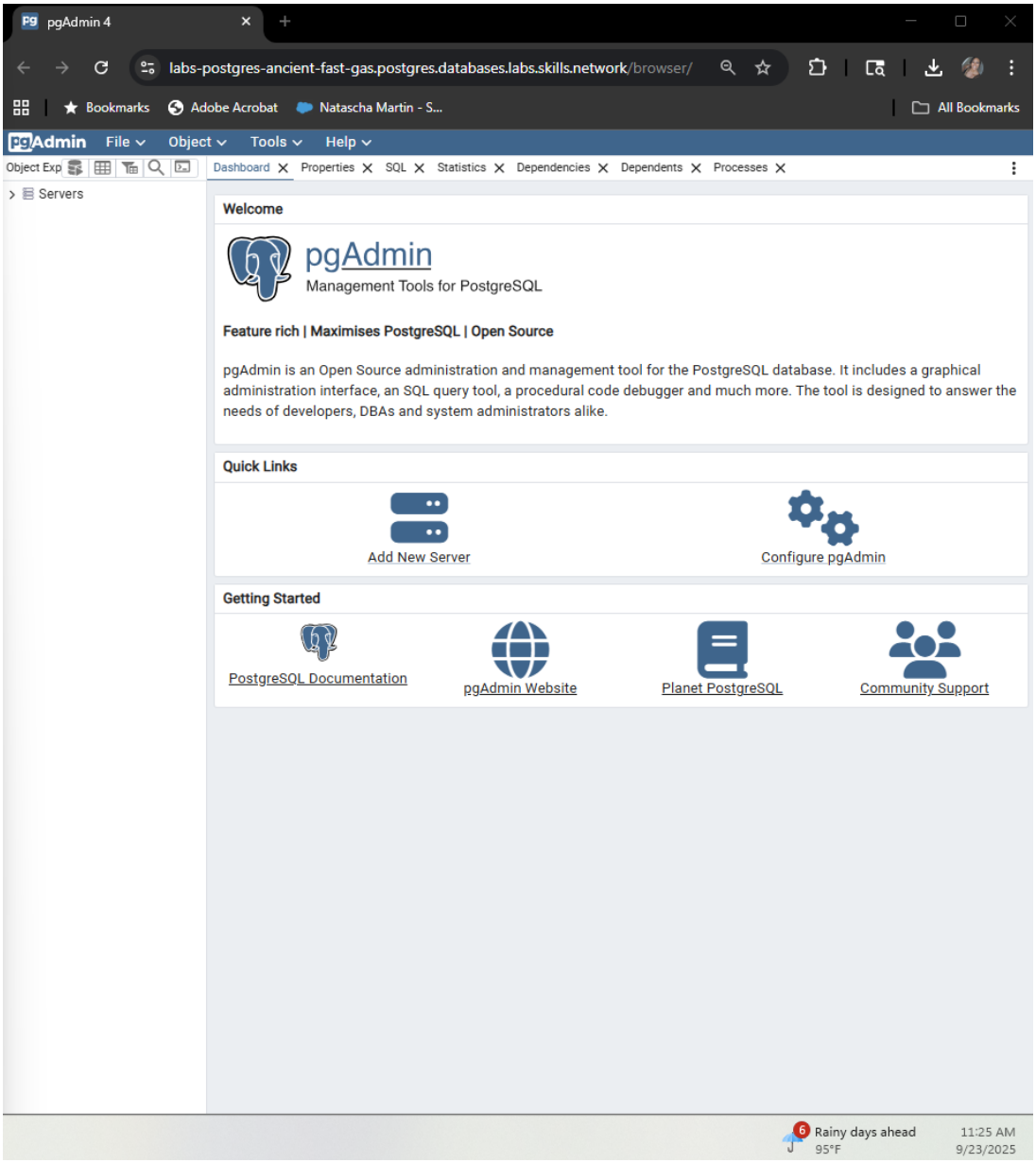
In this task of the Example Exercise, you will create a partial ERD of the HR database.

To get started with this lab, launch PostgreSQL using the Cloud IDE. You can do this by following these steps:

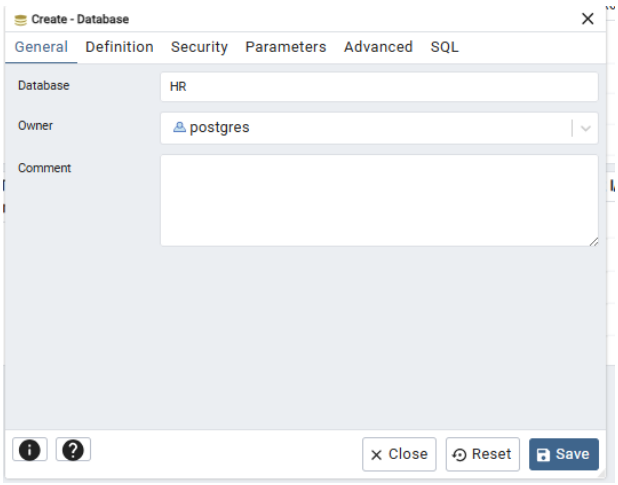
1. Click the Skills Network extension button on the left side of the window.
2. Open the **DATABASES** menu and click **PostgreSQL**.
3. Click **Create**. PostgreSQL may take a few moments to start.



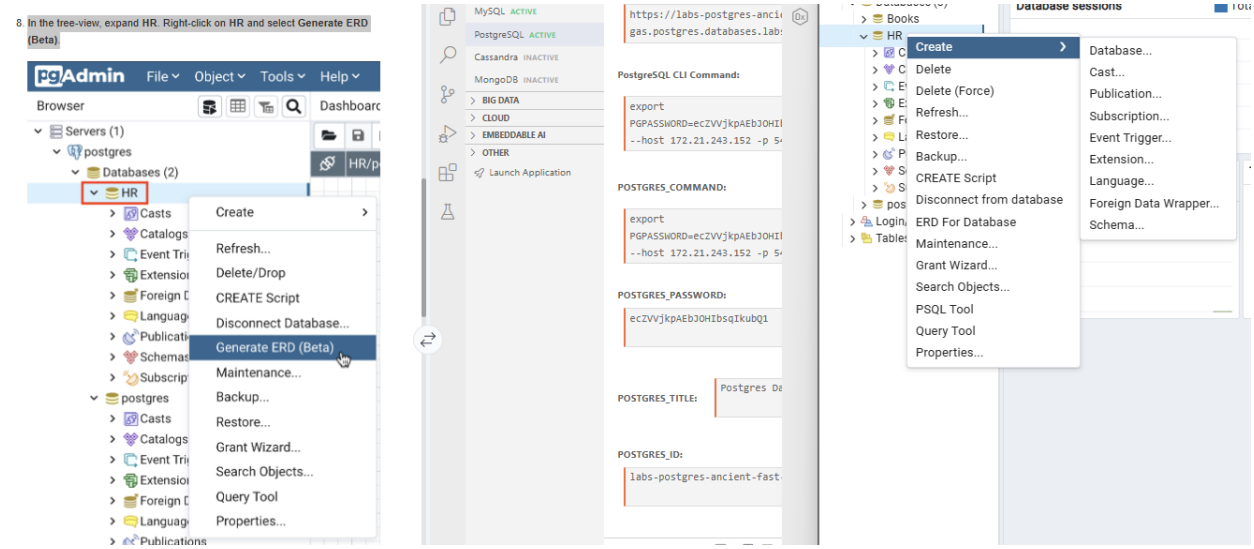
1. Note down your PostgreSQL service session password because you may need to use it later in the lab.
2. Click the pgAdmin button in the same window where you started PostgresSQL.
3. You will see the pgAdmin GUI tool.



In the tree-view, expand **Servers** > **postgres** > **Databases**. Enter your PostgreSQL service session password if prompted during the process. Right-click on **Databases** and go to **Create > Database**. Type **HR** as the name of the database and click **Save**.

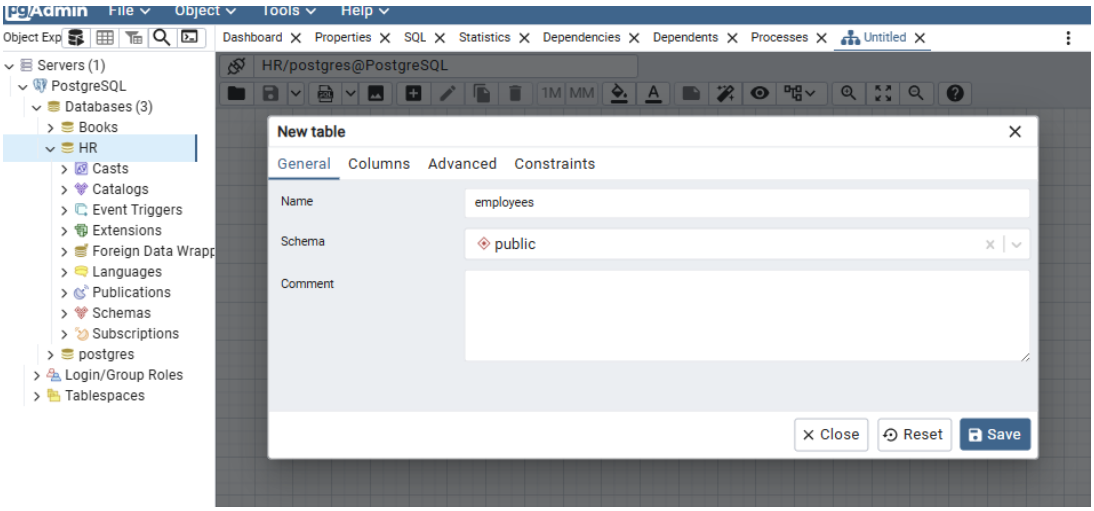


In the tree-view, expand **HR**. Right-click on **HR** and select **Generate ERD (Beta)**.

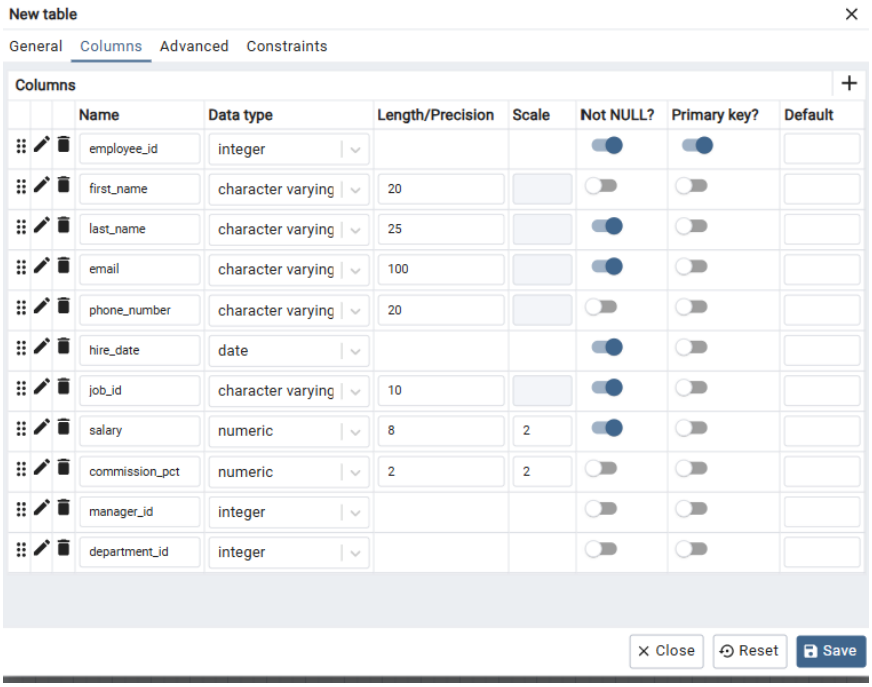


My pgAdmin environment did not include the ‘Generate ERD (Beta)’ option. Instead, I used the ‘ERD for Database’ feature, which provided the same ERD functionality for the HR database.

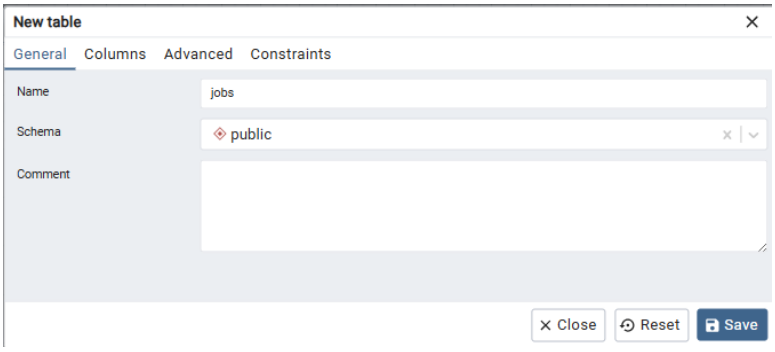
Click **Add table**. On the **General** tab, in the **Name** box, type **employees** as the name of the table. Don't click **OK**, proceed to the next step.

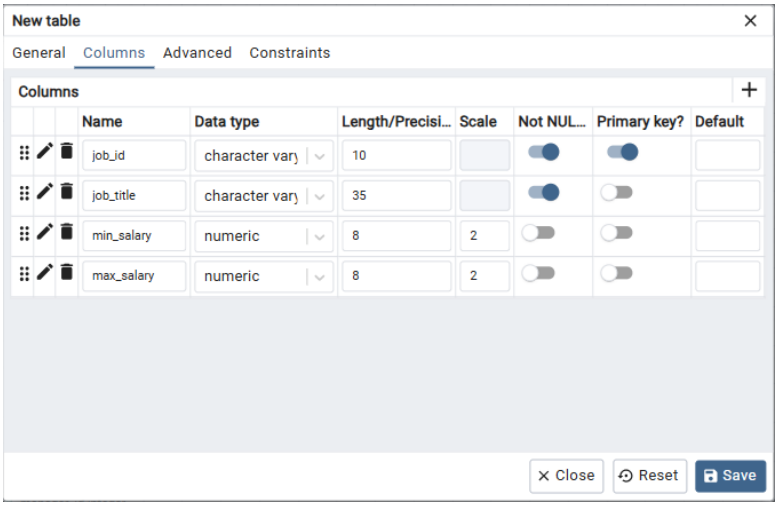


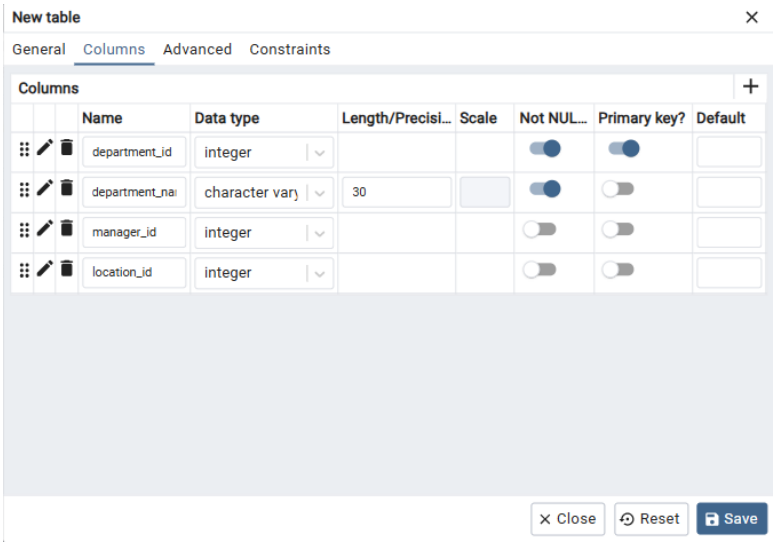
Switch to the **Columns** tab and click **Add new row** to add the necessary column placeholders. Now enter the **employees** table definition information as shown in the image below to create its entity diagram. Then click **OK**.

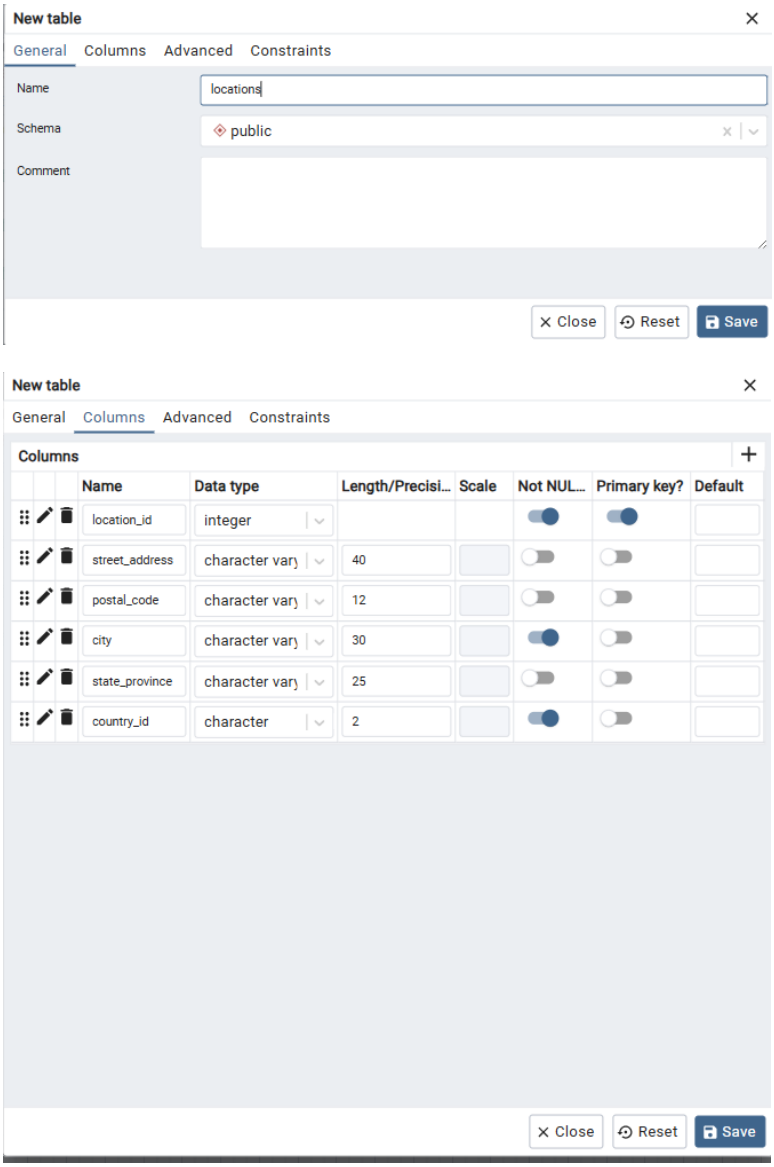


Similarly, create entity diagrams for the other three tables following steps 9 and 10:

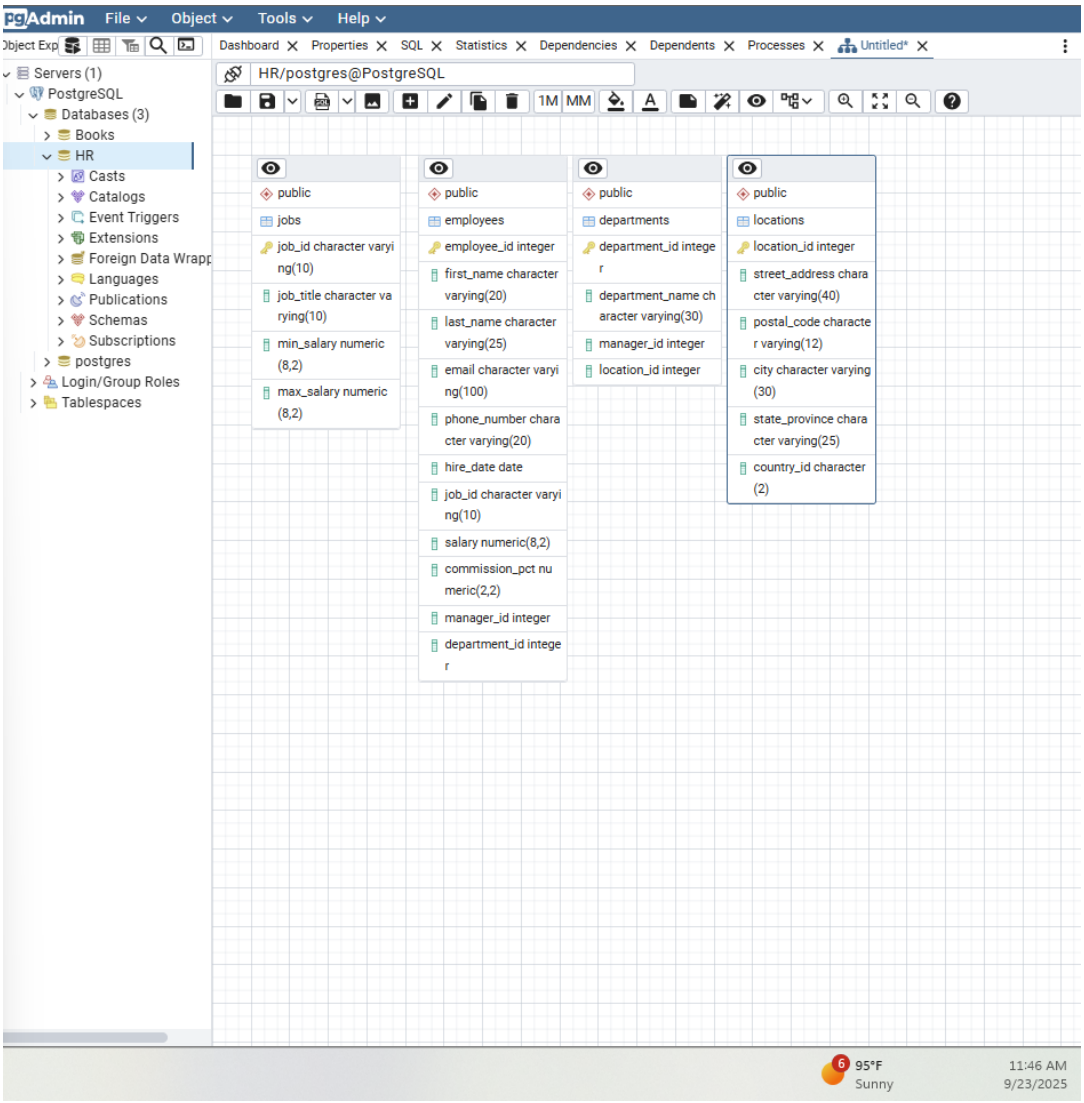

New table
General
Columns
Advanced
Constraints
Name
jobs
Schema
public
Comment
Close
Reset
Save


New table
General
Columns
Advanced
Constraints
Columns
Name
Data type
Length/Precisi...
Scale
Not NUL...
Primary key?
Default
job_id
character vary
10
job_title
character vary
35
min_salary
numeric
8
2
max_salary
numeric
8
2
Close
Reset
Save

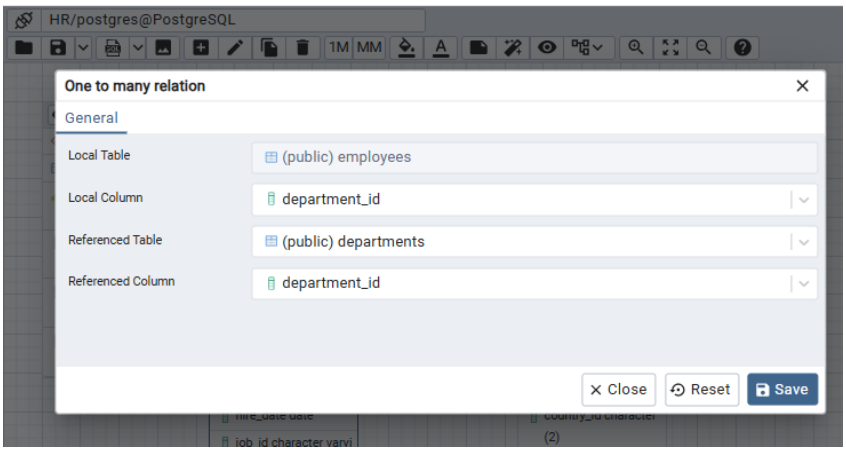

New table
General
Columns
Advanced
Constraints
Columns
Name
Data type
Length/Precisi...
Scale
Not NUL...
Primary key?
Default
department_id
integer
department_na
character vary
30
manager_id
integer
location_id
integer
Close
Reset
Save



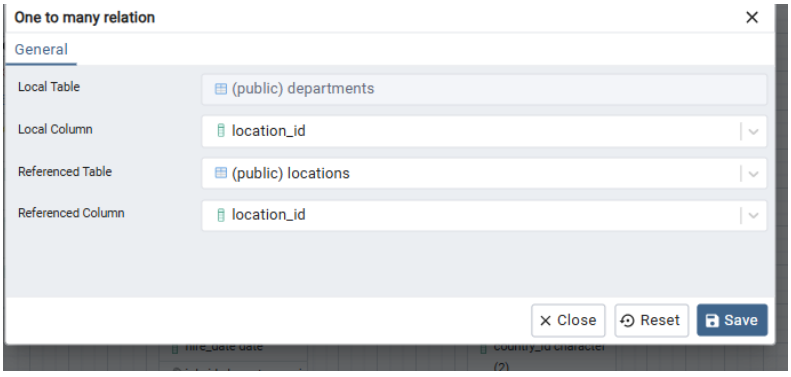
After creating all four entity diagrams, the entities of the ERD are complete.

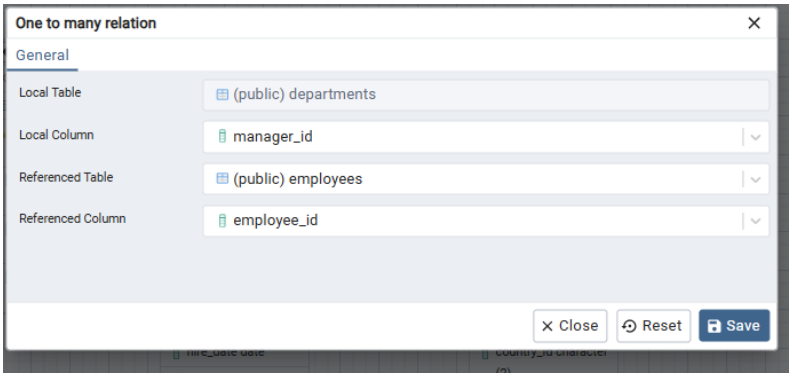


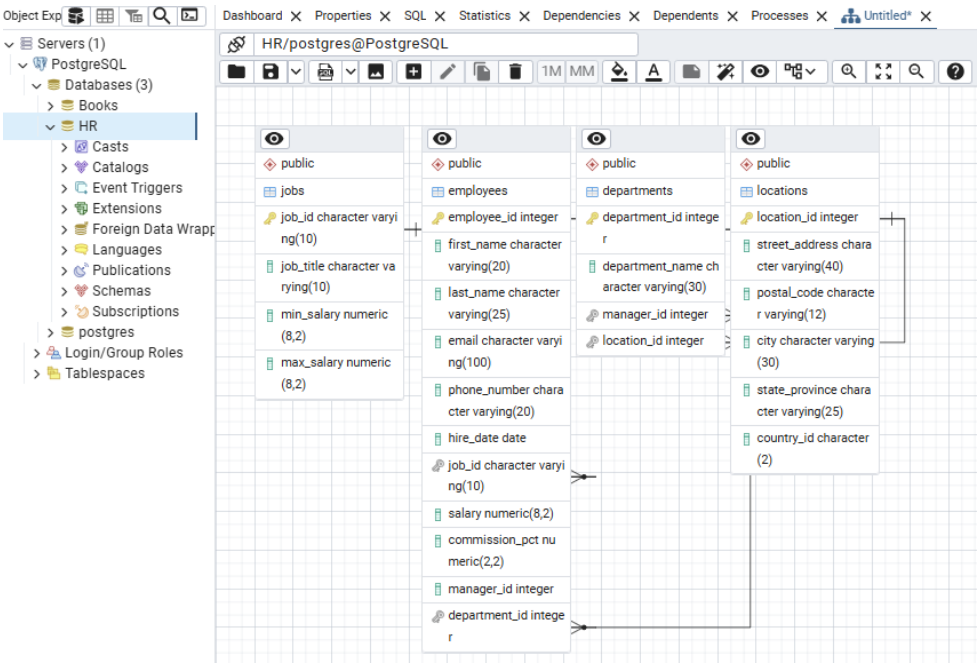
Next, you will create relationships between the entities by adding foreign keys to the tables. Select the entity diagram **employees** and click **One-to-Many link**. Now enter the definition information for a foreign key on the **employees** table as shown in the image below to create the relationship. Then click **OK**.



Similarly, create the other relationships between the tables following the instructions in step 13:





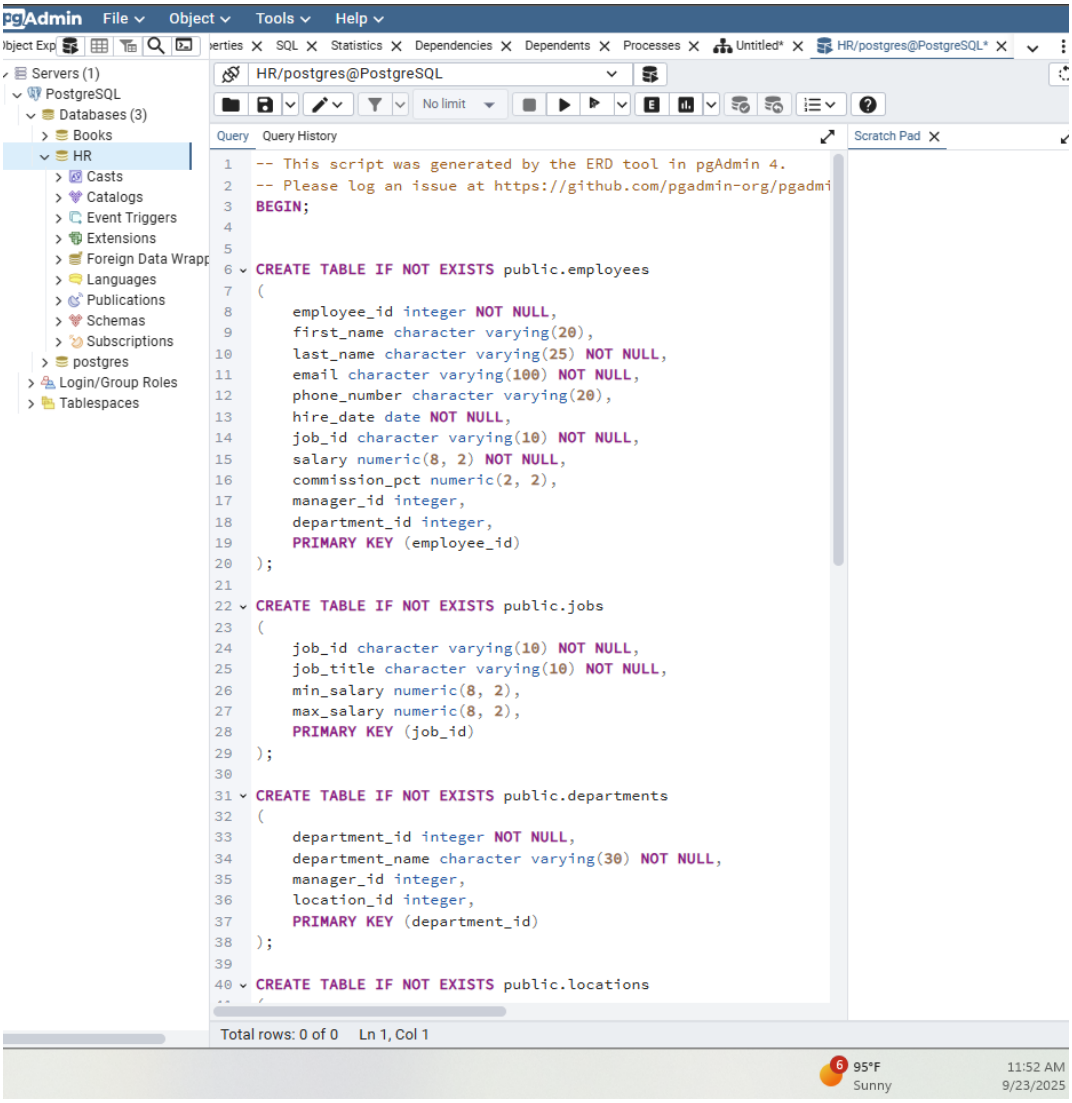


After creating all four relationships, you have completed the ERD for this exercise. Proceed to Task B.

Task B: Generate and execute SQL script from ERD to create the schema

In this task of the Example Exercise, you will generate and execute a SQL script from the ERD you created in Task A of the Example Exercise.

1. In the **Generate ERD (Beta)** window, click **Generate SQL**.



A new Query Editor window will open containing a SQL script generated from the ERD. Click **Execute/Refresh** to run the script. Proceed to Task C.

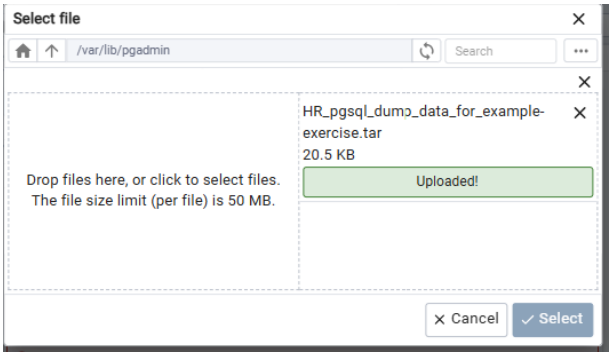
Task C: Load the database schema with data

In this task of the Example Exercise, you will load the database schema you created in Task B of the Example Exercise with data using the pgAdmin Restore feature.

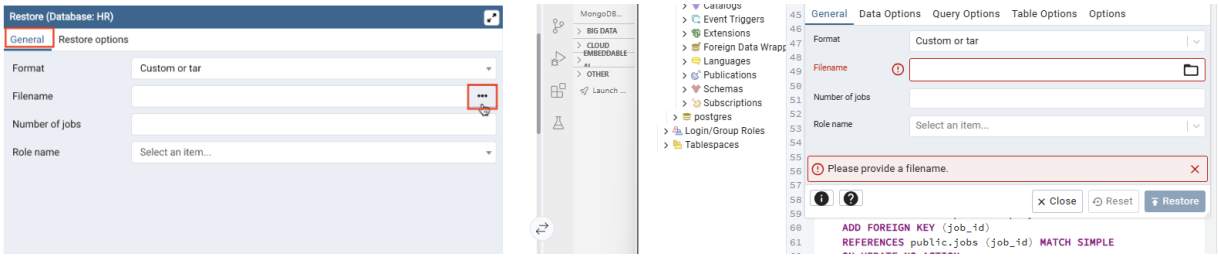
1. Download the **HR_pgsql_dump_data_for_example-exercise.tar** PostgreSQL dump file (containing the partial HR database data) using the link below to your local computer.
    - HR_pgsql_dump_data_for_example-exercise.tar
2. Follow the instructions below to import/restore the data:

- In the tree-view, expand **HR**. Right-click **HR** and click **Restore**.

Click **Upload File**. Now select upload as mentioned here.



Ensure **Format** is set to **All Files**, select the uploaded **HR_pgsql_dump_data_for_example-exercise.tar** file from the list, and then click **Select**.



Lab Summary: Database Design using ERDs

This lab focused on designing a database by creating an entity relationship diagram (ERD) in PostgreSQL using pgAdmin. The objectives were to create an ERD of the HR database, generate and execute an SQL script from the ERD to create the schema, and then load the schema with data.

In Task A, I was expected to create an ERD of the HR database. The instructions referenced a “Generate ERD (Beta)” option that was not available in my pgAdmin environment. Instead, I used the “ERD for Database” option, which provided the same core functionality. I created the entity diagrams for the employees, departments, jobs, and locations tables and then added the foreign key relationships between them.

In Task B, I generated a SQL script from the ERD and executed it in the Query Editor. This successfully created the database schema based on the ERD, and the tables were set up in PostgreSQL as expected.

In Task C, the goal was to load the schema with data using the Restore feature in pgAdmin. However, my pgAdmin environment did not display the restore options tab shown in the

sample lab instructions. Without that option, I could not follow the required steps to restore the provided HR_pgsql_dump_data_for_example-exercise.tar file. An attempt was made to work around this by adjusting the trigger settings during restore, but that also failed.

As a result, the data load portion of the lab could not be completed. The schema creation was successful, but the restore functionality was either unavailable or incompatible with the lab environment. The failure was not due to the SQL or ERD steps, but due to environment limitations and missing pgAdmin restore options.