Create Your First Django Model

Estimated time needed: 15 minutes

Learning Objectives

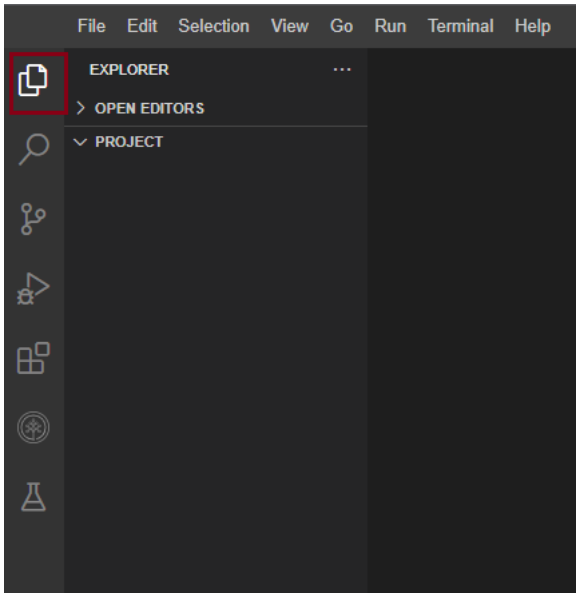
After completing this lab, you will be able to:

- Get familiar with Theia IDE and Django
- Setup a standalone Django ORM app
- Create your first Django project and application
- Create and test your first Django model

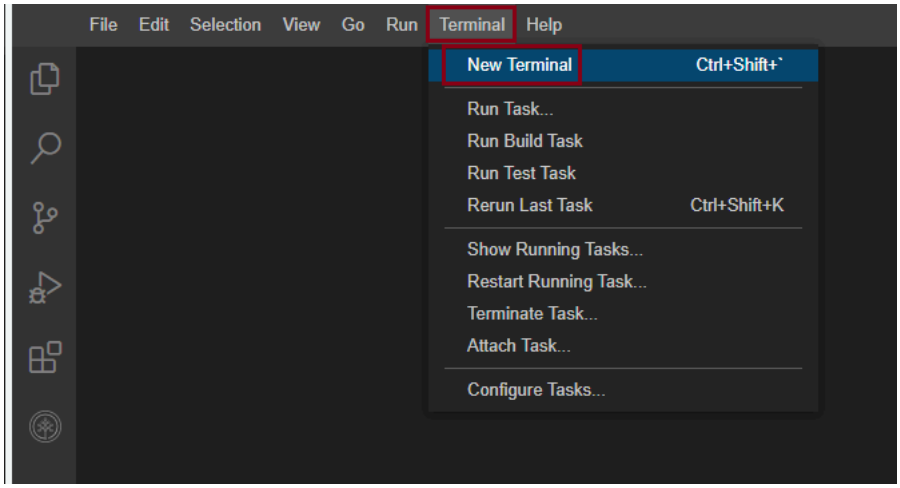
Working with files in Cloud IDE

If you are new to Cloud IDE, this section will show you how to create and edit files, which are part of your project, in Cloud IDE.

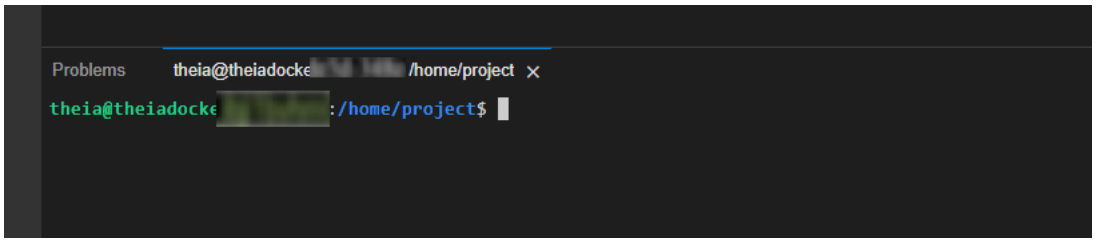
To view your files and directories inside Cloud IDE, click on this files icon to reveal it.



Click on `New`, and then `New Terminal`.



This will open a new terminal where you can run your commands.



Concepts covered in the lab

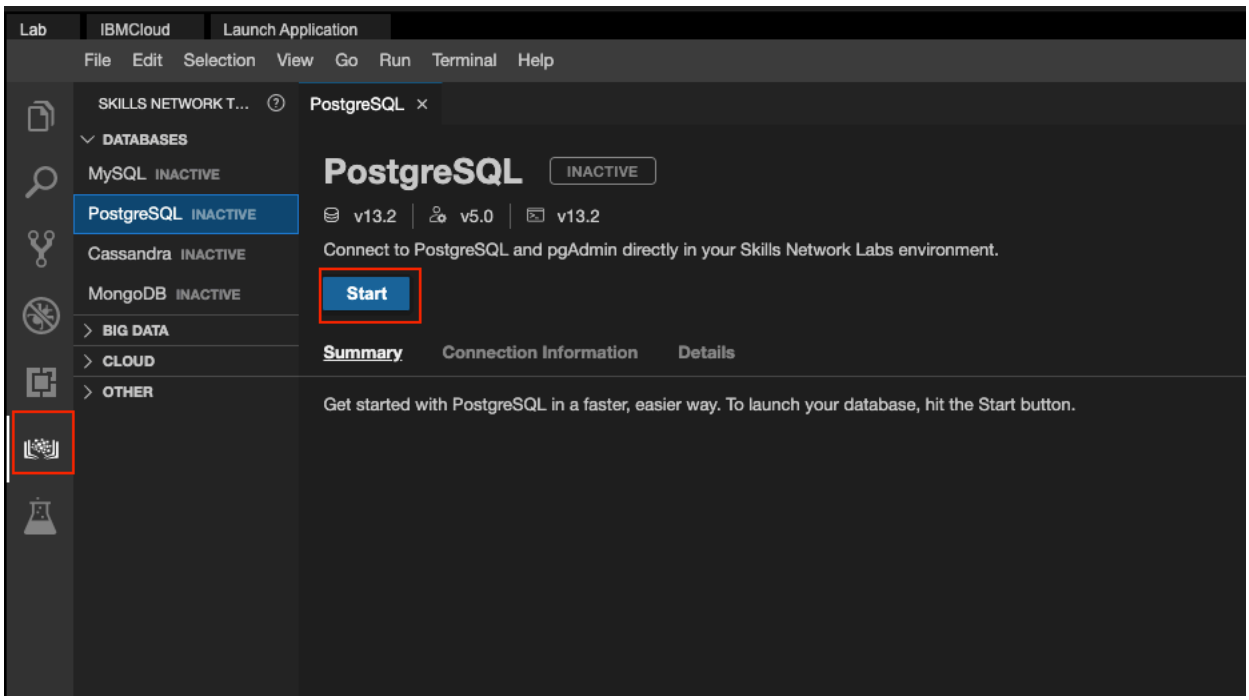
1. `Django ORM`: A Python ORM component of the Django web application framework, where each Django model maps to a database table.
2. `PostgreSQL` or `Postgres`: An open-source relational database management system used by Django.
3. `Psycopg`: An interface used by Django for working with PostgreSQL.
4. `PGAdmin`: Anadmin and development tool for managing PostgreSQL server.
5. `Database migrations`: The management of version-controlled, incremental and reversible changes to relational database schemas to update or revert the schema to a newer or older version.

Start PostgreSQL in Theia

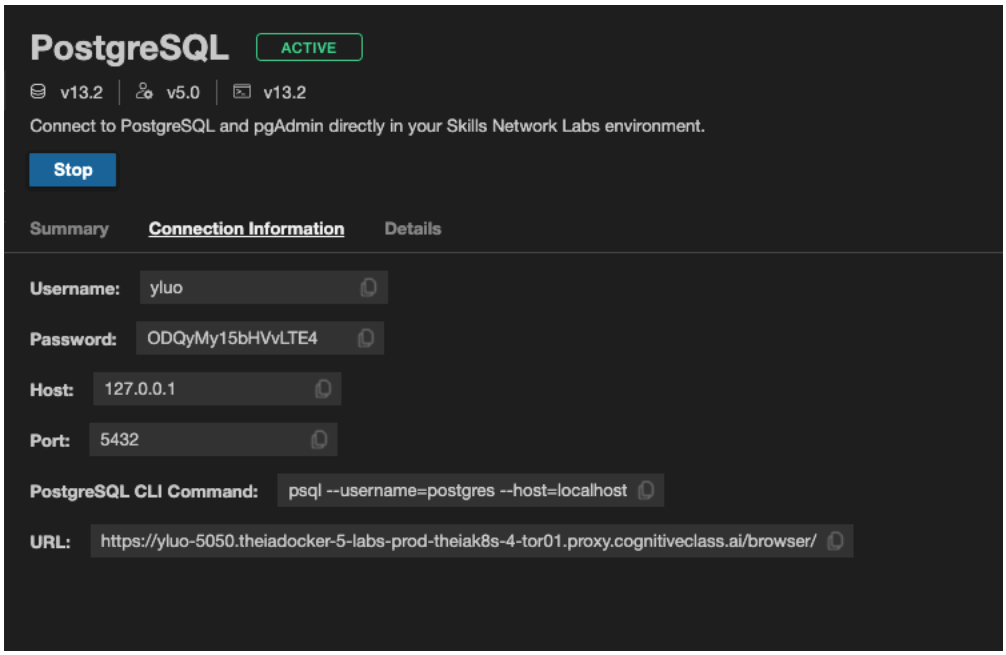
`PostgreSQL`, also known as `Postgres`, is an open-source relational database management system and it is one of the main databases Django uses.

If you are using the Theia environment hosted by Skills Network Labs, a pre-installed PostgreSQL instance is provided for you.

You can start PostgreSQL from UI by finding the SkillsNetwork icon on the left menu bar and selecting PostgreSQL from the DATABASES menu item:



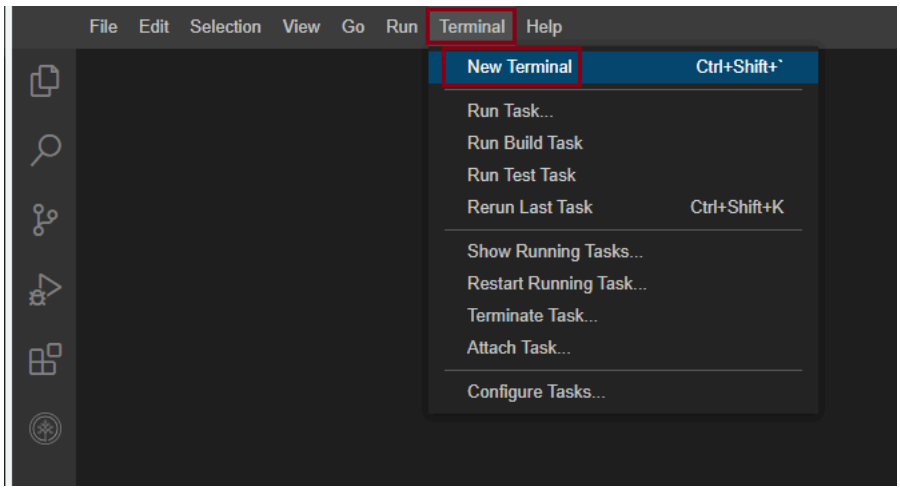
Once the PostgreSQL has been started, you can check the server connection information from the UI.
Please markdown the connection information such as generated `username`, `password`, and `host`, etc, which will be used to configure Django app to connect to this database.



Optional: Start PostgreSQL from terminal

You may also start PostgreSQL from terminal (*if you have not already started it from the UI):*

- If the terminal was not open, go to `Terminal > New Terminal`



- and in the new terminal run:

```
1
```

```
start_postgres
```

Copied!

- Once PostgreSQL is started, you can check the server connection information in the terminal. You need to save the connection information such as generated `username`, `password`, and `host`, etc, which will be used to configure Django app to connect to this database.

```
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```

```
Starting your Postgres database....
This process can take up to a minute.

Postgres database started, waiting for all services to be ready....

Your Postgres database is now ready to use and available with username: postgres password: Nzg3Mi15bHVvLTIz

You can access your Postgres database via:
https://yluo-5050.theiadocker-1.proxy.cognitiveclass.ai --username=postgres --host=localhost
```

Copied!

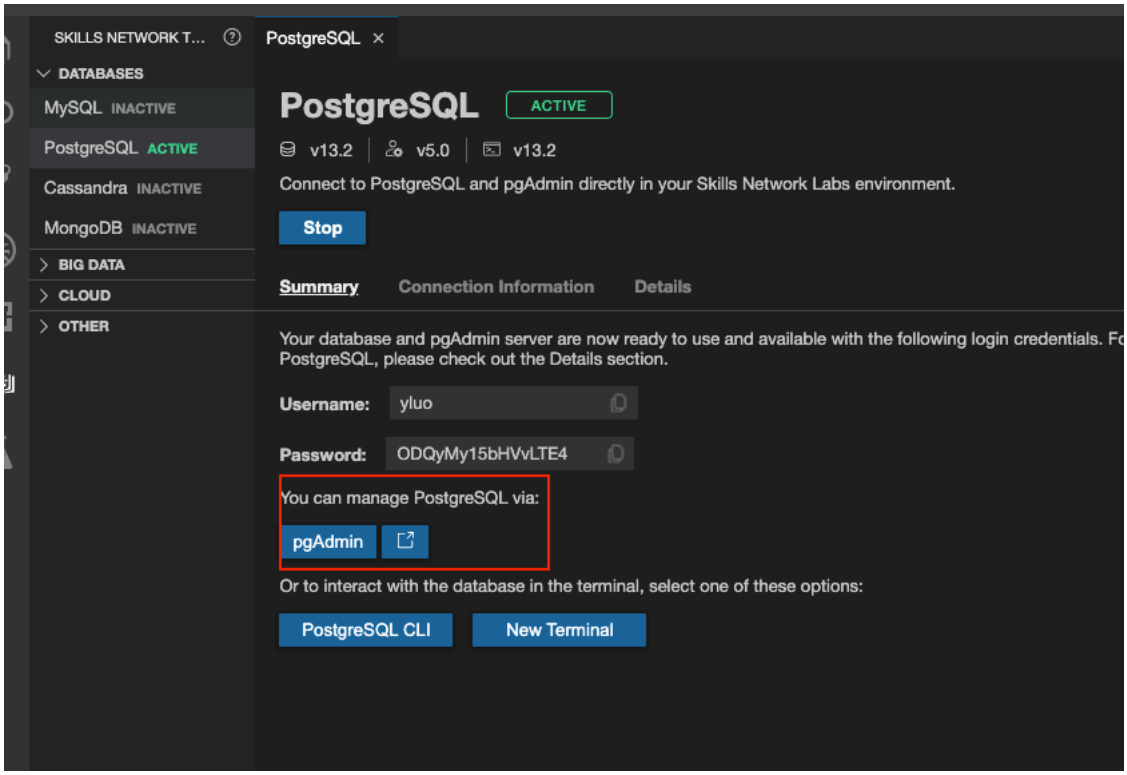
- Install these must-have packages before you setup the environment to access postgres.

```
1
2
```

```
pip install --upgrade distro-info
pip3 install --upgrade pip==23.2.1
```

Copied! Executed!

- Also, a `pgAdmin` instance is installed and started for you. It is a popular PostgreSQL admin and development tool for you to manage your PostgreSQL server interactively.



Setup Your First Django App

If the terminal was not open, go to `Terminal > New Terminal` and make sure your current Theia directory is `/home/project`.

- Run the following command-lines to download a code template for this lab.

```
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```
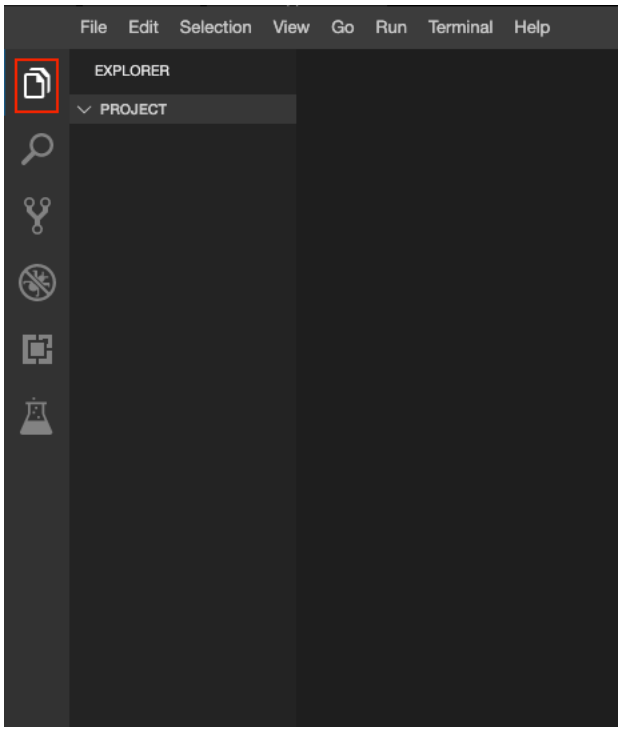

```
wget "https://cf-courses-data.s3.us.cloud-object-storage.appdomain.cloud/IBM-CD0251EN-SkillsNetwork/labs/m3_django_orm/lab1_template.zip"
unzip lab1_template.zip
rm lab1_template.zip
```

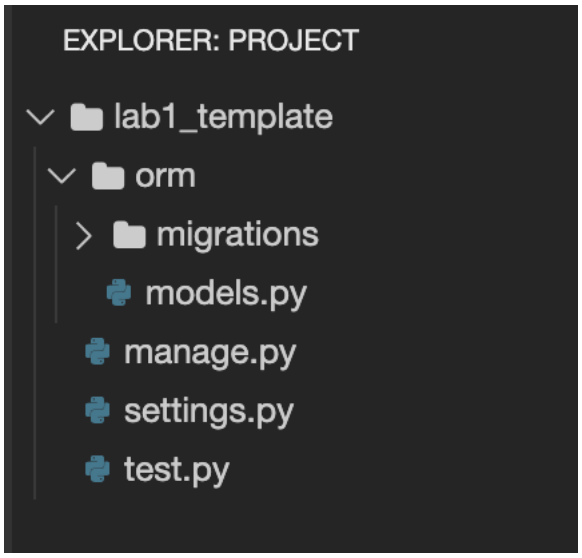
Copied! Executed!

You may need to press `Enter` key to run the last `rm` command.

After downloading and unzipping is done, click the `Explorer` on the left menu (the first button).



Your first Django project should look like the following:



Next, we need to set up a proper runtime environment for Django app.

- If the terminal was not open, go to `Terminal > New Terminal` and `cd` to the project folder

```
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```

```
cd lab1_template
```

Copied! Executed!

Let's set up a virtual environment which to contain all the packages we need.

```
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```

```
pip install virtualenv

virtualenv djangoenv

source djangoenv/bin/activate
```

Copied! Executed!

```
1
```

```
pip install -r requirements.txt
```

Copied! Executed!

The `requirements.txt` contains all necessary Python packages for you to run this lab.

In the created project, you could find some important project files:

- `manage.py` is a command-line interface that allows you to interact with and manage your Django project
- `settings.py` contains setting information about this project such as databases or installed Django apps
- `orm` folder is a container for a standalone Django ORM app
- `orm/models.py` contains model definitions

You will learn more details about these files in subsequent learning modules and labs.

Next let's connect our Django project to the `PostgreSQL` we started.

- Open `settings.py` and scroll to `DATABASES` section.

```
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11
```
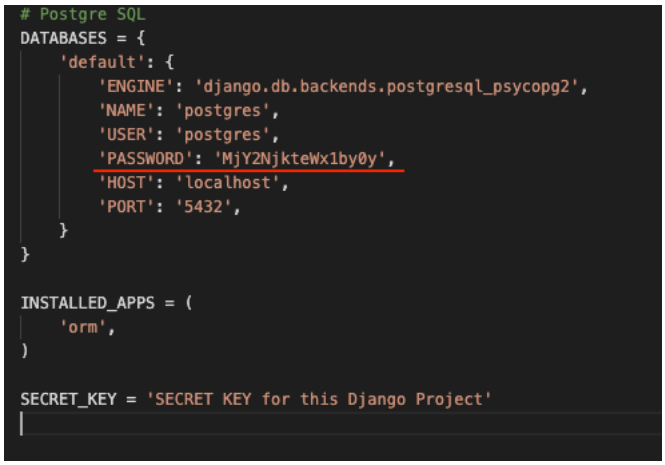

```
# Postgre SQL
DATABASES = {
    'default': {
        'ENGINE': 'django.db.backends.postgresql_psycopg2',
        'NAME': 'postgres',
        'USER': 'postgres',
        'PASSWORD': 'Place it with your password saved in Step 1',
        'HOST': 'localhost',
        'PORT': '5432',
    }
}
```

Copied!

- Replace the value of `PASSWORD` to be the generated `PostgreSQL` password generated in Step 1.

After that, your `settings.py` file should look like the following:



- OK now you first Django `orm` app is ready and you can start defining your first Django model in the next step

Define Your First Django Model

- Open `orm/models.py` (under `lab1_template/orm/` folder) and copy / paste the following snippet under comment

`# Define your first model from here:` to define a `User` model

```
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```

```
class User(models.Model):
    # CharField for user's first name
    first_name = models.CharField(null=False, max_length=30, default='john')
    # CharField for user's last name
```

```
    last_name = models.CharField(null=False, max_length=30, default='doe')
    # CharField for user's date for birth
    dob = models.DateField(null=True)
```

Copied!

Now you have defined a very simple `User` model that only contains `first_name` and `last_name` as `CharField` and `dob` as `DateField`

Activate the User Model

After the `User` model is defined, Django will be creating a corresponding database table called `orm_user`. The first part `orm` is your app name and the second part `user` is the model name.

Whenever you make changes to your models such as creating new models or modifying existing models, you need to perform database migrations. Django provides utils via `manage.py` interface to help you perform migrations.

- If your current working directory is not `/home/project/lab1_template`, `cd` to the project folder

```
1
```

```
cd /home/project/lab1_template
```

Copied! Executed!

- First, you will need to generate migration scripts for `orm` app

```
1
```

```
python3 manage.py makemigrations orm
```

Copied! Executed!

and you should see the following result in the terminal:

```
1
2
3
```

```
Migrations for 'orm':
  orm/migrations/0001_initial.py
    - Create model User
```

Copied!

- `orm/migrations` folder is where Django stores the changes to your models and you may wonder what SQL statements Django has created for your model migrations.

You can check the SQL statements by running:

```
1
```

```
python3 manage.py sqlmigrate orm 0001
```

Copied! Executed!

It prints the `orm_user` table creation SQL statement for you.

```
1
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3
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5
6
```

```
BEGIN;
--
-- Create model User
--
CREATE TABLE "orm_user" ("id" integer NOT NULL PRIMARY KEY AUTOINCREMENT, "first_name" varchar(30) NOT NULL, "last_name" varchar(30) NOT NULL, "dob"
COMMIT;
```

Copied!

In most cases, with Django Model works as ORM component, you don't need to worry about the SQL part at all. You can just use Django Model APIs provided to query/manipulate data in databases.

- Next, you can perform the migration to create `orm_user` table by running:

```
1
```

```
python3 manage.py migrate
```

Copied! Executed!

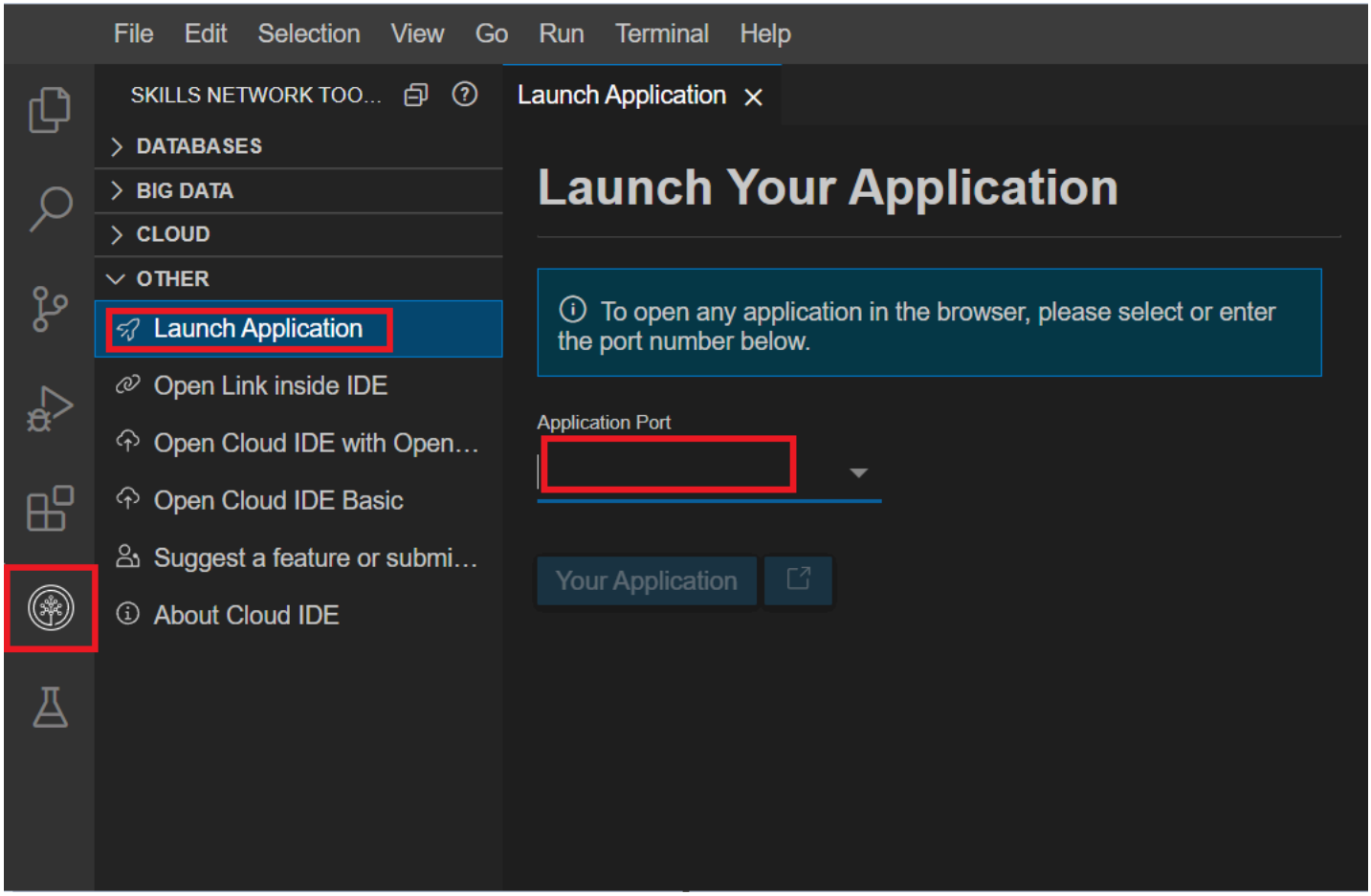
Django will perform migrations for all the installed apps including `orm` app.

```
1
2
3
4
```

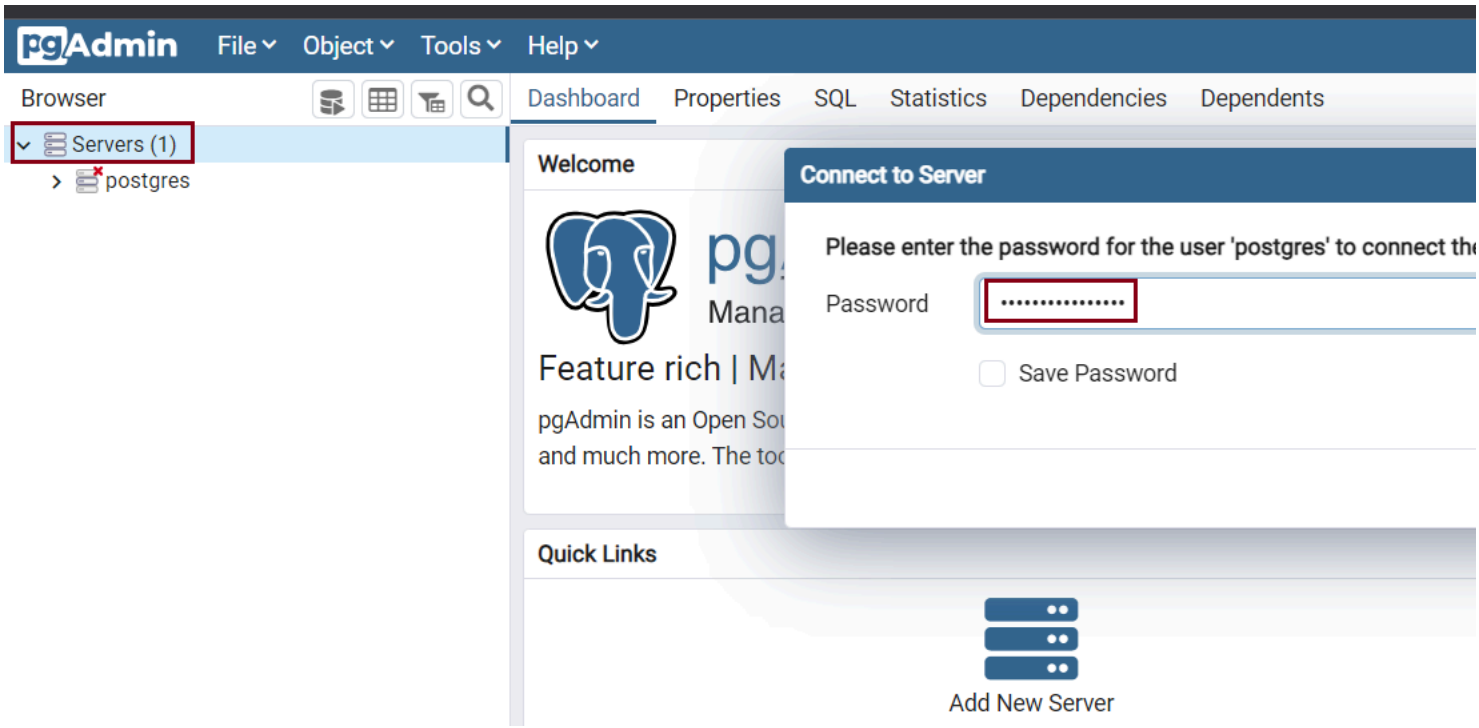
```
1. Operations to perform:
2.   Apply all migrations: orm
3. Running migrations:
4.   Applying orm.0001_initial... OK
```

Copied!

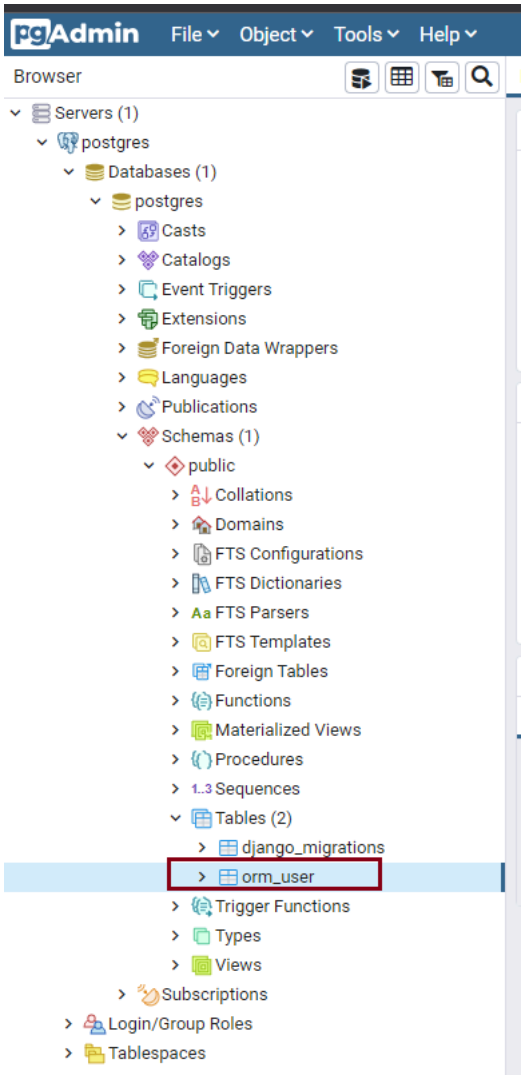
- Click on the Skills Network button on the left, it will open the **"Skills Network Toolbox"**. Then click the **Other** then **Launch Application**. From there enter the port no. as `5050`, and launch to open `pgAdmin`



- Once `pgAdmin` is started in a new browser tab, choose `Servers`, enter the password generated from Step 1 and click `OK`.



- Then expand `Databases->postgres->Schemas->public->Tables`, you should see the `orm_user` table created in previous migration step.



Test the Model

- Open `test.py` and you can find a `test_setup()` method to save a mockup `user` object and try to check if the user object was saved successfully.
- You could run the `test.py` to test your model:

```
1
```

```
python3 test.py
```

Copied!

You should see a message that reads,

> **Django Model setup completed.**

That's it, you have set up your first Django ORM app with first Django model.

Summary

In this lab, you have set up your first Django project and application. You have also created and tested your first Django model.

In the next lab, you will try to create some more real Django Models and perform Create, Read, Update, and Delete (CRUD) operations on them.

Author(s)

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