SQL Assignment – Building Energy

1. Using MySQL Workbench, create a new database called `BuildingEnergy`. All of the work below should be completed in the `BuildingEnergy` database. The SQL script should be self-contained, such that if it runs again it will re-create the database.

2. You should first create two tables, `EnergyCategories` and `EnergyTypes`. Each energy category can have many energy types.

- Populate the `EnergyCategories` table with rows for Fossil and Renewable.
- Populate the `EnergyTypes` table with rows for Electricity, Gas, Steam, Fuel Oil, Solar, and Wind.
- In the `EnergyTypes` table, you should indicate that Electricity, Gas, Steam, and Fuel Oil are Fossil energy sources, while Solar and Wind are renewable energy sources.

When inserting data into the tables, be sure to use an INSERT statement and not the table import wizard.

3. Write a JOIN statement that shows the energy categories and associated energy types that you entered. *It is good practice to check your work as you go by writing statements like this!*

	energycategory character varying	energytype character varying
1	Fossil	Electricity
2	Fossil	Fuel Oil
3	Fossil	Gas
4	Renewable	Solar
5	Fossil	Steam
6	Renewable	Wind

4. You should add a table called `Buildings`. There should be a many-to-many relationship between `Buildings` and `EnergyTypes`. Here is the information that should be included about buildings in the database:

- Empire State Building; Energy Types: Electricity, Gas, Steam
- Chrysler Building; Energy Types: Electricity, Steam
- Borough of Manhattan Community College; Energy Types: Electricity, Steam, Solar

5. Write a JOIN statement that shows the buildings and associated energy types for each building.

	building character varying	energytype character varying
1	Borough of Manhattan Community College	Solar
2	Borough of Manhattan Community College	Electricity
3	Borough of Manhattan Community College	Steam
4	Chrysler Building	Steam
5	Chrysler Building	Electricity
6	Empire State Building	Electricity
7	Empire State Building	Steam
8	Empire State Building	Gas

6. Please add this information to the `BuildingEnergy` database, inserting rows as needed in various tables.

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Building: Bronx Lion House; Energy Types:  Geothermal

Brooklyn Childrens Museum:  Energy Types: Electricity, Geothermal
```

7. Write a SQL query that displays all of the buildings that use Renewable Energies.

	building character varying	energytype character varying	energycategory character varying
1	Borough of Manhattan Community College	Solar	Renewable
2	Bronx Lions House	Geothermal	Renewable
3	Brooklyn Childrens Museum	Geothermal	Renewable

8. Write a SQL query that shows the frequency with which energy types are used in various buildings.

	energytype character varying	count bigint
1	Electricity	4
2	Steam	3
3	Geothermal	2
4	Solar	1
5	Gas	1

9. Do one (or more if you want!) of the following. 9(c) and 9(d) are both challenging--you are especially encouraged to work on in a group if you tackle one or both of these exercises!

a. Create the appropriate foreign key constraints.
b. Create an entity relationship (ER) diagram for the tables in the database. You can sketch this by hand and include a photo or scan if you wish.
c. Suppose you wanted to *design* a set of HTML pages to manage (add, edit, and delete) the information in the various database tables; create a *mockup* of the user interface (on paper or using a package like Balsamiq Mockups).
d. Suppose you want to track *changes over time* in energy type preferences in New York City buildings. What information should you add to each table? What might a report that shows the trends over time look like?