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CSC 315-01
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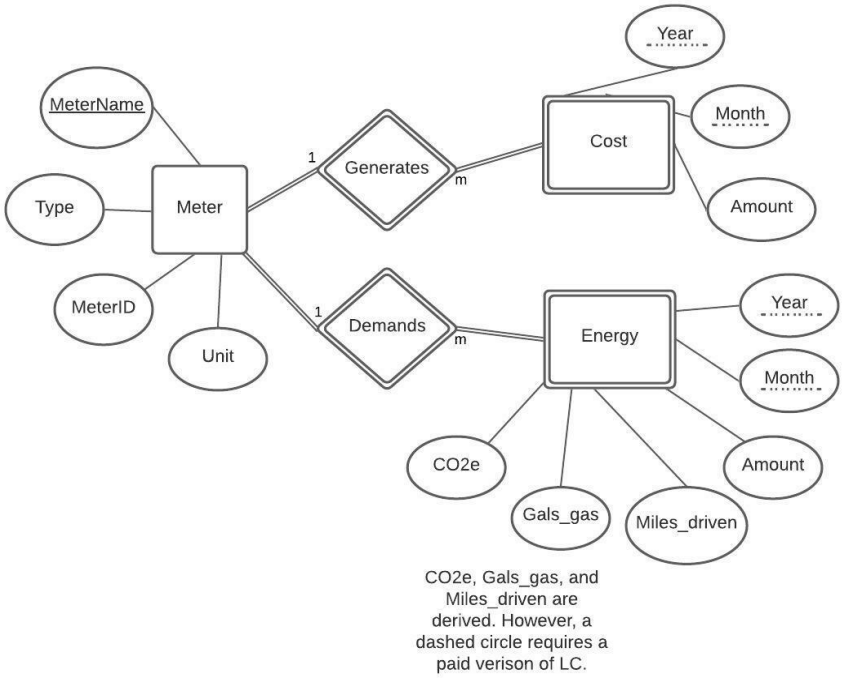
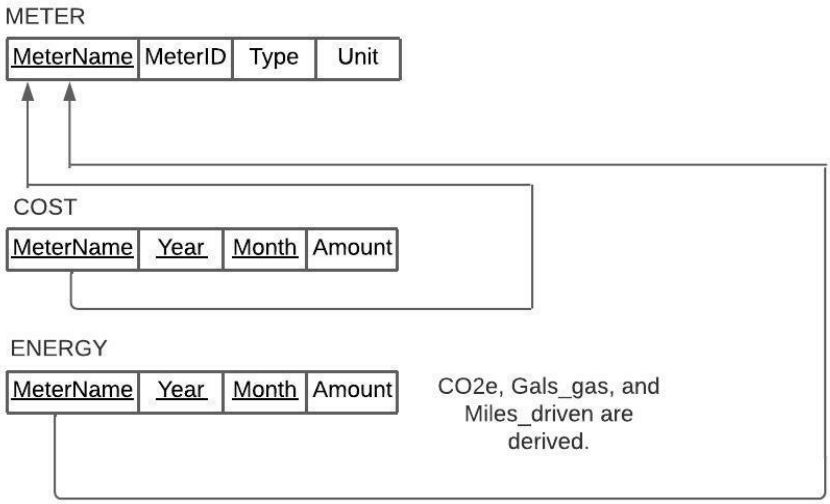
Database Model Document

ER Diagram



Relational Schema



Database Thoughts

- We have decided that CO2e, Gas_gals, and Miles_driven can be derived from Amount and Unit attributes in ENERGY. Therefore we are not going to directly store them in the database. LucidCharts requires a paid version to use dashed ovals, therefore we have added a note next to these attributes indicating that they are derived in the ER Diagram.

Initial Database Size

- 22 rows * 4 columns = 88 records in Meter (22 meters and 3 values to keep track of per meter)
- 1426 rows * 4 columns = 5704 records in Cost (1426 meter readings, and 4 values to keep track of per meter reading)
- 1426 rows * 4 columns = 11,408 records in Energy (1426 meter readings, and 4 values to keep track of per meter reading)

Types and Average Number of Searches

- Types of searches: join, project, grouping and aggregate functions
- To get the price, energy demand, and CO2e for a meter, year, and month combination we will need to join METER and COST. Each join will require the join condition to be checked 1426 times. We will then project the needed attributes.
- To calculate yearly averages we will use the AVG aggregate function. We will first select the tuples by the input year. Then, we will group by MeterName - This will require 12 additions and a division for each meter. Finally, we will select the input meter.

Sample Relational Algebra

Obtaining the cost amount for a user inputted meter, year, and month combination:

$$USER\_METER \leftarrow \sigma_{MeterName=<UserMeterInput>}(METER)$$

$$USER\_COMBO \leftarrow \sigma_{Year=<UserYearInput>\ AND\ Month=<UserMonthInput>}(USER\_METER \bowtie_{MeterName=MeterName} COST)$$

$$PRICE \leftarrow \pi_{Amount}(USER\_COMBO)$$