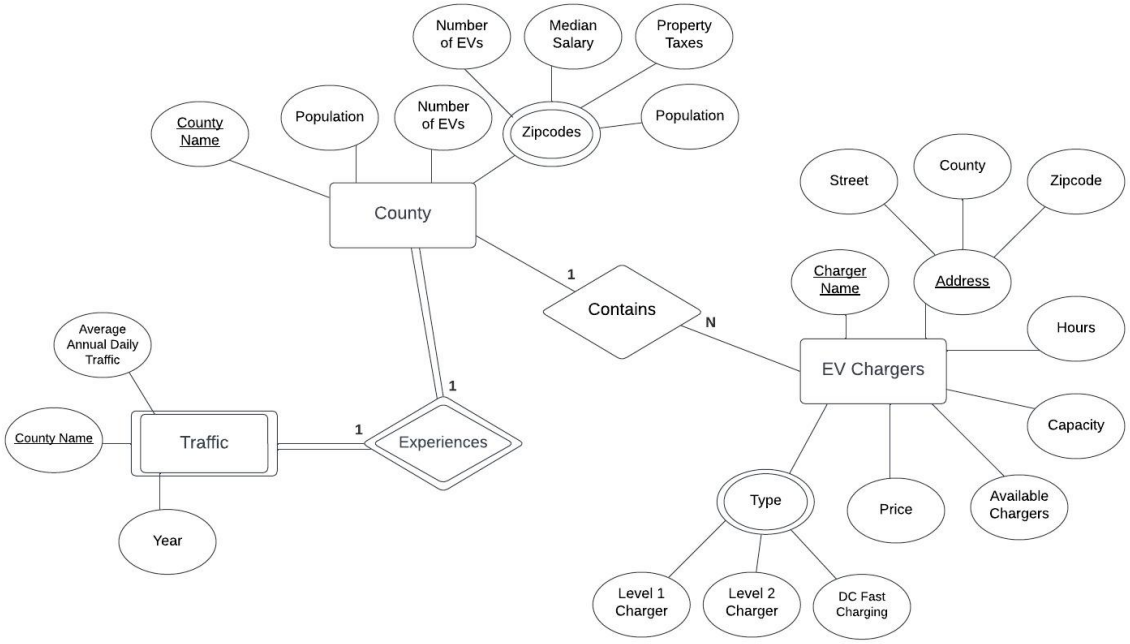
Phase III: NJ County EV Friendliness

ER Diagram:



A general description of how relational databases work and why they are valuable.

A relational database is a type of database that stores data in a structured way, organized into tables or relations. Each table contains rows, also called tuples, and columns, also called attributes. The tables can be related to each other based on common columns, forming a network of interconnected data. Using these related tables, we can create a miniworld, where data about the real world is stored into a virtual representation. These tables provide a consistent and structured way to store, manage, and access data about the real world. In our case, we want to store real word data about the EV friendliness of a county in New Jersey. Using a database, we can quickly

retrieve data that will provide the user with the information needed to make an informed decision about electric vehicles.

The various elements of your diagram and what they reveal about your database model.

The ER diagram representing our database will consist of the following databases: EV Ownership, NJ Annual Average Daily Traffic data, and NJ Census Data. The County relation would have a primary key called County Name. This would be unique for each tuple because there exists only one county with a given name. One County contains many EV Chargers (One-to-Many), thus a relationship exists between the two relations. The EV Chargers relation would have a primary key of Charger Name and a foreign key named Address, which is a composite of Street name, County, and Zip Code. The Traffic entity is a weak entity because its identification relies on the primary key of the relation County. None of the other attributes that exist in Traffic are unique. As a result, there exists an identifying relationship between County and Traffic. This relationship is One-to-One with full participation because every county has exactly one count of traffic.

The reasoning behind your database design given the goals for the sustainability project.

Traffic and population data is important when it comes to making a decision on whether to invest in an electric vehicle. Living in a county with lower average annual daily traffic counts can indicate that public transportation may be a more efficient method of commuting from one location to another. On the other hand, counties with higher traffic counts may indicate that public transportation options are barely accessible. Population

data can be used to see where a user ranks within their community. Data such as property taxes and median salary can help a user understand why some locations may have higher EV ownership than others. It can help a user decide whether their income is similar to those in the same community that own electric vehicles. By having the user enter information about their nearby location, they can be presented with the necessary information to make an informed decision.

A detailed textual use case that describes interactions with your proposed graphical user interface.

The actor's for our project would initially put in a request through input boxes. These boxes would ask for the following information: the county they live in and propose a range of how many miles they would typically travel in a day. With this data, the software could reach into the database and pull out relative chargers within the range and region. Using the charger's street location we can visually map the charger's location to a map of New Jersey. Also based on location we can pull down traffic data which can provide more insight into the practicality of purchasing an electric vehicle. The front-end will send the request to postgres which will contain the data the user entered. The data then will be returned after being appropriately filtered through SQL commands. The data can be further pruned through python before being served to the frontend to be visualized to the user.

Use Case Diagram: