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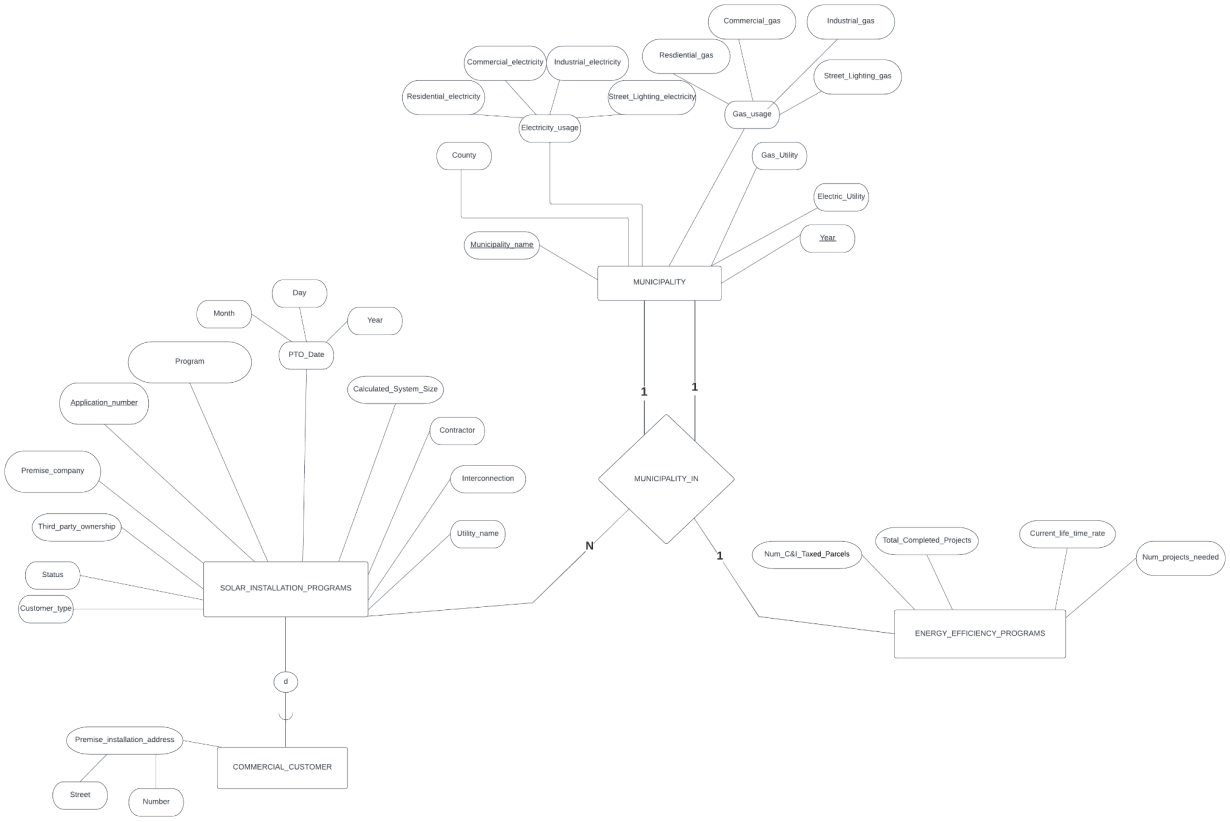
CSC315/BUS385/MGT385

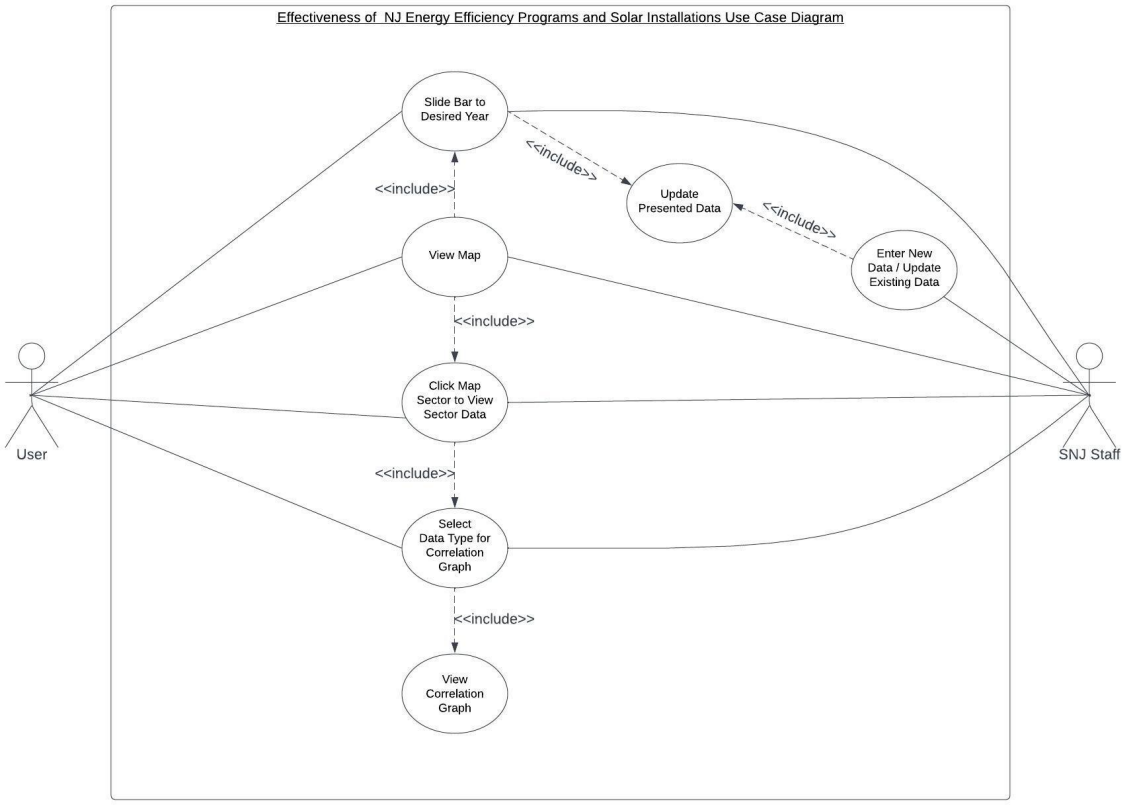
Effectiveness of NJ Energy Efficiency Programs and Solar Installations Model Explained

ER Diagram:



https://lucid.app/lucidchart/40154311-9125-4d48-9858-dd158b571a22/edit?viewport_loc=-1800%2C-266%2C6026%2C2749%2C0_0&invitationId=inv_1f8c1ddf-a6ac-4440-9e5c-1a1ef04d2033

UML Diagram:



Narrative:

Relational Databases: How and Why?

Databases are collections of sets of data that are managed by a database management system (DBMS). They are designed in a way such that the various sets of data are all ultimately related in some way or another, which allows us to process the data efficiently and get answers to queries that we have regarding the data. It also allows multiple users to easily insert, modify and delete existing data (depending on their permissions), and the changes from one user appear consistently for all other users of the database (Oracle, 2023).

Database Design, Elements, and Goals:

Our database consists of three entities, a specialization, and a ternary relationship between all entities. The municipality entity describes the energy and gas consumption of each township; the municipality is identified by its name and the year

the data was collected. The other two entities describe a municipality's participation in the energy efficiency and solar installation programs. The solar installation program has a specialization to specify between residential and commercial customers of solar companies. The ternary relationship MUNICIPALITY_IN describes that a municipality participates in one or both of the environmental programs. The goal of our database is to show the relationship between participation in these programs and how ecologically friendly the municipality is. We hope to see that municipalities that participate in one or both programs will use less electricity and gas.

Use Case Description:

Use Case: View Map

Actors: User or Sustainability NJ staff

Goal: Show overview of information on entire state of NJ

Typical Course of Events:

1. User navigates to the database application
2. Map will load as it is the main GUI
3. Map will be color coded for increased user readability

Exceptions:

1. Database application is not working or online, map will not load

Use Case: Slide Bar

Actors: User or Sustainability NJ Staff

Goal: Change the data presented based on year

Typical Course of Events:

1. Slide bar will start in the most recent year
2. User will click and drag slide bar to desired year
3. Once selected, the presented data will update to reflect the chosen year

Exceptions:

1. User selects a year that is not represented in the database. The slidebar will only be able to choose from 2015 to 2020. Some years in between do not have any recorded data but can be interpolated from surrounding years.

Use Case: Selecting Map Sector

Actors: User or Sustainability NJ staff

Goal: allow user to view details about specific areas in the state of NJ

Typical Course of Events:

1. While viewing the map, user will be able to click on any sector inside the map
2. This will bring up data on the specific sector, including average income and participation in eco programs

Use Case: Select Data Type for Correlation Graph

Actors: User and Sustainability NJ staff

Goal: Show comparisons on different data in a specific sector

Typical Course of Events:

1. While viewing the map, the user will click on the desired sector
2. The user will then be able to select between the available data
3. Once Selected, a correlation graph will be presented for the correlation between the specified data and energy consumption of the sector

Use Case: View Correlation Graph

Actors: No one

Goal: provide users with a comparison of energy consumption and a specified variable

Typical Course of Events:

1. User will select a sector on the map and select the variable desired for the graph
2. The graph will then be displayed over the map, showing now the selected variable correlates with energy consumption in the sector
3. The user may switch between variables at will and the graph will reflect their choices

Exceptions:

1. There is no direct user interaction, other use cases describe how the user will interact with and influence the graphs

Use Case: Enter New Data / Modify Existing Data in Database
Actors: Sustainability NJ staff
Goal: be able to expand available data and make changes to stored data
Typical Course of Events:

1. Staff will have a new or updated CSV file formatted similarly to the database
2. Staff will upload the CSV file to the database application
3. The database stores new data and correctly updates existing data

Exceptions:

1. If there is data for years not previously accounted for, the slide bar must be able to extend to show those years.
2. CVS may not be formatted correctly and database will not be able to understand the information.
3. Updating the existing data may cause conflicts in the map and graphs.

Use Case: Update Presented Data
Actors: No one
Goal: Take the user's specifications and modify the graphical interfaces to reflect the changes
Typical Course of Events:

1. User will select some option to view a specific set of data
2. The database will make a query to find the specified data
3. The map / graph will update the presented data to reflect the user's choice

Sources

Oracle. "What Is a Database?" *Oracle*, 2023, https://www.oracle.com/database/what-is-database/#:~:text=Database%20defined,

-A%20database%20is&text=Data%20within%20the%20most%20common,updated%2C%20controlled%2C%20and%20organized.