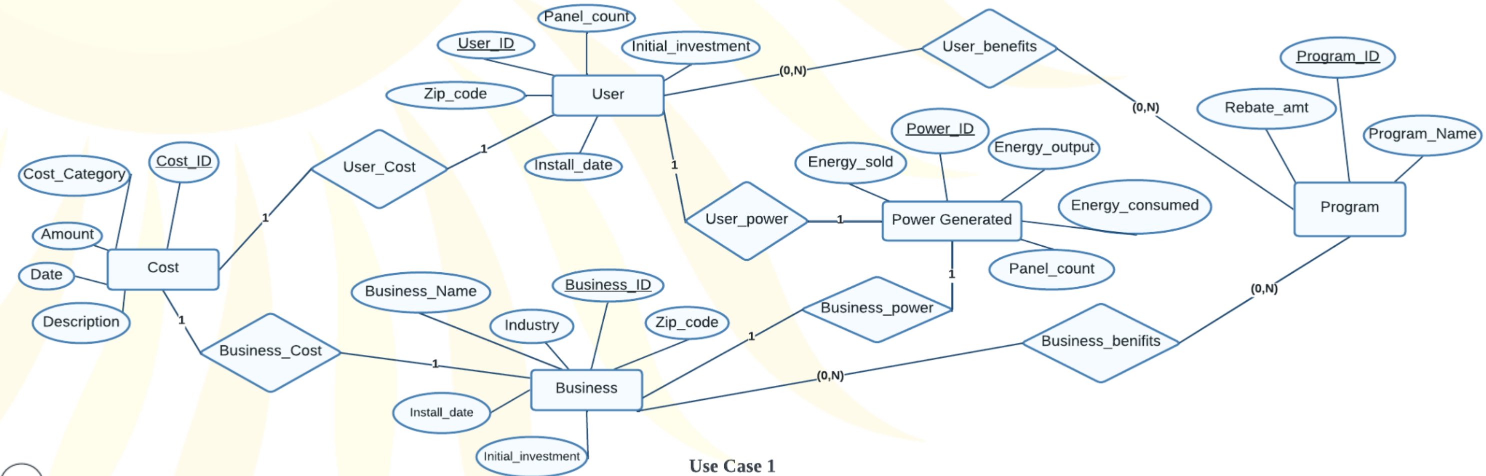
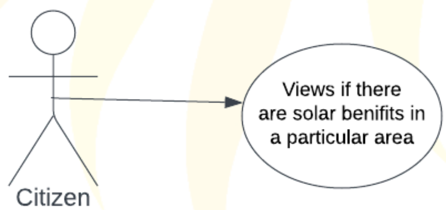
Phase III: The Database Model Explained

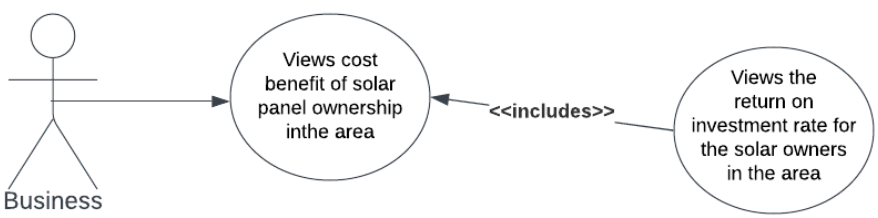
By: Claire Engebreth, Simon Blamo, Joe Petrecca, Mackenzie Malpass, and Sathya Rameshkumar





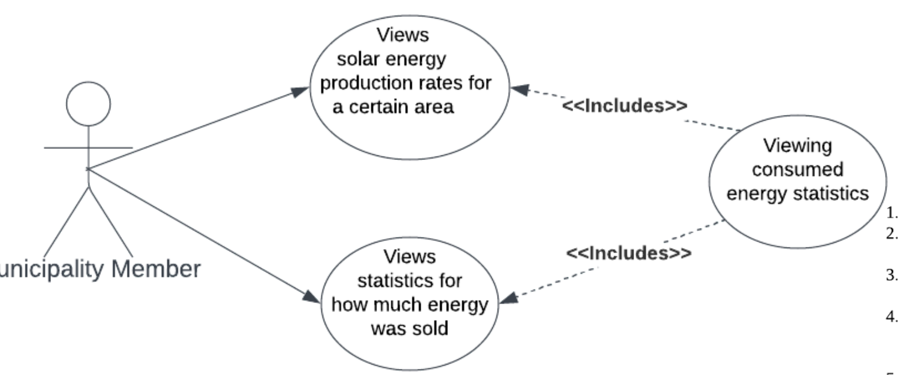
Use Case 1

1. The user logs in to the solar energy database with their account credentials.
2. The user navigates to the "Solar Energy Benefits" section of the database.
3. The user selects the "Search by Zip Code" option to find solar energy benefits for a specific area.
4. The user enters the zip code of the area they want to search for and clicks the "Search" button.
5. The database retrieves and displays information about the solar energy benefits for the selected area, including available government incentive programs, estimated cost savings, and environmental impact.
6. The user reviews the information and determines whether the benefits of solar energy production in the selected area are worth pursuing.
7. If the user decides to pursue solar energy production in the area, they can use the information provided by the database to take the next steps in the process, such as finding a solar energy installer or applying for government incentive programs.



Use Case 2

1. The business owner logs in to the solar energy database with their account credentials.
2. The business owner navigates to the "Solar Energy Cost-Benefit Analysis" section of the database.
3. The business owner selects the "Search by Zip Code" option to find solar energy cost-benefit analysis for a specific area.
4. The business owner enters the zip code of the area they want to search for and clicks the "Search" button.
5. The database retrieves and displays information about the solar energy costs and benefits for the selected area, including estimated installation costs, potential energy savings, available government incentive programs, and environmental impact.
6. The business owner reviews the information and determines whether the costs and benefits of solar energy production in the selected area are worth pursuing.
7. If the business owner decides to pursue solar energy production in the area, they can use the information provided by the database to take the next steps in the process, such as finding a solar energy installer or applying for government incentive programs.
8. The use case includes the step of looking at the initial investment costs, which shows the business owner how much they will need to invest in order to realize the potential cost savings and environmental benefits of solar energy production.



Use Case 3

1. The municipality member logs in to the solar energy database with their account credentials.
2. The municipality member navigates to the "Solar Energy Production and Sales" section of the database.
3. The municipality member selects the "View by Municipality" option to view solar energy production and sales for their municipality.
4. The database retrieves and displays information about solar energy production and sales in the municipality, including total solar energy production, energy sold to the grid, and energy used by municipality-owned facilities.
5. The municipality member reviews the information and analyzes the trends in solar energy production and sales in the municipality.
6. The municipality member can use this information to develop proposals for increasing solar energy production in the municipality, promoting solar energy adoption, and reducing greenhouse gas emissions.

The The use case includes the step of looking at energy production rates for the area and how much energy has been sold, which helps the municipality member identify the potential for solar energy production and understand the economic and environmental impact of solar energy in their municipality.

Actors and their interactions with the system:

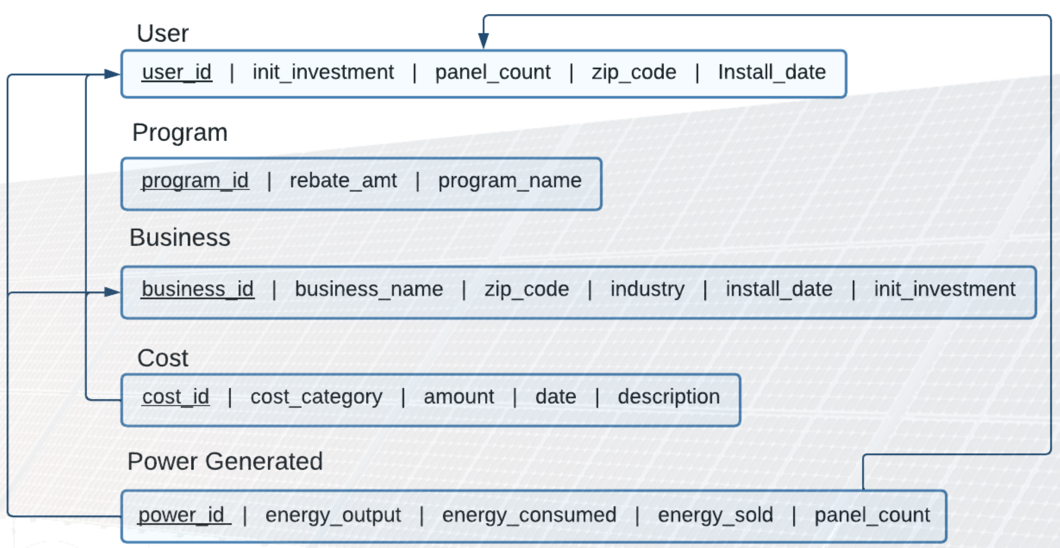
1. Citizen Users: These users are interested in solar panel technology and want to learn more about its benefits and how to implement it for their homes. They can access information on solar panel installation, energy savings, and available incentives through the database.
2. Business Owners: These users are interested in implementing solar panel systems for their businesses. They can access information on the costs and benefits of solar panel installations, available financing options, and incentive programs through the database.
3. Municipal Managers: These users are interested in promoting solar panel adoption within their communities. They can access data on solar panel usage and trends across their region, as well as benefits programs, policies and incentives related to solar panel adoption, through the database.

The goals that the system helps these actors achieve include:

1. Educating and informing users about the benefits of solar panel technology and how to implement it for their homes and businesses.
2. Providing data and insights to support decision-making around solar panel adoption, including information on costs, incentives, and energy savings.
3. Promoting positive change and contributing to a more sustainable future through increased solar panel adoption.

The scope of the system includes:

1. Gathering and storing data related to solar panel technology and its impact on sustainability.
2. Providing a user-friendly interface that allows users to access and analyze this data.
3. Supporting decision-making around solar panel adoption and promoting positive change towards a more sustainable energy future.



Narrative

Relational databases are a way of organizing and storing data in a structured format. They use tables to store data, with each table representing a specific entity or concept, such as users or solar panels. Each row in the table represents a specific instance of that entity, and each column represents a specific attribute or characteristic of that entity.

The elements of our diagram include entities such as users, businesses, government programs, and solar panels, as well as relationships between these entities such as installation and cost. The diagram shows the structure of the database and the relationships between the entities. It reveals information about the attributes and primary keys of each entity, as well as the types of relationships between them, such as one-to-one, one-to-many, and many-to-many.

Our database design was created with the goals of the sustainability project in mind. We aimed to create a comprehensive tool that would provide data and insights into the use of solar panels, and help users reason about important sustainability challenges. We designed our database to support multiple user types, including citizens, business owners, and municipal managers, and to offer a user-friendly interface that is simple and easy to use.

For example, one use case for a standard user is to search for the benefits of solar panels in a specific area. The user can enter their zip code and panel count to see the estimated energy output and savings, as well as the environmental benefits of using solar panels. Another use case for a business owner is to find a cost-benefit analysis of owning solar panels in their area. The owner can see the estimated costs of installation and maintenance, as well as the potential savings on energy bills and available government incentives. This use case includes an "includes" relationship between the search for benefits and the initial investment cost.

The design of our database was guided by the overarching goals of the sustainability project. As the use of solar panels has grown significantly in recent years, there is a growing need for reliable data and analysis to support decision-making around their use. We recognized the value of a comprehensive database that could store a wide range of data related to solar panels, including performance metrics, energy output, and cost. By doing so, we aimed to provide a tool that would help users explore questions such as the most effective solar panel models, which have the highest energy output, and the cost of installation and maintenance.

To ensure that our database could be used by a variety of stakeholders, we designed it to support multiple user types. This included citizens, who may be interested in information about solar panel installations in their area and the environmental benefits of solar power. Business owners may need more detailed information about the costs and benefits of solar panel installations, while municipal managers may need access to data on solar panel usage and trends across the entire region. By providing different levels of access to different user groups, the proposed database can ensure that users are only able to access the information that is relevant to their needs and interests.

We also recognized the importance of a user-friendly interface that is simple and easy to use. Our database design takes this into account and includes a graphical user interface that allows users to quickly and easily access the information they need. This interface is designed to be intuitive, with clear navigation and search functions that allow users to easily find the data they are looking for. By providing a user-friendly interface, we aimed to ensure that our database is accessible to a wide range of users, regardless of their technical expertise.

One key aspect of our database design is the use of a relational database model. This model allows us to store data in a structured way, with each piece of data linked to other related pieces of data. This makes it easy to search and analyze data, and to draw insights and conclusions from the data. Additionally, a relational database model provides the flexibility to easily update and modify data as needed, ensuring that the database remains current and relevant over time.

To help users navigate the data stored in our database, we created a UML Use Case diagram that models the proposed graphical user interface (GUI). This diagram illustrates the various elements of the GUI and the interactions between users and the database. It includes use cases for citizens, business owners, and municipal managers, each with their own unique goals and interactions with the database. For example, the citizen use case involves searching for information about solar panel installations in their area and the environmental benefits of solar power. Meanwhile, the business owner use case involves finding a cost-benefit analysis of owning solar panels in their area. And the municipal manager use case involves looking at energy production rates for the area and how much energy has been sold.

Overall, our database model and design were created to support positive change and contribute to a more sustainable future for all. The user-friendly interface and various use cases make it easy for users to access information and insights about solar panel adoption and its impact on sustainability.