usecaseDiagram

actor Customer

actor Admin

Customer -->(Register Account)

Customer -->(Login)

Customer -->(View Green Energy Products)

Customer -->(Learn About Carbon Footprint Reduction)

Customer -->(Schedule Consultation)

Customer -->(Schedule Installation)

Customer -->(Calculate Carbon Footprint)

Customer -->(Track Energy Usage)

Customer -->(Manage Account)

Customer -->(Access Accessibility Features)

Admin -->(Manage Product Catalog)

Admin -->(View Appointments)

Admin -->(Manage User Accounts)

Admin -->(Manage Content)

* **Actors:**
  + **Customer:** Represents the end-users who interact with the platform to learn about green energy, schedule services, and manage their energy usage.
  + **Admin:** Represents the Rolsa Technologies staff who manage the platform's content, users, and appointments.
* **Use Cases:**
  + **Register Account:** Allows customers to create a new account.
  + **Login:** Allows registered customers and admins to access the platform.
  + **View Green Energy Products:** Allows customers to browse and view information about solar panels, EV chargers, and smart home systems.
  + **Learn About Carbon Footprint Reduction:** Allows customers to access educational resources on reducing their carbon footprint.
  + **Schedule Consultation:** Allows customers to book appointments for consultations.
  + **Schedule Installation:** Allows customers to book appointments for installations.
  + **Calculate Carbon Footprint:** Allows customers to use the carbon footprint calculator.
  + **Track Energy Usage:** Allows customers to monitor and track their energy consumption.
  + **Manage Account:** Allows customers to update their profile information and manage their appointments.
  + **Access Accessibility Features:** Allows users to modify the websites display and navigation to better suit their needs.
  + **Manage Product Catalog:** Allows admins to add, edit, and remove product information.
  + **View Appointments:** Allows admins to view and manage scheduled appointments.
  + **Manage User Accounts:** Allows admins to manage customer and admin accounts.
  + **Manage Content:** Allows admins to add, edit, and remove articles and other informational content.
* **Relationships:**
  + The lines connecting actors to use cases indicate that the actor can initiate the use case.

ERD

erDiagram

CUSTOMER {

int customer\_id PK

varchar name

varchar email

varchar password

varchar address

varchar phone

}

PRODUCT {

int product\_id PK

varchar name

varchar description

decimal price

varchar specifications

varchar image\_url

}

APPOINTMENT {

int appointment\_id PK

int customer\_id FK

datetime appointment\_date

varchar service\_type

varchar status

}

CARBON\_FOOTPRINT {

int footprint\_id PK

int customer\_id FK

datetime calculation\_date

decimal electricity\_usage

decimal transportation\_usage

decimal lifestyle\_usage

decimal total\_footprint

}

ENERGY\_USAGE {

int usage\_id PK

int customer\_id FK

datetime date\_recorded

decimal electricity\_usage

decimal gas\_usage

}

ARTICLE {

int article\_id PK

varchar title

text content

varchar author

datetime publication\_date

}

CUSTOMER ||--o{ APPOINTMENT : "schedules"

CUSTOMER ||--o{ CARBON\_FOOTPRINT : "calculates"

CUSTOMER ||--o{ ENERGY\_USAGE : "tracks"

PRODUCT ||--o{ APPOINTMENT : "relates to"

CUSTOMER ||--o{ ENERGY\_USAGE : "records"

* **Entities:**
  + **CUSTOMER:** Stores customer information.
  + **PRODUCT:** Stores information about green energy products.
  + **APPOINTMENT:** Stores appointment details.
  + **CARBON\_FOOTPRINT:** Stores carbon footprint calculation results.
  + **ENERGY\_USAGE:** Stores energy consumption data.
  + **ARTICLE:** stores information about green energy articles.
* **Attributes:**
  + Each entity has attributes that define its properties.
  + PK indicates the primary key (unique identifier) of the entity.
  + FK indicates a foreign key, which links to the primary key of another entity.
* **Relationships:**
  + ||--o{ represents a one-to-many relationship.
    - A customer can schedule many appointments.
    - A customer can have many carbon footprint calculations.
    - A customer can track many energy usage records.
    - A product can be related to many appointments.
    - A customer can record many energy usage records.
  + The labels on the relationships (e.g., "schedules," "calculates") describe the nature of the relationship.

**Key Considerations:**

* This ERD represents a simplified model. You might need to add more entities and attributes depending on the specific requirements of the application.
* Data types (e.g., varchar, int, decimal, datetime) are used for clarity. You would choose appropriate data types based on the database system you use.
* This Diagram is designed to provide a solid base for the database design.

DATABASE DESIGN

-- Database Design for Rolsa Technologies Platform

-- Tables:

-- 1. Customers

CREATE TABLE Customers ( customer\_id SERIAL PRIMARY KEY, name VARCHAR(255) NOT NULL, email VARCHAR(255) UNIQUE NOT NULL, password VARCHAR(255) NOT NULL, -- Consider hashing passwords! address VARCHAR(255), phone VARCHAR(20), registration\_date TIMESTAMP DEFAULT CURRENT\_TIMESTAMP );

-- 2. Products

CREATE TABLE Products ( product\_id SERIAL PRIMARY KEY, name VARCHAR(255) NOT NULL, description TEXT, price DECIMAL(10, 2), specifications TEXT, image\_url VARCHAR(255), category VARCHAR(50) -- e.g., Solar Panel, EV Charger, Smart Home );

-- 3. Appointments

CREATE TABLE Appointments ( appointment\_id SERIAL PRIMARY KEY, customer\_id INT REFERENCES Customers(customer\_id), appointment\_date TIMESTAMP NOT NULL, service\_type VARCHAR(50) NOT NULL, -- e.g., Consultation, Installation status VARCHAR(20) DEFAULT 'Pending', -- e.g., Pending, Confirmed, Completed, Cancelled product\_id INT REFERENCES Products(product\_id) -- Optional: if appointment relates to a specific product );

-- 4. Carbon Footprint Calculations

CREATE TABLE CarbonFootprintCalculations ( footprint\_id SERIAL PRIMARY KEY, customer\_id INT REFERENCES Customers(customer\_id), calculation\_date TIMESTAMP DEFAULT CURRENT\_TIMESTAMP, electricity\_usage DECIMAL(10, 2), -- kWh transportation\_usage DECIMAL(10, 2), -- kg CO2 equivalent lifestyle\_usage DECIMAL(10, 2), -- kg CO2 equivalent total\_footprint DECIMAL(10, 2) -- kg CO2 equivalent );

-- 5. Energy Usage Tracking

CREATE TABLE EnergyUsageTracking ( usage\_id SERIAL PRIMARY KEY, customer\_id INT REFERENCES Customers(customer\_id), date\_recorded DATE NOT NULL, electricity\_usage DECIMAL(10, 2), -- kWh gas\_usage DECIMAL(10, 2), -- cubic meters or similar unit other\_usage DECIMAL(10,2), -- for other types of energy );

-- 6. Articles

CREATE TABLE Articles ( article\_id SERIAL PRIMARY KEY, title VARCHAR(255) NOT NULL, content TEXT, author VARCHAR(255), publication\_date TIMESTAMP DEFAULT CURRENT\_TIMESTAMP, category VARCHAR(50) );

-- 7. User Roles (Optional, for admin panel)

CREATE TABLE UserRoles ( role\_id SERIAL PRIMARY KEY, role\_name VARCHAR(50) UNIQUE NOT NULL );

-- 8. Users (Optional, for admin panel)

CREATE TABLE Users ( user\_id SERIAL PRIMARY KEY, username VARCHAR(255) UNIQUE NOT NULL, password VARCHAR(255) NOT NULL, -- Consider hashing passwords! role\_id INT REFERENCES UserRoles(role\_id) );

-- Indexes (for performance)

CREATE INDEX idx\_customer\_email ON Customers (email); CREATE INDEX idx\_appointment\_customer ON Appointments (customer\_id); CREATE INDEX idx\_footprint\_customer ON CarbonFootprintCalculations (customer\_id); CREATE INDEX idx\_usage\_customer ON EnergyUsageTracking (customer\_id);

* **Data Types:** Appropriate data types are used for each column (e.g., VARCHAR, INT, DECIMAL, TIMESTAMP).
* **Primary and Foreign Keys:** Primary keys are used to uniquely identify records, and foreign keys establish relationships between tables.
* **Indexes:** Indexes are added to improve query performance, especially for frequently accessed columns.
* **Password Hashing:** It's crucial to hash passwords securely using a strong hashing algorithm (e.g., bcrypt) instead of storing them in plain text.
* **Normalization:** The database is designed with normalization principles in mind to reduce data redundancy and improve data integrity.
* **Scalability:** The design can be scaled to accommodate future growth and additional features.
* **Optional Tables:** The UserRoles and Users tables are optional and would be used if you implement an admin panel with user roles and permissions.
* **Units of Measure:** Be sure to clarify what units of measure are used in the energy usage table.
* **Soft Deletes:** Consider adding a 'deleted' boolean field to all tables, instead of actually deleting data, to allow for data recovery.