Solar-Decathlon-2018-Document

Database Description - The data team designed the database design for the system. The entities, fields and relations are explained below. The link to the design of the database is :- [Design Link.](#)

- Building - This entity stores general information about every building.
    1. building_id (PK) (int) - This is a field which stores an unique number for every building.
    2. city (varchar) - This is a field which describes the city in which the building is.
    3. street (varchar) - This field stores data about the name of the street where the building lies.
    4. postcode (varchar) - This field stores the postcode of the building.
    5. country (varchar) - This field stores the country in which the building is.
    6. nr_of_floors (int)- This field stores data about the number of floors that a building has.
    7. building_name (varchar) - This field stores the name of the building.

- Houses - This entity stores data on every house of the building. A building has many houses.
    1. house_id (PK) (int) - This is an unique number for every house in the entity.
    2. floor_nr (int) - This fields describes the floor number of the house in the building
    3. time_created (datetime) - This is the date and time when house was created.
    4. time_updated (datetime) - This is the date and time when the data for the house was last updated.
    5. type (varchar) - This field stores the type of house.
    6. house_rating (float) - This field stores the rating given to a house on basis of the performance/efficiency of the house.
    7. enery_budget (float) - Here the budget of the energy consumption for every house is set.
    8. building_id (FK) (int) - This is a foreign key from the table "Building".

- Water_System - This entity stores data about the general information about the water system of every house. Every house has one water system.
    1. water_system_id (PK) (int) - This field stores an unique number for every water system for a house.
    2. total_usage (float) - This field stores total water used by the water system belonging to that house.

3. System_status (enum("ON", "OFF")) - This field shows the current status of the water system of the house.
4. house_id (FK) (int) - This is a foreign key from the table Houses.

- Family - This entity stores data about the family living inside the house. A house can have many families.
  1. family_id (PK) (int) - This field has unique number for each family.
  2. number_of_members (int) - This field stores the number of members in an family.
  3. house_id (FK) (int) - This is a foreign key from the table "Houses".

- Weekdays - This entity stores data about the time when the family works and when it is at home on every day. This data can be used to predict when the appliances are mostly used.
  1. day_of_the_week (PK) (varchar) - This field stores name of the day.
  2. family_id (PK, FK) (int) - This is a foreign key from "Family" table.
  3. work_day_start (time) - This field stores the time when the last member in the house leaves the house on a particular day.
  4. Work_day_end (time) - This field stores the time when the first member in the house arrives in the house on a particular day.

- Personal_details - This entity stores general information about every person living in the building. A family has many people.
  1. personId (PK) (int) - This field has unique number for identifying every person.
  2. birthdate (date) - This field contains date of birth for every person.
  3. food_preference (enum("Not Applicable", "Flexitarian", "Pescatarian", "Vegetarian", "Vegan")) - This field contains the type of diet a person usually takes.
  4. last_sleep_from (datetime) - This field stores the time person slept last time.
  5. last_sleep_till (datetime) - This entity stores the time when the person woke up from the last sleep.
  6. first_name (varchar) - This stores the first name of the person.
  7. last_name (varchar) - This stores the last name of the person.
  8. middle_name (varchar) - This stores the middle name of the person.
  9. gender (enum("Male", "Female")) - This stores the gender of the person.
  10. age (int) - This stores the age of the person.
  11. email (varchar) - This stores the email of the person.
  12. phone_nr (varchar) - This stores the phone number of the person.
  13. family_id (FK) (int) - This is a foreign key from "Family" table.

- Person_Activity - This entity describes the activities every person performs every time. A person can perform many activities. A Type_Of_Activity belongs to many person_activity.
    1. activity_id (PK) (int) - This field has an unique number for every activity that a person performed.
    2. activity_start_time (datetime) - This field stores the starting date and time of the activity.
    3. activity_end_time (datetime) - This field stores the ending date and time of the activity.
    4. activity_duration (time) - This field stores the duration in which the activity was performed.
    5. activity_type (FK) (varchar) - This is a Foreign key from "Type_Of_Activities".
    6. personId (FK) (int) - This is a foreign key from "Personal_Details".

- Type_Of_Activities - This entity describes general information about the Activities a person can perform.
    1. activity_type (PK) (varchar) - This field stores the name of the activity. Example:- (Running)
    2. activity_description (varchar) - This field gives a description of the activity.

- Battery - This entity stores general information about the battery of the house. A building has one battery.
    1. battery_id (PK) (int) - This field has an unique number for the battery of every building.
    2. percentage_charged (float) - This field stores data on how much the battery has been charged.
    3. system_status (enum("ON", "OFF")) - This field stores if the system is ON or OFF.
    4. building_id (FK) (int) - This is a foreign key from the table "Building".

- Solar_Panel - This entity stores general information about solar panels. A battery has many solar panels.
    1. solar_panel_id (PK) (int) - This field has an unique number for every solar panel in the house.
    2. energy_generated (float) - This field stores the energy generated by every solar panel.
    3. system_status (enum("ON", "OFF")) - This field stores if the system is ON or OFF.
    4. send_to_grid (enum("TRUE", "FALSE")) - This field stores if the system is sending energy to the grid.

5. battery_id (FK) (int) - This is a foreign key from the table "Battery".
6. grid_id (FK) (int) - This is a foreign key from the table "Grid".

● Grid - This entity stores general data about the Grid of the building.
1. grid_id (PK) (int) - This field has an unique number for every grid.
2. total_power_stored (float) - This field stores data about the total energy that every grid has stored.

● Solar_Panel_Readings - This entity stores the readings for the solar panels from time to time. A solar panel has many solar_panel_readings.
1. solar_panel_reading_id (PK) (int) - This field has an unique number for every reading.
2. timestamp (datetime) - The field holds the date and time when the sensors read the values.
3. energy_generated (float) - This field stores the energy generated from the last reading till the current one.
4. send_to_grid (enum("TRUE", "FALSE")) - This field stores if the system is sending energy to the grid at the time of the reading.
5. Solar_panel_id (FK) (int) - This is a foreign key from the table "Solar_Panel".

● Weather - This entity stores data about the latest information received from weather forecast. A building has one weather.
1. weather_id (PK) (int) - This field is an unique number for every reading for Weather table.
2. reading_time (datetime) - This field stores the date and time when the entry was entered in the "Weather" table.
3. temperature (float) - This field stores the latest temperature outside the building.
4. humidity (float) - This field stores the latest humidity outside the house in percentage.
5. windspeed (int) - This field stores the latest wind speed value in the "Weather" table in km/hr.
6. wind_direction (int) - This field stores the latest value of the angle of the wind flow in degrees (int value).
7. solar_radiation (float) - This field stores latest value for the solar radiation in weber/(m^2).
8. amount_of_CO2 (float) - This field stores latest value for the amount of CO_2 outside the building in percentage.
9. building_id (FK) (int) - This is a foreign key from the table "Building".

- Weather_Readings - This entity stores data about all the readings of the weather outside every building. A "Weather" table has many "Weather_Readigs".
    1. weather_readings_id (PK) (int) - This field is an unique number for every reading for Weather_Readings table.
    2. current_reading_time (datetime) - This field stores the date and time when the entry was entered in the "Weather_Readings" table.
    3. current_temperature (float) - This field stores the temperature outside the building.
    4. current_humidity (float) - This field stores the humidity outside the house in percentage.
    5. current_windspeed (int) - This field stores the wind speed value in the "Weather_Readings" table in km/hr.
    6. current_wind_direction (int) - This field stores the value of the angle of the wind flow in degrees (int value).
    7. current_solar_radiation (float) - This field stores value for the solar radiation in weber/(m^2).
    8. current_amount_of_CO2 (float) - This field stores value for the amount of CO_2 outside the building in percentage.
    9. weather_id (FK) (int) - This is a foreign key from the table "Weather".

- Rooms - This entity stores general data about the rooms inside the house. A house has many Rooms and a Room belongs to a particular house.
    1. room_id (PK) (int) - This field is an unique number for every room in a building.
    2. room_name (varchar) - This field stores the name of the room.
    3. last_humidity (float) - This field stores last reading received for humidity inside the room.
    4. last_temperature (float) - This field stores last reading received for the temperature inside the room.
    5. last_amount_CO2 (float) - This field stores last reading received for the amount of CO_2 in percentage inside the room.
    6. last_reading_time (datetime) - This field stores date and time of the new entry added to the current table.
    7. nr_of_appliances (int) - This field stores the total number of appliances inside a room.
    8. last_lux (float) - This field stores data about the brightness inside a room which is measured in lux.
    9. night_mode (enum("ON", "OFF")) - This field stores data if the night_mode inside the room is on or off.
    10. house_id (FK) (int) - This field is a foreign key from the table "Houses".

- Room_Readings - This entity stores data about all the readings like weather and general information readed by the sensors inside the room. Every room has many room readings.
    1. Reading_time (PK) (datetime) - This field stores date and time of every reading inside rooms table when the reading is entered inside the database.
    2. temperature (float) - This field stores the temperature inside the room.
    3. humidity (float) - This field stores the humidity inside the room in percentage.
    4. amount_of_CO2 (float) - This field stores the amount of CO2 inside the room in percentage.
    5. lux (float) - This field stores the brightness inside the room measured in lux.
    6. room_id (FK) (int) - This is foreign key from the table "Rooms".

- Room_Water_Meter - This entity stores general information about the water meter inside the room. A room can have one or many water meters.
    1. meter_id (PK) (int) - This field stores an unique number for every meter.
    2. avg_water_consumed (float) - This field stores the average of hot and cold water consumed everyday.
    3. meter_status (enum("ÖN", "OFF")) - This field stores data on the status of the water meter, if it is on or off.
    4. room_id (FK) (int) - This field is a foreign key from the table "Rooms".

- Room_Water_Meter_Readings - This entity stores all the readings from the water meter sensors inside the rooms. A Room_Water_Meter has many Room_Water_Meter_Readings.
    1. meter_readings_id (PK) (int) - This field is an unique number for every reading for Room_Water_Meter_Readings table.
    2. water_consumed (float) - This field stores data about the water consumed between previous and current reading from the water meter sensor.
    3. reading_time (datetime) - This field stores date and time when a new row is entered in the table.
    4. hot_water_reading (float) - This field stores data about the hot water consumed from previous reading to the current one.
    5. cold_water_reading (float) - This field stores data about the cold water consumed from previous reading to the current one.
    6. meter_id (int) - This field is a foreign key from Room_Water_Meter table.

- Light - This entity stores data about every light inside the room. A Room has many Lights.
    1. light_id (PK) (int) - This field stores an unique number for every new light.

2. colour_temperature (float) - This field stores the colour temperature for every light.
3. brightness (float) - This field stores the brightness of every light in lux.
4. room_id (FK) (int) - This is a foreign key from the table "Rooms".

- Sockets - This entity stores general information about the sockets inside the house. A Room has many Sockets. An appliance can be connected to various sockets.
    1. socket_id (PK) (int) - This field stores an unique number for every socket.
    2. socket_status (enum("ON", "OFF")) - This field stores data about the current status of the sockets which could be on or off.
    3. average_power_consumed (float) - This field stores the average of power consumed by the socket everyday.
    4. socket_name (varchar) - This field stores the name of every socket.
    5. room_id (FK) (int) - This is a foreign key from the table Rooms.
    6. appliance_id (FK) (int) - This is a foreign key from the table List_Of_All_Possible_Appliances.

- Socket_Readings - This entity stores data about all the readings from the sockets. Every socket has many socket readings.
    1. socket_readings_id (PK) (int) - This field is an unique number for every reading for Socket_Readings table.
    2. power_consumed (float) - This field stores the power consumed whenever the status of the socket changes from ON to OFF.
    3. reading_time (datetime) - This field stores the date and time whenever a new row is entered in Socket_Readings table.
    4. socket_id (FK) (int) - This is a foreign key from Sockets table.

- List_Of_All_Possible_Appliances (PK) (int) - This entity stores general information about all the appliances in the building.
    1. appliance_id (PK) (int) - This field stores an unique number for every appliance in the building.
    2. appliance_name (varchar) - This field stores the name of the appliance.
    3. maximum_kwh (float) - This field stores the maximum energy that an appliance can consume.
    4. minimum_kwh (float) - This field stores the minimum energy that an appliance can consume.
        - ❖ Maximum and minimum energy that an appliance can consume is stored to try and guess which appliance is connected to the socket. Maximum and minimum energy for an appliance is addition and subtraction of 2kw-h to the actual value it consumes.

5. last_brightness (float) - This field stores the value of last brightness that the appliance had.

- Appliance_Brightness - This entity stores data about the brightness of the appliances when it is changed. For example :- Laptop, mobile, etc. An appliance can have many readings with appliance brightness.
    1. appliance_brightness_id (PK) (int) - This field stores an unique number for every reading for the brightness of the appliance.
    2. brightness (float) - This field stores the brightness of the appliance for every reading in lux.
    3. time (datetime) - This field stores date and time when the brightness is changed.
    4. Appliance_id (FK) (int) - This is a foreign key to the table List_Of_All_Possible_Appliances.

- Appliance_Water_Meter - This entity stores general information about the water meter of the appliance. An appliance which requires water can have only one water meter. Eg:- washing machine.
    1. meter_id (PK) (int) - This field stores an unique number for every meter.
    2. avg_water_consumed (float) - This field stores the average of hot and cold water consumed everyday.
    3. meter_status (enum("ÖN", "OFF")) - This field stores data on the status of the water meter, if it is on or off.
    4. appliance_id (FK) (int) - This field is a foreign key from the table "List_Of_All_Possible_Appliances".

- Appliance_Water_Meter_Readings - This entity stores all the readings from the water meter sensors inside the appliances. An Appliance_Water_Meter has many Appliance_Water_Meter_Readings.
    7. meter_readings_id (PK) (int) - This field is an unique number for every reading for Appliance_Water_Meter_Readings table.
    8. water_consumed (float) - This field stores data about the water consumed between previous and current reading from the water meter sensor.
    9. reading_time (datetime) - This field stores date and time when a new row is entered in the table.
    10. hot_water_reading (float) - This field stores data about the hot water consumed from previous reading to the current one.
    11. cold_water_reading (float) - This field stores data about the cold water consumed from previous reading to the current one.
    12. meter_id (int) - This field is a foreign key from Appliance_Water_Meter table.