Data Type

Household

|  |  |  |
| --- | --- | --- |
| Attribute | Data type | Nullable |
| Email | String | Not Null |
| Square footage | Integer | Not Null |
| Household type | String | Not Null |
| Utilities | String | Null |
| Heating | Integer | Null |
| Cooling | Integer | Null |

Postal Code

|  |  |  |
| --- | --- | --- |
| Attribute | Data type | Nullable |
| Postal Code | String | Not Null |
| City | String | Not Null |
| State | String | Not Null |
| Latitude | Float | Not Null |
| Longitude | Float | Not Null |

Power Generator

|  |  |  |
| --- | --- | --- |
| Attribute | Data type | Nullable |
| Order Number | Integer | Not Null |
| Generation type | String | Not Null |
| Average monthly kilowatt hours generated | Integer | Not Null |
| Battery storage capacity | Integer | Null |

Appliance

|  |  |  |
| --- | --- | --- |
| Attribute | Data type | Nullable |
| Order Number | Integer | Not Null |
| BTU rating | Integer | Not Null |
| Manufacturer name | String | Not Null |
| Model name | String | Null |

Air handler

|  |  |  |
| --- | --- | --- |
| Attribute | Data type | Nullable |
| RPM | Integer | Null |
| EER | Float | Null |
| SEER | Float | Null |
| HSPF | Float | Null |
| Energy source | String | Null |

Water heater

|  |  |  |
| --- | --- | --- |
| Attribute | Data type | Nullable |
| Tank size | Float | Null |
| Energy source | String | Null |
| Current temperature setting | Integer | Null |

Business Constraints

1. Appliance Addition and Deletion:

- Any appliance that is added to the system must have its number, type, manufacturer, and model name.

- The system must allow deletion of an appliance in case the details were entered incorrectly.

2. Power Generation Addition and Conditionals:

- A newly added household will not have any power generation information by default, and the user must be shown the "Add power generation" form.

- If a household is "off-the-grid", the user must provide power generation information and cannot skip this step.

- If a household is not "off-the-grid", the user can choose to skip this step.

3. Power Generation Listing and Deletion:

- For every power generation method entered, the system must display the generator type, monthly kilowatt hours, and battery storage capacity (if applicable).

- The system must allow the deletion of a power generation method in case details were entered incorrectly.

- If all generators are deleted and the household is "off-the-grid", the user cannot leave this screen until at least one generator has been added.

4. Reports Generation:

- When a user chooses the "View reports" menu option, a list with links to generate each report listed in this section will be displayed.

- If a report requires parameters, inputs for these parameters should be provided to the user.

- If parameters are missing or incorrect, the report should not be executed and an error message should be displayed.

- If a report does not return any results, an appropriate message should be displayed instead of a blank page or an empty table.

5. Top 25 Popular Manufacturers:

- The system must be able to generate a report listing the top twenty-five manufacturers with the most appliances in the database.

6. Manufacturer/Model Search:

- The system must allow the user to enter a string and return a list of distinct results where the entered string matches (case insensitively) any part of a manufacturer name or model name.

7. Heating/Cooling Method Details:

- The system must provide statistics grouped and ordered by household type, including the count of various appliances and average values of certain properties.

8. Water Heater Statistics by State:

- The system must provide a report with water heater statistics for each state.

9. Off-the-Grid Household Dashboard:

- The system must provide a report with specific details about off-the-grid households.

10. Household Averages by Radius:

- The system must allow users to input a postal code and a search radius to provide household statistics within a certain distance of a postal code.

- The postal code must be validated, and if invalid, an appropriate error message must be displayed.

TD

1. Main Menu

- Lock Types: Read-only locks to retrieve menu options.

- Number of Locks: Single lock.

- Enabling Conditions: Triggered by successful login.

- Frequency: High, as it's accessed upon every successful login.

- Consistency (ACID): Not critical, order is not critical.

- Subtasks: None. No decomposition needed.

- Mother Task: Not needed.

2. Household Info

- Lock Types: Read-only locks for viewing household info, write locks for updating household info.

- Number of Locks: Multiple, depending on the number of fields in the household info.

- Enabling Conditions: Enabled by successful login and user's access rights.

- Frequency: Medium, depends on how often users view or update their household info.

- Consistency (ACID): Not critical, as simultaneous updates to household info by multiple users are not expected.

- Subtasks: None.

- Mother Task: Could be part of a larger task like "Manage Household Energy".

3. Add Appliance

- Lock Types: Write locks for adding new appliances.

- Number of Locks: Multiple, corresponding to the number of fields in the appliance info.

- Enabling Conditions: Enabled by user selection from the main menu and access rights.

- Frequency: Low, depends on how often users add new appliances.

- Consistency (ACID): Important, to prevent duplicate entries or conflicts when adding new appliances.

- Subtasks: None.

- Mother Task: Could be part of a larger task like "Manage Household Appliances".

4. Appliance Listing

- Lock Types: Read-only locks for viewing the appliance list.

- Number of Locks: Single lock to access the appliance list.

- Enabling Conditions: Enabled by user selection from the main menu and access rights.

- Frequency: Medium, depends on how often users view the appliance list.

- Consistency (ACID): Not critical, as simultaneous viewing of the appliance list by multiple users is not problematic.

- Subtasks: None.

- Mother Task: Could be part of a larger task like "Manage Household Appliances".

5. Add Power Generation

- Lock Types: Write locks for adding new power generation info.

- Number of Locks: Multiple, depending on the number of fields in the power generation info.

- Enabling Conditions: Enabled by user selection from the main menu and access rights.

- Frequency: Low, depends on how often users add new power generation info.

- Consistency (ACID): Important, to prevent duplicate entries or conflicts when adding new power generation info.

- Subtasks: None.

- Mother Task: Could be part of a larger task like "Manage Household Energy".

6. Power Generation Listing

- Lock Types: Read-only locks for viewing the power generation list.

- Number of Locks: Single lock to access the power generation list.

- Enabling Conditions: Enabled by user selection from the main menu and access rights.

- Frequency: Medium, depends on how often users view the power generation list.

- Consistency (ACID): Not critical, as simultaneous viewing of the power generation list by multiple users is not problematic.

- Subtasks: None.

- Mother Task: Could be part of a larger task like "Manage Household Energy".

7. Wrapping Up

- Lock Types: None required.

- Number of Locks: None required.

- Enabling Conditions: User has completed other tasks and wants to

7. Wrapping Up

- Lock Types: None required.

- Number of Locks: None required.

- Enabling Conditions: User has completed other tasks and wants to end the session.

- Frequency: High, every user session ends with this.

- Consistency (ACID): ACID properties are not applicable here.

- Subtasks: None.

- Mother Task: Could be part of a larger task like "Manage Household Energy".

8. View Report

- Lock Types: Read-only locks for viewing the report.

- Number of Locks: Single lock to access the report.

- Enabling Conditions: Enabled by user selection from the main menu and access rights.

- Frequency: Low to Medium, depends on how often users view the report.

- Consistency (ACID): Not critical, as simultaneous viewing of the report by multiple users is not problematic.

- Subtasks: None.

- Mother Task: Could be part of a larger task like "Manage Household Energy".

Please note that the "Manage Household Energy" and "Manage Household Appliances" are hypothetical mother tasks I've suggested based on the task decompositions above. They may or may not be applicable to your specific project.