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Data Types

Household

Attribute	Data Type	Nullable
Household Type	String	Not Null
Email	String	Not Null
Postal Code	Integer	Not Null
3 Digit Area Code	Integer	Null
7 Digit Number	Integer	Null
Number Type	String	Null
Square Foot (ft2)	Integer	Not Null
Occupants	Integer	Not Null
Bedroom Count	Integer	Not Null

Appliances

Attribute	Data Type	Nullable
Type	String	Not Null
Manufacturer	String	Not Null
ID	Integer	Not Null
Household	String	Not Null
Model Name	String	Null

TV (Appliances Subtype)

Attribute	Data Type	Nullable
Max Resolution	String	Not Null
Display Size	Integer	Not Null
Display Type	String	Not Null

Dryer (Appliances Subtype)

Attribute	Data Type	Nullable
Heat Source	String	Not Null

Washer (Appliances Subtype)

Attribute	Data Type	Nullable
Loading Type	String	Not Null

Oven (Appliances Subtype)

Attribute	Data Type	Nullable
Oven Type	String	Not Null
Heat Source	String	Not Null

Refrigerator/Freezer (Appliances Subtype)

Attribute	Data Type	Nullable
Refrigerator/Freezer Type	String	Not Null

Bathroom

Attribute	Data Type	Nullable
Bathroom Number	Integer	Not Null
Type	String	Not Null
Primary	Bool	Null

Full Bathroom (Bathroom SubType)

Attribute	Data Type	Nullable
Bathtubs	Integer	Not Null
Showers	Integer	Not Null
Tub/showers	Integer	Not Null
Bidets	Integer	Not Null
Commodes	Integer	Not Null
Sinks	Integer	Not Null

Full Bathroom (Bathroom SubType)

Attribute	Data Type	Nullable
Name	String	Null
Bidets	Integer	Not Null
Commodes	Integer	Not Null
Sinks	Integer	Not Null

Business Logic Constraints

Main Menu

- When initially accessing the application the user will have the ability to either enter household information, or view reports.

Household Information

User Startup

- Users who are new to Hemkraft must enter their email address
- Users who have an existing household associated with their email address in the Hemkraft system will not be able to add their household.

Postal Code Entry

- If the postal code entered by the user does not match one in the database, they will be thrown an error.
- Users will be asked to confirm their city and state based on the entered postal code. If the user answers no to the confirmation they will be prompted to re-enter their postal code.

Phone Number Entry

- If the phone number entered by the user already matches one in the database, the user shall be thrown an error.

Bathroom Entry

- If the user has already entered a primary full bathroom, they will be unable to add another one.

Reports

View Report

- If the report requires any parameter to generate, the relevant parameters are displayed with a submit button to generate the report. If there are any incorrect or missing parameters upon submission, the user will be thrown an error message.
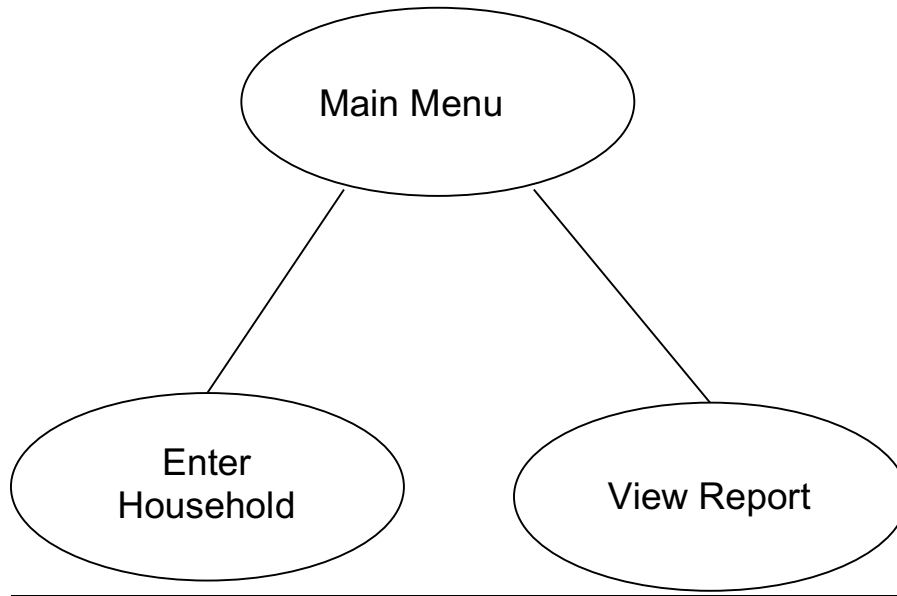
- If there are no results for a report, the user will see a corresponding message. The NULL values will be replaced with empty strings.

Task Decomposition with Abstract Code

Main Menu
Task Decomposition

Lock Types: Two Lookups, one read to enter Householdinfo and one to view report
Number of Locks: All two are read-only
Number of schemas: Single
Enabling Conditions: Triggered by successful login.
Frequency: As many times as successful access to the application and return from a task to Household info page or Query page
Consistency(ACID): Not critical, one user can enter Household information while another user is looking at it(view Report)
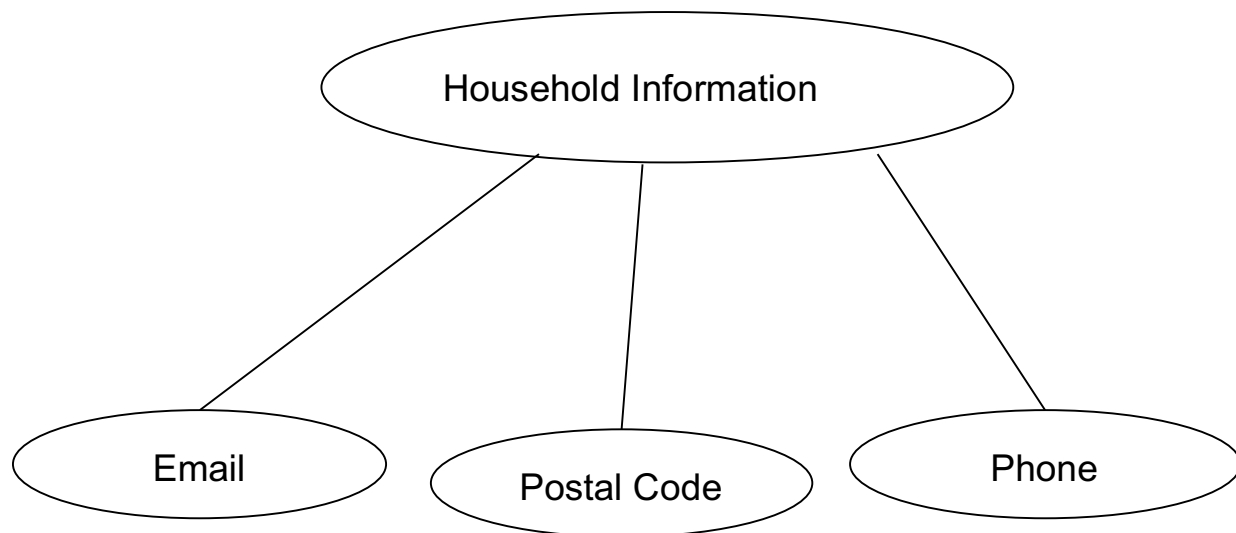**Subtasks:** View or display Data or read page to enter household information

Abstract Code
- User access's application and is presented with two options
    - When *View Reports* menu option is selected:
        - Show *"Top 25 Popular Manufacturers", "Manufacturer/Model Search", "Average TV Display Size By State", "Extra Fridge/Freezer", "Laundry Center",* and *"Bathroom Statistics"* links.
    - If the report does not need any parameter, the individual **Report** will be displayed after click the link, otherwise:
        - Click *Top 25 Popular Manufacturers* link - Jump to the **Top 25 Popular Manufacturers Form**.

- Click *Manufacturer/Model Search* link - Jump to the **Manufacturer/Model Search** **Form**.
    - Click *Average TV Display Size By State* link - Jump to the **Average TV Display Size By State** **Form**.
    - Click *Extra Fridge/Freezer* link - Jump to the **Extra Fridge/Freezer Form**.
    - Click *Laundry Center* link - Jump to the **Laundry Center Form**.
    - Click *Bathroom Statistics* link - Jump to the **Bathroom Statistics** **Form**.
  - Click *Submit* button to generate report.
    - If there is no missing or incorrect input data:
      - If the report is empty:
        - Replace all NULL values with empty strings
      - Display the **Report**.
    - Else display the error message.

  - When *Enter my household info* menu option is selected
    - User completes *Email ('$email')* input field.
    - If data validation is successful for the *Email ('$email')* input field, then:
      - When *Submit* button is clicked:
        - If User *Email ('$email')* is found:
          - Return to **Main Menu** form, with an error message.
      - Else:
        - Store *Email* as session variable *('$email')*.
        - Go to **Postal Code** form.
    - Else *Email* field is invalid, display **Main Menu** with error message

Household Information

Lock Types: Read and insert email on email address entry, Read and insert city and state information on Postal code , Read and insert on phone number entry
Number of Locks: 3 Read-only and 3 Insert/Update

Number of schemas: Single
Enabling Conditions: Triggered by successful login.
Frequency: Every time a user clicks on "enter my household info", and enter an email that does not exist in the database
Consistency(ACID): a successful email must be entered before adding a real postal code then phone number
Subtasks: Get email address, post code entry and phone number entry

Abstract Code

- When ***Enter my household info*** menu option is selected
    - User completes *Email ('*$email'*)* input field.
    - If data validation is successful for the *Email ('*$email'*)* input field, then:
        - When ***Submit*** button is clicked:
            - If User *Email ('*$email'*)* is found:
                - Return to **Main Menu** form, with an error message.
        - Else:
            - Store *Email* as session variable *('*$email'*)*.
            - Go to **Postal Code** form.
    - Else *Email* field is invalid, display **Main Menu** with error message

Postal Code
Task Decomposition
Lock Types: One lookup of postalcode and single insert/update when use confirms city and and state
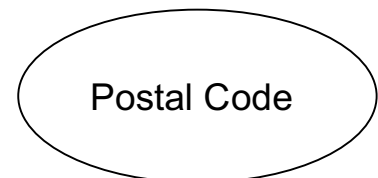**Number of Locks:** 1 read only and 1 insert
Number of schemas: single
Enabling Conditions: Triggered by user entering valid postal code and previously entering and valid email.
Frequency: every time a successful email is entered and valid postal code entered by user
Consistency(ACID):
Subtasks: Mother Task is not needed. No decomposition needed.

Postal Code

Abstract Code

- User completes *Postal Code ('*$postal_code'*)* input field.
- If data validation is successful and the *Postal Code ('*$postal_code'*)* matches one listed in the database, then:
    - Display the city and state and prompt the User to confirm that the entered *Postal Code ('*$postal_code'*)* matches the desired city and state with ***"Yes"*** and ***"No"*** buttons.
        - If User clicks "***Yes"*** **city and state saved** - Jump to **Phone Number Entry** form.
        - If User clicks **"No"** - Jump back to the **Postal Code** form.

- If data validation is unsuccessful and the *Postal Code (*'$postal_code'*)* does not match any one listed in the database, then throw an error message.

Phone Number
Task Decomposition
Lock Types: 1 lookup for number type and 2 inserts for area code and number
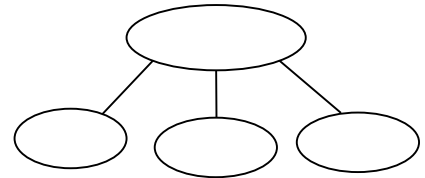**Number of Locks:** single read-only and 2 insert
Number of schemas: single
Enabling Conditions: Triggered by user completing **Postal Code** form.
Frequency: every successful click on yes will permit user to add phone number information
Consistency(ACID): The use must answer yes in order to add phone number
Subtasks: Mother Task is not needed. No decomposition needed.

Abstract Code
- User confirms if they want to enter a *Phone Number (*'$phone_number'*)* with the **"Yes/No"** button.
  - If User selects **"Yes"**:
    - User inputs:
      - *Area Code (*'$area_code'*)*
      - *Number (*'$number'*)*
      - *Number Type (*'$number_type'*)*
    - If the *Phone Number (*'$phone_number'*) satisfies the data validation,*
      - Click **Next** - Jump to **Household Info** form
    - Else *Phone Number* field is invalid, display **Phone Number** with error message
  - If User selects **"No"**:
      - Click **Next** - Jump to **Household Info** form
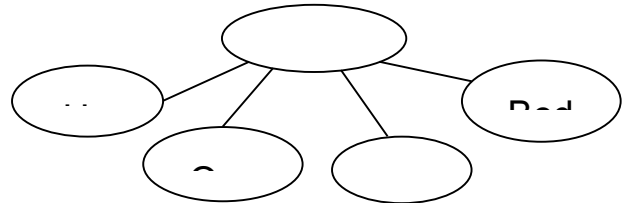
Household Info
Task Decomposition
Lock Types: 4 inserts of Household type, number of occupants, square footage and bedroom counts
Number of Locks: 4 insert locks
Number of schemas: single
Enabling Conditions: Triggered by completing **Phone Number** form.
Frequency: after every successful phone number input

Consistency(ACID): not critical, order is not critical
Subtasks: Mother Task is not needed. No decomposition needed.

Abstract Code
- User inputs:
  - *Household Type ('$household_type')*
  - *Square Foot(ft2) ('$sq_ft')*
  - *Occupants ('$occupants')*
  - *Bedrooms ('$bedrooms')*
- If the *User Inputs satisfy the data validation,*
  - Click *Next* - Jump to **Bathroom** form.
- Else *User Inputs* field is invalid, display **User Inputs** with error message

Bathroom
Task Decomposition
Lock Types: 3 lookups, one for bathroom type, another for if primary and the other for bathroom listing. 1 insert of bathroom type(either half or full). 6 insert for sinks, commodes, bidets, bathtubs, showers, tub/showers counts and another insert if the bathroom is primary bathroom
Number of Locks: 8 insert locks normally
Number of schemas: single
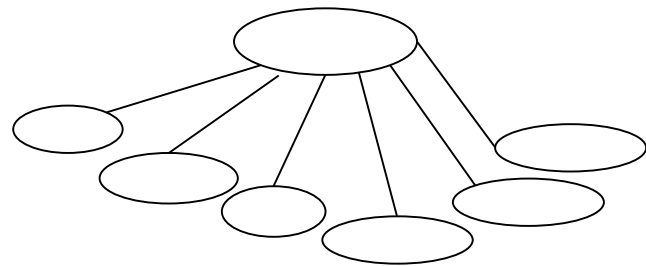**Enabling Conditions:** Triggered by completing **Household Info** form.
Frequency: Every time a user clicks next after household info
Consistency(ACID): every user can only assign a primary bathroom one
Subtasks: Bathroom listing and add another bathroom, No decomposition needed.

Abstract Code
- User clicks on either half or full as bathroom type
- User inputs:
  - Sinks('$Sinks)
  - Commodes('$Commodes)
  - Bidets('$Bidets)
  - Bathtubs('$Bathtubs)
  - Showers('$Showers)
  - Tub/showers('$Tub/showers)
- User check beside *This bathroom is a primary bathroom*
- Click *add* - to insert all information to the database
- After adding a bathroom, the bathroom listing showing bathroom's number, type and if it is a primary bathroom

- Next, the user can choose to add another bathroom or Click *Next* - Jump to **Appliances** form.

Appliances

Task Decomposition
Lock Types: one lookup to choose appliance type and 3 insert/updates for appliance type, manufacturer and model name
Number of Locks: 1 read-only and 3 insert
Number of schemas: single
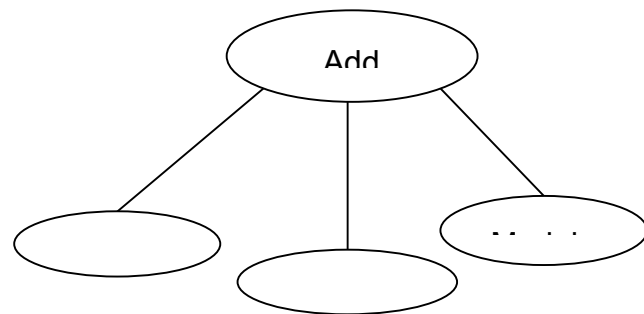**Enabling Conditions:** Triggered by completing **Bathroom** form
Frequency: Every time a user completes bathroom form and clicks next to add appliance information.
Consistency(ACID): optimally, the appliance type must be chosen first to prompt the user for information specific to that type after adding
Subtasks: Subtask dependence on which appliance type the user chooses for example display type, display type and maximum resolution can be required if appliance type of TV is chosen

Abstract Code
- User clicks on "add appliance" button and is required to:
  - Choose appliance type from list in the database
  - Add appliance manufacturer('$Manufacturer)
  - Add appliance model name('$model)
  - And based on the appliance type chosen, the user is prompted with information specific to the appliance. Where appliance chosen is Cooker with a combination of oven and cooktop;
    - The user is expected to choose between gas, electric and microwave as a heat source of oven
    - The user is also prompted to choose the heat type for example convection for the oven
    - On the cooker's cooktop side, the user adds the heat source for example induction
  - Click *Next* - Jump to **add** to add the appliance
  - After adding the appliance, the appliance listing is shown listing appliance number, type manufacturer and model.

○ Below the listing table, the user is provided with two options to either;
  ■ add another appliance, returning the user to "add appliance" form
  ■ Or to finish adding appliances by clicking **Next**

Reports

Task Decomposition

Lock Types: one lookup to choose which type of report that will be generated
Number of Locks: 1 read-only
Number of schemas: single
Enabling Conditions: Triggered by **View Reports** menu option is selected if the report does not require any parameters. If the report requires any input parameters, the report is generated after the **Submit** button is clicked, and no missing or incorrect data is identified
Frequency: Every time a user clicks
Consistency(ACID): An error message will be thrown if the report is empty. The instances with NULL values will be replaced with empty strings.
Subtasks: Subtask dependence on which type of the report the user wants to display.

Abstract Code

● User clicks on "add appliance" button and is required to:
  ○ Click **Top 25 Popular Manufacturers** link - Jump to the **Top 25 Popular Manufacturers Form**.
    ■ The top 25 manufacturers with the most appliances will be listed.
    ■ Click each **Manufacturer Name**, a drilldown report by manufacturer will be provided. This will include the raw count of each appliances for this manufacturer.
  ○ Click **Manufacturer/Model Search** link - Jump to the **Manufacturer/Model Search Form**.
    ■ User inputs: *String ('$string')*
    ■ A list of manufacturer name and model name which match the string will be displayed.
  ○ Click **Average TV Display Size By State** link - Jump to the **Average TV Display Size By State Form**.
    ■ The list of average TV display size per state is displayed.
    ■ Click each **State Name**, a drilldown report by state will be provided. This will include the screen type, maximum resolution, and average display size.
  ○ Click **Extra Fridge/Freezer** link - Jump to the **Extra Fridge/Freezer Form**.
    ■ A count of all households with more than one fridge or freezer will be displayed
    ■ Top ten states for the households with multiple fridges or freezers will be displayed. This will also include the % of chest freezers, upright freezers, and all other freezers.

- ○ Click *Laundry Center* link - Jump to the **Laundry Center <u>Form</u>**.
    - ■ The most common washer type and dryer heat source by state will be displayed in one table.
    - ■ Another table will display the household count per state with washer but without dryer.
- ○ Click *Bathroom Statistics* link - Jump to the **Bathroom Statistics <u>Form</u>**.
    - ■ The minimum, average, and the maximum of the count of all bathrooms, half bathrooms, full bathrooms, commodes, sinks, bides, bathtubs, showers, and tubs/showers, per household will be displayed.
    - ■ The state and postal code with the most count of bidets are displayed.
    - ■ Counts of households which have only one single bathroom are displayed.
- ○ Click *Household Average by Radius* link - display only
    - ■ The search results for the household statistics within a certain distance of a postal code is displayed. The results include average bathroom count, average bedroom count, average occupant count, the ratio of commodes to occupants, average number of appliances, and the most common heat source is displayed.