

## **CS 6400 Database Systems Concepts and Design**

Team 22 - Phase 1 Report

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## 1. Tables

### 1.1. User Table

Attribute	Data Type	Nullable
Logged_in_User_Name	String	Not
Password	String	Not
Logged_in_First_Name	String	Not
Logged_in_Last_Name	String	Not
User_Type	String	Not

### 1.2. Repair Table

Attribute	Data Type	Nullable
VIN	String	Not
Repair_Status	String	Not
Vendor_Name	String	Not
Vendor_Address	String	Not
Vendor_Phone_Number	Integer	Not
Description	String	Not
Start_Date	Timestamp	Not
End_Date	Timestamp	Not
Repair_Cost	Decimal	Not
NHTSA_Recall_Campagin_Number	String	Null

### 1.3. Recall Table

Attribute	Data Type	Nullable
<b>NHTSA_Recall_Campagin_Number</b>	String	Not
<b>Recall_Description</b>	String	Not
<b>Recall_Manufacture</b>	String	Not

#### 1.4. Vehicle Table

Attribute	Data Type	Nullable
<b>VIN</b>	String	Not
<b>Vehicle_Type</b>	String	Not
<b>Vehicle_Manufacturer</b>	String	Not
<b>Model_Name</b>	String	Not
<b>Model_Year</b>	Integer	Not
<b>Vehicle_Color</b>	String	Not
<b>Mileage</b>	Integer	Not
<b>Sales_Price</b>	Decimal	Not
<b>Vehicle_Description</b>	String	Null

#### 1.5. Sell\_Transaction Table

Attribute	Data Type	Nullable
<b>VIN</b>	String	Not
<b>Sale_date</b>	Timestamp	Not
<b>Sale_price</b>	Decimal	Not
<b>Salesperson_username</b>	String	Not

## 1.6. Buy\_Transaction Table

Attribute	Data Type	Nullable
VIN	String	Not
Inventory_clerk_username	String	Not
Customer_tax_identification_number	String	Null, see constraints
Customer_driver_license_number	String	Null, see constraints
Purchase_date	Timestamp	Not
Purchase_price	Decimal	Not
Blue_book_value	Integer	Not
Purchase_condition	String	Not

## 1.7. Customer Table

Attribute	Data Type	Nullable
Address	String	Not
Phone	String	Not
Email	String	Null
Customer_name	String	Null, see constraints
Driver_license_number	String	Null, see constraints
Tax_identification_number	String	Null, see constraints
Business_name	Integer	Null, see constraints
Primary_contact_name	String	Null, see constraints
Primary_contact_title	String	Null, see constraints

## 2. Business Logic Constraints

- Only the Owner and Inventory Clerk have the access to read and write the **Recall/Repair** and **Vehicle** Tables.
- The *Model\_Year* in the **Vehicle** Table cannot exceed current year plus one and must be 4-digits form.
- Inventory clerk and owner have links to Add Repair and Edit repair button;
- If Repair.Status is 'complete' or **Vehicle.VIN** not in **Repair** table, no **Add Repair** nor **Edit Repair** is allowed;
- If **Vehicle.VIN** in **Sell\_transcation** table, neither changes in repair nor sell vehicle is allowed;
- If a VIN number is associated with an item in **Sell\_transcation**, no further sale transaction on the item with same *VIN* is allowed.
- **Repair.End\_date** >= **Repair.Start\_date**;
- **Repair.Repair\_cost** >= 0;
- **Vehicle.Vehicle\_mileage** >= 0;
- **Vehicle.Model\_year** >= 1900;
- **Sell\_transcation.Sale\_date** >= **Buy\_transcation.Purchase\_date**;
- In table **Buy\_transcation**, one of the attributes *Customer\_driver\_license\_number* and *Customer\_tax\_identification\_number* will be null, and the other one will be not null.
- If person is selected in add new customer subtask, in table **Customer**, *Driver\_license\_number* and *Customer\_name* are not null while *Tax\_identification\_number*, *Business\_name*, *Primary\_contact\_name* and *Primary\_contact\_title* are forced to be null;
- If business is selected in add new customer subtask, in table **Customer**, *Driver\_license\_number* and *Customer\_name* are forced to be null while *Tax\_identification\_number*, *Business\_name*, *Primary\_contact\_name* and *Primary\_contact\_title* are not null;

### 3. Assumptions

- The *Username* on **User** table is unique.
- The *User\_type* on the **User** table could only be one of "Inventory\_clerk", "Salespeople", "Manager" and "Owner".
- The *NHTSA\_Recall\_Campagin\_Number* in **Recall** table and **Repair** table is unique and may link with multiple repairs, and will not be changed.
- The *VIN* in **Vehicle** table is unique and will not be changed.
- The *Status* in the **Repair** table could only be one of "Pending", "In Progress" and "Complete".
- The vehicle in the **Repair** table which is under "Pending" or "In Progress" could not be presented in the public search results.
- $\text{Vehicle.Sales\_price} = \text{Vehicle.Purchase\_price} * 125\% + \text{Repair.Repair\_cost} * 110\%$ ;

### 4. Task Decomposition and Abstract Code

Public Search

**Task Decomposition:**



**Lock Types:** Read-only on **Vehicle**, **Sell\_Transaction** and **Repair** Table.

**Number of Locks:** 3

**Enabling Conditions:** None

**Frequency:** About 100 vehicle search requires per day

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

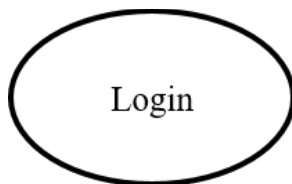
**Subtasks:** Mother Task is not needed. No decomposition needed.

**Abstract Code:**

- Show total number of vehicles that **Repair.Status** != “pending” or “In progress” and are not existed on **Sell\_Transaction** table
- Show drop-down menus for vehicle type, manufacturer, model year and color selections
- Show blank field for Keyword input
- Show **Search** button and **Login** button
- Users can click the title of any given columns to sort on that respective column;
- Upon:
  - ❖ User enters vehicle type, manufacturer, model year, color or keyword, and clicks **Search** button:
    - If all the input fields are empty, show warning message;
    - If there are vehicles that exit on **Vehicle** table, then look up **Repair** table and **Sell\_Transaction** table by VIN, if **Repair.Status** != “pending” or “in progress”, or not exist on **Repair** table, and not existed on **Sell\_Transaction** table, then show results, sorted by VIN;
    - If no vehicles meet the search criteria on **Vehicle** table, show error message “Sorry, it looks like we don’t have that in stock!”
  - ❖ User clicks an individual result:
    - Go to **View Vehicle Detail** task;
  - ❖ User clicks **Login** button:
    - Go to **Login** task.

## Login

**Task Decomposition:**



**Lock Types:** Read-only to **User** table

**Number of Locks:** Single

**Enabling Conditions:** Enabled by clicking on **Employee Login**

**Frequency:** About 20 logins per day

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

**Subtasks:** Mother Task is not needed. No decomposition needed.

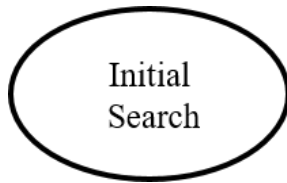
**Abstract Code:**

- Show **Login** and **Cancel** button
- Show empty field for **Username** and **Password** input.
- Upon:
  - ❖ User enters **Username**, **Password** and clicks **Login** button:
    - If either inputted **Username** or **Password** is empty, show warning message;

- If user inputted username is not found on **User** table, or user inputted username could be found on **User** table, but the user inputted password does not match the respective **User.Username**, clear the input field, show error message;
- If both the user inputted username and password match an item in **User** table, go to **Initial Search** page;
- ❖ User clicks **Cancel** button:
  - Go to **Public Search** page.

## Initial Search

### Task Decomposition:



**Lock Types:** Read-only to the **Vehicle**, **Repair**, **Sell\_Transaction** Table

**Number of Locks:** 3

**Enabling Conditions:** Enabled by successful login.

**Frequency:** About 100 vehicle search requires per day.

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

**Subtasks:** Mother Task is not needed. No decomposition needed.

### Abstract Code:

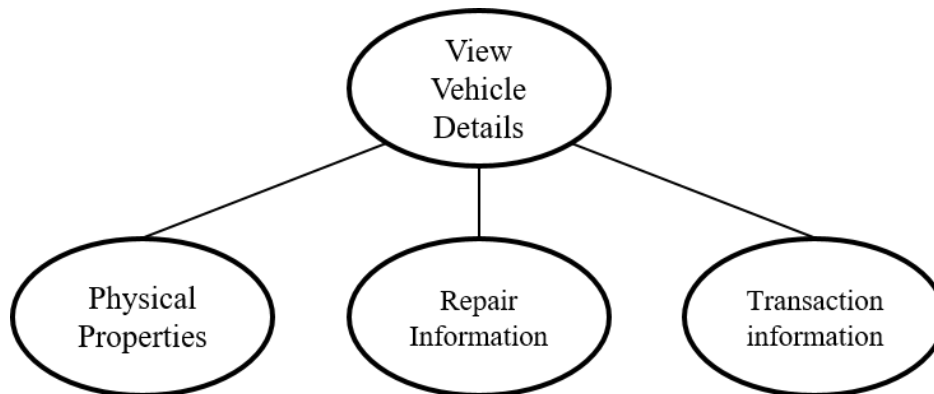
- Show **Search** and **Logout** button
- Show the same input form as on the **Public Search** page along with a VIN input field
- If **User.User\_Type** == "Inventory\_clerk":
  - ❖ Upon:
  - ❖ When user input and clicks **Search** button:
    - If all the input fields are empty, show warning message;
    - If there are vehicles that exit on **Vehicle** table and are not on **Sell\_Transaction** table, show results, sorted by VIN;
    - If no vehicles meet the search criteria on **Vehicle** table, show error message "Sorry, it looks like we don't have that in stock!"
- If **User.User\_Type** == "Salesman":
  - ❖ Upon:
  - ❖ When user input and clicks **Search** button:
    - The same will happen as on the **Public Search** page;
- If **User.User\_Type** == "Manager":
  - ❖ Show number of items on **Vehicle** table where **Repair.Status** == "Pending" as "Number of cars repair pending"
  - ❖ Show number of items on **Vehicle** table where **Repair.Status** == "In progress" as "Number of cars repair in progress"
  - ❖ Show number of items on **Vehicle** table where **Repair.Status** == "Complete" and not in **Sell\_Transaction** table as "Number of available vehicles for purchase"
  - ❖ Upon:
  - ❖ When user input and clicks **Search** button:
    - If all the input fields are empty, show warning message;



- If there are vehicles that exist on **Vehicle** table, show results, sorted by VIN;
- If no vehicles meet the search criteria on **Vehicle** table, show error message “Sorry, it looks like we don’t have that in stock!”
- ❖ Have additional filter by sold vehicles, unsold vehicles, or all vehicles:
  - If user choose “sold vehicles”, filter the results so only show vehicles exist on **Sell\_Transaction** table.
  - If user choose “unsold vehicles”, filter the results so not show vehicles exist on **Sell\_Transaction** table.
  - If user choose “all vehicles”, do not filter, show all the results.
- if **User.User\_Type** == “Owner”:
  - ❖ Have all the functionality as other users described above
- When user selects a search result: Go to **View Vehicle Detail** Form
- When **Logout** button is clicked, go to **Public Search** page.

## View Vehicle Detail Form

### Task Decomposition:



Lock Types: Read-only on **Vehicle**, **User**, **Customer**, **Repair**, **Buy\_transaction**, **Sell\_transaction** and **Recall** Table.

Number of Locks: 7

Enabling Conditions:

Physical Properties subtask is enabled by clicking **View Vehicle Detail** button on selecting a single entry on the public search or employee search result list

Repair information subtask is enabled by Users Type as “Manager” by clicking **View Vehicle Detail** button;

Repair information subtask, along with **Add Repair** and **Edit Repair** button, is enabled by Users Type as “Inventory Clerk” or “Owner” by clicking **View Vehicle Detail** button;

Transaction information subtask is enabled by Users Type as “Manager” or “Owner” by clicking **View Vehicle Detail** button;

**Sell Vehicle** button is enabled by Users Type as “Salesperson” or “Owner” by clicking **View Vehicle Detail** button;

Frequency: About 500 view vehicle detail per day; subtasks have different frequency;

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

Subtasks: Mother Task is needed; Decomposed into three subtasks.

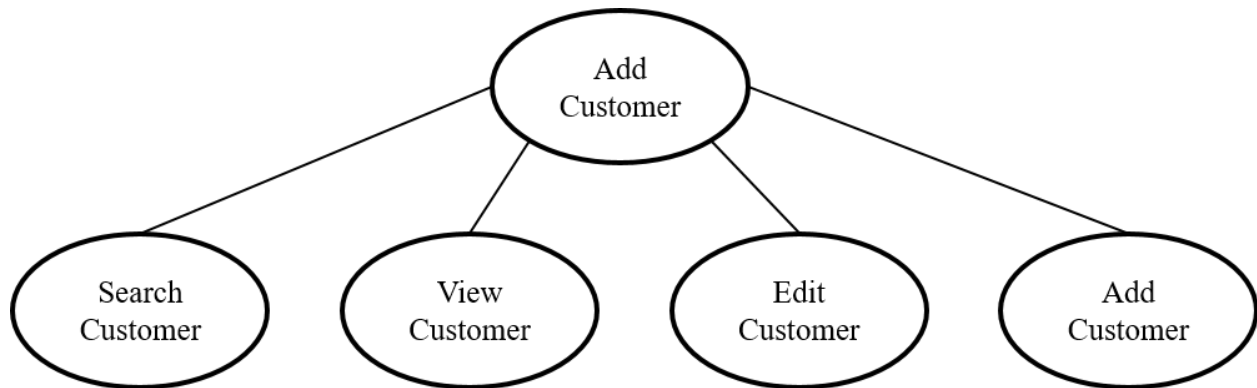
### Abstract Code

- Show **View Vehicle Detail** on public search or employee search result list
- Upon:
  - ❖ Click **View Vehicle Detail** button:

- View physical properties, repair information, and/or transaction information as stated in Enabling Conditions;
- Show **Repair Description** pop-out button;
- Click **Repair Description** pop-out button: View [Repair.description](#);
- ❖ Click **Done** button - Go back to search result list.

## Add Customer Form

### Task Decomposition:



Lock Types: Read and write on [Customer](#) Table; Read-only on [User](#) Table

Number of Locks: 2

Enabling Conditions: Enabled by clicking **Add Customer** button on public search or employee search result list

Frequency: About 20 add customer per day; subtasks have different frequency;

Consistency (ACID): Search runs prior to view, edit or add customer

Subtasks: Mother Task is needed. Decomposed into four subtasks.

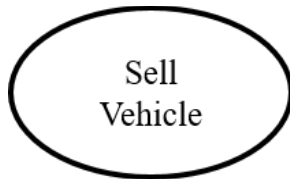
### Abstract Code:

- Show **Add Customer** button upon clicking **Sell Vehicle** button by salesperson or **Add Vehicle** button by inventory clerk.
- Upon:
  - ❖ Click **Add Customer** button
    - Run Search Customer subtask, user input customer's driver\_licence\_number (as a person) or Tax\_identification\_number (as a business);
    - If input in [Customer.driver\\_licence\\_number](#) or [Customer.Tax\\_identification\\_number](#):
      - View Customer; Show **Edit Customer** button;
      - Upon Click **Edit Customer**:
        - User enters customer information
        - Click **Save** button: Update [Customer](#) Table; Return to View Customer;
        - Click **Cancel** button: Return to View Customer;
    - If the user's input does not match any items in [Customer.driver\\_licence\\_number](#) nor [Customer.Tax\\_identification\\_number](#):
      - Show message 'new customer!'
      - Show **Add New Customer** button;
      - Upon clicking **Add New Customer** button:
        - User select either Person or Business;
        - If Person is selected:

- User enter address, email (optional), phone\_number, first\_name, last\_name;
  - Click **Save** button: Write to **Customer** Table; Return to Add Customer; View customer;
  - Click **Cancel** button: Return to **Add New Customer**;
- If Business is selected:
  - User enter address, email, phone\_number, business\_name, primary\_contact\_name, primary\_contact\_title;
  - Click **Save** button: Write to **Customer** Table; Return to Add Customer; View customer;
  - Click **Cancel** button: Return to Add New Customer;
- ❖ Click **Done** button – Go back to **Add New Vehicle** Form (inventory clerk) or **Sell Vehicle** Form (salesperson)

## Sale Order Form

### Task Decomposition:



Lock Types: Read and write on **Sell\_Transaction** Table; Read-only on **Vehicle**, **User** and **Customer** Table;

Number of Locks: 4

Enabling Conditions: Enabled by clicking **Sell Vehicle** button on vehicle detail form

Frequency: About 10 add sell vehicle per day

Consistency (ACID): Consistency is not critical; order is not critical

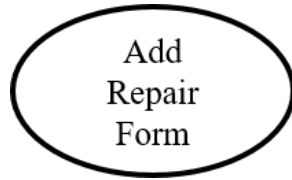
Subtasks: No decomposed is needed.

### Abstract Code

- Show Sell Vehicle on vehicle detail screen.
- Upon:
  - ❖ User click **Sell Vehicle** button;
    - Show **Add Customer** button;
    - Upon Add Customer finished, show Sale Order Form;
      - User enters *sale\_date*;
      - Click Done button: Write into **Sell\_Transaction** Table; Display Vehicle detail form;
      - Click **Cancel** Button: Return to Vehicle Detail Form;

## Add Repair Form

### Task Decomposition:



Lock Types: Read and Write to the [Repair](#) Table and [Recall](#) Table. Read and Write exclusives locks needed on [Repair](#) table, Read-only on [Recall](#) Table.

Number of Locks: 3

Enabling Conditions: Enabled by Users Type as “Inventory\_clerk” or “Owner” by clicking **Add Repair Form** button in **Repair/Recall Repository**

Frequency: About 50 adding repairs/recalls requires in total

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

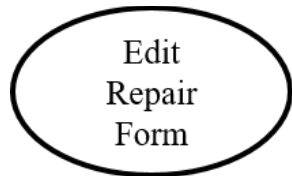
Subtasks: Mother Task is not needed. No decomposition needed.

#### Abstract Code:

- Show **Add Repair Form**, **Edit Repair Form**, **View Repair From**, **Delete Repair Form** buttons in **Repair/Recall Repository**
- User clicks **Add Repair Form** button and the system displays a new repair form table with **Submit** and **Cancel** button
- User enters *VIN*, *Repair\_Vendor\_Name*, *Repair\_Vendor\_Address*, *Repair\_Vendor\_Phone\_Number*, *Repair\_Description*, *Repair\_Start\_Date*, *Repair\_Cost*, *NHTSA\_Recall\_Campagin\_Number*
- User selects one of “Pending”, “In Progress” and “Complete” in *Repair\_Status*
- Upon:
  - ❖ Click **Submit** button;
    - If *NHTSA\_Recall\_Campagin\_Number* is not Null and is not in [Recall.NHTSA\\_Recall\\_Campagin\\_Number](#):
      - Show Error Message and Return to **Repair/Recall Repository**
    - Else if all items except *NHTSA\_Recall\_Campagin\_Number* are not Null:
      - Write to [Repair](#) Table and go back to **Repair/Recall Repository**
    - Else:
      - Show Error Message and Return to **Repair/Recall Repository**
  - ❖ Click **Cancel** button - Go back to **Repair/Recall Repository**

#### Edit Repair Form

##### Task Decomposition:



Lock Types: Read and Write to the [Repair](#) Table and [Recall](#) Table. Read and Write exclusives locks needed on [Repair](#) table, Read-only on [Recall](#) Table.

Number of Locks: 3

Enabling Conditions: Enabled by Users Type as “Inventory\_clerk” or “Owner” by clicking **Edit Repair Form** button in **Repair/Recall Repository**

Frequency: About 100 editing requires in total

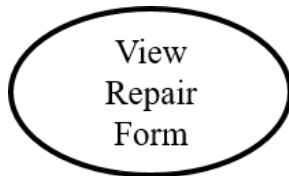
Consistency (ACID): Not critical, order is not critical.

Subtasks: Mother Task is not needed. No decomposition needed.

**Abstract Code:**

- Show *Add Repair Form*, *Edit Repair Form*, *View Repair From*, *Delete Repair Form* in Repair/Recall Repository
- User clicks *Edit Repair Form* button and show *Submit* and *Cancel* button
- User edits Repair Form Items
- User selects one of “*Pending*”, “*In Progress*” and “*Complete*” in *Repair\_Status*
- Upon:
  - ❖ Click *Submit* button;
    - If *NHTSA\_Recall\_Campagin\_Number* is not Null and is not in *Recall.NHTSA\_Recall\_Campagin\_Number*:
      - Show Error Message and Return to Repair/Recall Repository
    - Else if all items except *NHTSA\_Recall\_Campagin\_Number* are not Null:
      - Write to *Recall* Table and go back to Repair/Recall Repository
    - Else:
      - Show Error Message and Return to Repair/Recall Repository
  - ❖ Click *Cancel* button - Go back to Repair/Recall Repository

## View Repair Form

**Task Decomposition:**

Lock Types: Read-only to the *Repair* Table. Read exclusives locks needed on *Repair* table.

Number of Locks: 1

Enabling Conditions: Enabled by Users Type as “*Inventory\_clerk*” or “*Owner*” by clicking *View Repair Form* button in Repair/Recall Repository

Frequency: About 200 viewing requires in total

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

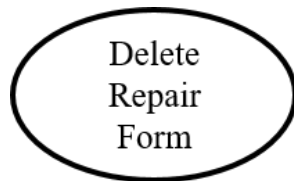
Subtasks: Mother Task is not needed. No decomposition needed.

**Abstract Code:**

- Show *Add Repair Form*, *Edit Repair Form*, *View Repair From*, *Delete Repair Form* in Repair/Recall Repository
- User clicks *View Repair Form* button and show *Search* and *Done* button
- User inputs the *VIN* number in the search bar
- Upon:
  - ❖ Click *Search* button:
    - If *VIN* is Null or is not in *Recall.VIN*:
      - Show Error Message and Return to Repair/Recall Repository
    - Else:
      - Find and display all repair forms for this *VIN* ordered by the descending *Start\_Date*
  - ❖ Click *Done* button - Go back to Repair/Recall Repository

## Delete Repair Form

### Task Decomposition:



Lock Types: Read and Write to the [Repair](#) Table. Read and Write exclusives locks needed on [Repair](#) table

Number of Locks: 2

Enabling Conditions: Enabled by Users Type as “Inventory\_clerk” or “Owner” by clicking **Delete Repair Form** button in

**Repair/Recall Repository**

Frequency: About 20 deleting requires in total

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

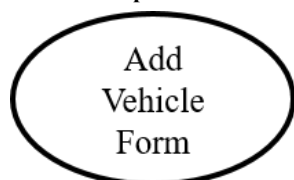
Subtasks: Mother Task is not needed. No decomposition needed.

### Abstract Code:

- Show **Add Repair Form, Edit Repair Form, View Repair From, Delete Repair Form** in **Repair/Recall Repository**
- User clicks **Delete Repair Form** button and show search bar with **Search** and **Done** button
- User inputs the *VIN* number in the search bar
- Upon:
  - ❖ Click **Search** button:
    - If *VIN* is Null or is not in [Repair.VIN](#):
      - Show Error Message and Return to **Repair/Recall Repository**
    - Else:
      - Find and display all repair forms for this *VIN* ordered by the descending *Start\_Date*.
      - Select and Delete one or more repair form for this *VIN*
  - ❖ Click **Done** button - Go back to **Repair/Recall Repository**

## Add Vehicle Form

### Task Decomposition:



Lock Types: Read and Write to the [Vehicle](#) Table

Number of Locks: 2

Enabling Conditions: Enabled by Users Type as “Inventory\_clerk” or “Owner” by clicking **Add Vehicle Form** button in **Vehicle**

**Category**

Frequency: About 100 adding requires in total

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

Subtasks: Mother Task is not needed. No decomposition needed.

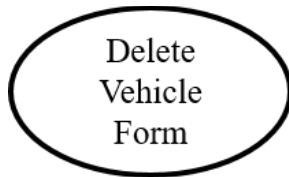
### Abstract Code:

- Show **Add Vehicle Form, Edit Vehicle Form, View Vehicle Form, Delete Vehicle Form** button in **Vehicle Category**

- User clicks **Add Vehicle Form** button and the system displays a new vehicle form table with **Submit** and **Cancel** button
- User enters *VIN*, *Vehicle\_Type*, *Vehicle\_Manufacturer*, *Model\_Name*, *Model\_Year*, *Color*, *Mileage*, *Vehicle\_Description*
- Upon:
  - ❖ Click **Submit** button;
    - If *VIN* is in *Vehicle.VIN*::
      - Show Error Message and Return to **Vehicle Category**
    - Else if all items except *Vehicle\_Description* are not Null:
      - Write to *Vehicle* Table and go back to **Vehicle Category**
    - Else:
      - Show Error Message and Return to **Vehicle Category**
  - ❖ Click **Cancel** button - Go back to **Vehicle Category**

## Delete Vehicle Form

### Task Decomposition:



Lock Types: Read and Write to the *Vehicle* Table, Read-only on *Repair* Table

Number of Locks: 3

Enabling Conditions: Enabled by Users Type as “Inventory\_clerk” or “Owner” by clicking **Delete Vehicle Form** button in **Vehicle Category**

Frequency: About 50 deleting requires in total

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

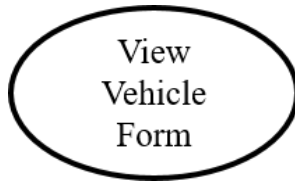
Subtasks: Mother Task is not needed. No decomposition needed.

### Abstract Code:

- Show **Add Vehicle Form**, **Edit Vehicle Form**, **View Vehicle Form**, **Delete Vehicle Form** button in **Vehicle Category**
- User clicks **Delete Vehicle Form** button and the system displays a search bar with **Search** and **Done** button
- User enters *VIN* in the search bar
- Upon:
  - ❖ Click **Submit** button;
    - If *VIN* is Null or is not in *Vehicle.VIN*:
      - Show Error Message and Return to **Vehicle Category**
    - Else if there is *Repair.VIN* same as *VIN*:
      - Show Error Message and Return to **Vehicle Category**
    - Else:
      - Display the information of this *VIN* from *Vehicle* Table
      - Delete the *VIN* information and Click **Done** button: Go back to **Vehicle Category**
  - ❖ Click **Done** button - Go back to **Vehicle Category**

## View Vehicle Form

## Task Decomposition:



Lock Types: Read and Write to the [Vehicle](#) Table

Number of Locks: 2

Enabling Conditions: Enabled by Users Type as “Inventory\_clerk” or “Owner” by clicking *View Vehicle Form* button in [Vehicle Category](#)

Frequency: About 100 viewing requires in total

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

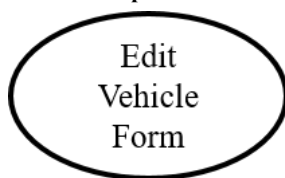
Subtasks: Mother Task is not needed. No decomposition needed.

## Abstract Code:

- Show *Add Vehicle Form, Edit Vehicle Form, View Vehicle Form, Delete Vehicle Form* button in [Vehicle Category](#)
- User clicks *View Vehicle Form* button and the system displays a new empty vehicle form with *Search* and *Done* button
- User enters *VIN* in the search bar
- Upon:
  - ❖ Click *Submit* button;
    - If *VIN* is Null or is not in [Vehicle.VIN](#):
      - Show Error Message and Return to [Vehicle Category](#)
    - Else:
      - Display the information of this *VIN* from [Vehicle](#) Table
      - Click *Done* button: Go back to [Vehicle Category](#)
  - ❖ Click *Done* button - Go back to [Vehicle Category](#)

## Edit Vehicle Form

## Task Decomposition:



Lock Types: Read and Write to the [Vehicle](#) Table

Number of Locks: 2

Enabling Conditions: Enabled by Users Type as “Inventory\_clerk” or “Owner” by clicking *Edit Vehicle Form* button in [Vehicle Category](#)

Frequency: About 100 editing requires in total

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

Subtasks: Mother Task is not needed. No decomposition needed.

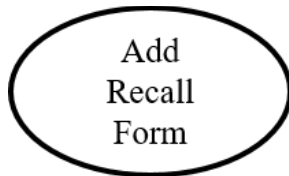
## Abstract Code:



- Show **Add Vehicle Form, Edit Vehicle Form, View Vehicle Form, Delete Vehicle Form** button in **Vehicle Category**
- User clicks **Edit Vehicle Form** button and the system displays a search bar with **Search** and **Done** button
- User enters *VIN* in the search bar
- Upon:
  - ❖ Click **Submit** button;
    - If *VIN* is Null:
      - Show Error Message and Return to **Vehicle Category**
    - Else:
      - Display the information of this *VIN* from **Vehicle** Table and User edits the information
      - Click **Done** button:
        - If all of the items except *Vehicle\_Description* are not null and *Vehicle\_Description* can be Null or Not Null:
          - ◆ Write to the **Vehicle** table and Go back to **Vehicle Category**
        - Else:
          - ◆ Show Error Message and Return to **Vehicle Category**
  - ❖ Click **Done** button - Go back to **Vehicle Category**

## Add Recall Form

### Task Decomposition:



Lock Types: Read and Write to the **Recall** Table

Number of Locks: 2

Enabling Conditions: Enabled by Users Type as “Inventory\_clerk” or “Owner” by clicking **Add Vehicle Form** button in **Repair/Recall Repository**

Frequency: About 5 adding requires in total

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

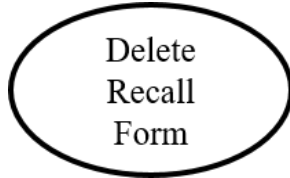
Subtasks: Mother Task is not needed. No decomposition needed.

### Abstract Code:

- Show **Add Recall Form, Edit Recall Form, View Recall Form, Delete Recall Form** button in **Repair/Recall Repository**
- User clicks **Add Recall Form** button and the system displays a new recall form with **Submit** and **Cancel** button
- User enters *NHTSA\_Recall\_Campagin\_Number*, *Recall\_Description*, *Recall\_Manufacture* information
- Upon:
  - ❖ Click **Submit** button;
    - If *NHTSA\_Recall\_Campagin\_Number* is in **Recall.NHTSA\_Recall\_Campagin\_Number**:
      - Show Error Message and Return to **Repair/Recall Repository**
    - Else if all items are not Null:
      - Write to **Recall** Table and go back to **Repair/Recall Repository**
    - Else:
      - Show Error Message and Return to **Repair/Recall Repository**
  - ❖ Click **Cancel** button - Go back to **Repair/Recall Repository**

## Delete Recall Form

## Task Decomposition:



Lock Types: Read and Write to the [Recall](#) Table, Read-only on [Repair](#) Table

Number of Locks: 3

Enabling Conditions: Enabled by Users Type as “Inventory\_clerk” or “Owner” by clicking **Delete Recall Form** button in **Repair/Recall Repository**

Frequency: About 10 deleting requires in total

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

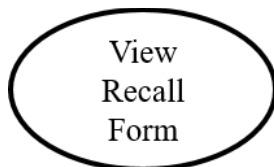
Subtasks: Mother Task is not needed. No decomposition needed.

## Abstract Code:

- Show **Add Recall Form, Edit Recall Form, View Recall Form, Delete Recall Form** button in **Repair/Recall Repository**
- User clicks **Delete Vehicle Form** button and the system displays a search bar with **Search** and **Done** button
- User enters *NHTSA\_Recall\_Campagin\_Number* in the search bar
- Upon:
  - ❖ Click **Submit** button;
    - If *NHTSA\_Recall\_Campagin\_Number* is Null or is not in [Recall.NHTSA\\_Recall\\_Campagin\\_Number](#):
      - Show Error Message and Return to **Repair/Recall Repository**
    - Else if there is [Repair.NHTSA\\_Recall\\_Campagin\\_Number](#) same as *NHTSA\_Recall\_Campagin\_Number*:
      - Show Error Message and Return to **Repair/Recall Repository**
    - Else:
      - Display the information of this *NHTSA\_Recall\_Campagin\_Number* from [Recall](#) Table
      - Select the *NHTSA\_Recall\_Campagin\_Number* information and delete. Click **Done** button: Go back to **Repair/Recall Repository**
  - ❖ Click **Done** button - Go back to **Repair/Recall Repository**

## View Recall Form

## Task Decomposition:



Lock Types: Read and Write to the [Recall](#) Table

Number of Locks: 2

Enabling Conditions: Enabled by Users Type as “Inventory\_clerk” or “Owner” by clicking **View Recall Form** button in **Vehicle Category**

Frequency: About 50 viewing requires in total

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

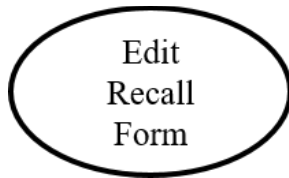
Subtasks: Mother Task is not needed. No decomposition needed.

#### Abstract Code:

- Show **Add Recall Form, Edit Recall Form, View Recall Form, Delete Recall Form** button in **Repair/Recall Repository**
- User clicks **View Recall Form** button and the system displays a search bar with **Search** and **Done** button
- User enters *NHTSA\_Recall\_Campagin\_Number* in the search bar
- Upon:
  - ❖ Click **Submit** button;
    - If *NHTSA\_Recall\_Campagin\_Number* is Null or is not in *Recall.NHTSA\_Recall\_Campagin\_Number*:
      - Show Error Message and Return to **Repair/Recall Repository**
    - Else:
      - Display the information of this *NHTSA\_Recall\_Campagin\_Number* from *Recall* Table
      - Click **Done** button: Go back to **Repair/Recall Repository**
  - ❖ Click **Done** button - Go back to **Repair/Recall Repository**

#### Edit Recall Form

##### Task Decomposition:



Lock Types: Read and Write to the *Recall* Table

Number of Locks: 2

Enabling Conditions: Enabled by Users Type as “Inventory\_clerk” or “Owner” by clicking **Edit Recall Form** button in **Vehicle Category**

Frequency: About 100 editing requires in total

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

Subtasks: Mother Task is not needed. No decomposition needed.

#### Abstract Code:

- Show **Add Vehicle Form, Edit Vehicle Form, View Vehicle Form, Delete Vehicle Form** button in **Repair/Recall Repository**
- User clicks **Edit Vehicle Form** button and the system displays a search bar with **Search** and **Done** button
- User enters *NHTSA\_Recall\_Campagin\_Number* in the search bar
- Upon:
  - ❖ Click **Submit** button;
    - If *NHTSA\_Recall\_Campagin\_Number* is Null or *NHTSA\_Recall\_Campagin\_Number* is not in *Recall.NHTSA\_Recall\_Campagin\_Number*:
      - Show Error Message and Return to **Repair/Recall Repository**
    - Else:

- Display the information of this *NHTSA\_Recall\_Campaign\_Number* from [Recall](#) Table and User edits the information
- Click **Done** button:
  - If all of the items are not Null:
    - ◆ Write to the [Recall](#) table and Go back to **Repair/Recall Repository**
  - Else:
    - ◆ Show Error Message and Return to **Repair/Recall Repository**
- ❖ Click **Done** button - Go back to **Repair/Recall Repository**

## View Seller History Report

### Task Decomposition:



Lock Types: Read-only on the [Sell\\_transcation](#) Table. Read-only on [Customer](#) Table. Read-only on [Repair](#) Table.

Number of Locks: 3

Enabling Conditions: Enabled by Users Type as “Manager” or “Owner” by clicking **View Sale History Report** button in **Initial Search** Page.

Frequency: About 10 views per day.

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

Subtasks: Mother Task is not needed. No decomposition needed.

### Abstract Code:

- Show **View Sale History Report** button in **Initial Search** Page.
- Show **Done** button.
- For each *Driver\_license\_number* and *Tax\_identification\_number* in [Customer](#) table:
  - ❖ Calculate the total number of vehicles sold to Burdell’s in the [Sell\\_transcation](#) Table.
  - ❖ Calculate the average price for the vehicles each customer has sold to Burdell’s in the [Sell\\_transcation](#) Table.
  - ❖ Calculate the average number of repairs per vehicle in the [Repair](#) Table.
- Find and display the name of the customers (either first or last name or the company name) from the [Customer](#) table in descending order of the total number of vehicles the respective customer have sold to Burdell’s.
- Display the average price for the vehicles and the average number of repairs per vehicle for each customer.
- Highlight the customers that show an average of five or more repairs per vehicle sold to Burdell’s with a red background.
- Upon:
  - ❖ Click **Done** button - Go back to **Initial Search** Page.

## View Inventory Age Report

### Task Decomposition:



Lock Types: Read-only on the [Sell\\_transcation](#) Table. Read-only on [Vehicle](#) Table.

Number of Locks: 2

Enabling Conditions: Enabled by Users Type as “Manager” or “Owner” by clicking *View Inventory Age Report* button in **Initial Search** Page.

Frequency: About 10 views per day.

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

Subtasks: Mother Task is not needed. No decomposition needed.

#### Abstract Code:

- Show *View Inventory Age Report* button in **Initial Search** Page.
- Show *Done* button.
- For each type of vehicle (identified with *Vehicle\_type* in [Vehicle](#) table):
  - ❖ Calculate the minimum, average, and maximum age (decided by *Model\_year* in [Vehicle](#) table) of unsold vehicles in inventory, in days.
- Find and display *Vehicle\_type* in [Vehicle](#) table in alphabetical order.
- Display the minimum, average, and maximum age of unsold vehicles in inventory, in days, for each *Vehicle\_type*. If a vehicle type has no unsold units, the report should display “N/A” for that *Vehicle\_type*.
- Upon:
  - ❖ Click *Done* button - Go back to **Initial Search** Page.

### View Average Time in Inventory Report

#### Task Decomposition:



Lock Types: Read-only on the [Sell\\_transcation](#) Table. Read-only on [Buy\\_transcation](#) Table. Read-only on [Vehicle](#) Table.

Number of Locks: 3

Enabling Conditions: Enabled by Users Type as “Manager” or “Owner” by clicking *View Average Time in Inventory Report* button in **Initial Search** Page.

Frequency: About 10 views per day.

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

Subtasks: Mother Task is not needed. No decomposition needed.

#### Abstract Code:

- Show *View Inventory Age Report* button in **Initial Search** Page.
- Show *Done* button.
- For each type of vehicle (identified with *Vehicle\_type* in [Vehicle](#) table):

- ❖ Calculate the average time in the inventory of unsold vehicles, in days. Using *Purchase\_date* from the *Buy\_transcation Table* and *Sale\_date* from the *Sell\_transcation Table*.
- Find and display all *Vehicle\_type* in *Vehicle* table in alphabetical order.
- Display the average time in the inventory of unsold vehicles, in days, for each *Vehicle\_type*. If a *Vehicle\_type* has no unsold units, the report should display “N/A” for that vehicle type.
- Upon:
  - ❖ Click **Done** button - Go back to in **Initial Search** Page.

## View Price per Condition Report

### Task Decomposition:



Lock Types: Read-only on the *Buy\_transcation Table*. Read-only on *Vehicle* Table.

Number of Locks: 2

Enabling Conditions: Enabled by Users Type as “Manager” or “Owner” by clicking **View Inventory Age Report** button in **Initial Search** Page.

Frequency: About 10 views per day.

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

Subtasks: Mother Task is not needed. No decomposition needed.

### Abstract Code:

- Show **View Price per Condition Report** button in **Initial Search** Page.
- Show **Done** button.
- For each *Vehicle\_type* in the *Vehicle* table and for each *Purchase\_condition* in the *Buy\_transcation Table*:
  - ❖ Calculate the average price of vehicles purchased. If a vehicle type or condition has never been purchased, the report should display “\$0” for that result.
- Display the average price of vehicles per *vehicle\_type* and per *purchase\_condition* in a pivot table.
- Upon:
  - ❖ Click **Done** button - Go back to **Initial Search** Page.

## View Repair Statistics Report

### Task Decomposition:



Lock Types: Read-only on the *Repair* Table. Read-only on the *Vehicle* Table.

Number of Locks: 2

Enabling Conditions: Enabled by Users Type as “Manager” or “Owner” by clicking **View Inventory Age Report** button in **Initial Search** Page.

Frequency: About 10 views per day.

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

Subtasks: Mother Task is not needed. No decomposition needed.

Abstract Code:

- Show **View Repair Statistics Report** button in **Initial Search** Page.
- Show **Done** button.
- For each *Vendor\_name* in **Repair** table:
  - ❖ Calculate the number of repairs by that vendor.
  - ❖ Calculate the total cost spent on completed repairs from that vendor using *Repair\_cost* in the **Repair** table.
  - ❖ Calculate the average number of repairs per vehicle (identified by *VIN* from the **Vehicle** Table) from that vendor using *Repair\_cost* in the **Repair** table.
- Calculate the average length of repair time (in days) from that vendor using *Start\_date* and *End\_date* in the **Repair** table
- Find and display all *Vendor\_name* in **Repair** table in alphabetical order.
- Display the number of repairs, the total cost spent on completed repairs, the average number of repairs per vehicle, and the average repair time (in days) for each vendor.
- Upon:
  - ❖ Click **Done** button - Go back to **Initial Search** Page.

## View Monthly Sales Report

Task Decomposition:



Lock Types: Read-only on the **Sell\_transcation** Table. Read-only on **Buy\_transcation** Table. Read-only on **Repair** Table.

Read-only on **User** Table. .

Number of Locks: 4

Enabling Conditions: Enabled by Users Type as “Manager” or “Owner” by clicking **View Monthly Sales Report** button in **Initial Search** Page.

Frequency: About 50 views per day.

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

Subtasks: Mother Task is to show a summary page, which lists for all sales transactions, by year and month. Subtask is for each year/month show a drilldown report for that year and month.

Abstract Code:

- Show **View Monthly Sales Report** button in **Initial Search** Page.
- Show **Done** button in both the mother task and subtask.

- Find and display *Sale\_date* in the [Sell\\_transcation](#) Table in descending order.
- For each calendar year and month in *Sale\_date*:
  - ❖ Calculate and display the number of vehicles sold (i.e. the number of items) from the [Sell\\_transcation](#) Table. If a year or month have 0 items in [Sell\\_transcation](#), do not show that year or month.
  - ❖ Calculate and display the total sales income using *Sale\_price* from the [Sell\\_transcation](#) Table.
  - ❖ Calculate and display the net sales income using *Sale\_price* from the [Sell\\_transcation](#) Table, *Purchase\_price* from the [Buy\\_transcation](#) Table, and *Repair\_cost* from the [Repair](#) Table
- For each year/month result, create a clickable link to a drilldown report, find all items from the [Salesperson](#) Table as a subitem of the [User](#) Table.
- For each item from the [Salesperson](#) Table:
  - ❖ Calculate the number of vehicles sold (i.e. the number of items) from the [Sell\\_transcation](#) Table.
  - ❖ Calculate the total sales using *Sale\_price* from the [Sell\\_transcation](#) Table.
- Find and display all items from the [Salesperson](#) Table, sorted by total vehicles in descending order, followed by total sales in descending order. Display these items' *Logged\_in\_first\_name* and *Logged\_in\_last\_name* from the [User](#) Table.
- Upon:
  - ❖ Click **Done** button - Go back to **InitialSearch** Page.
  - ❖ Click each individual **year or month** link - Go to the drill down report for that respective year or month.