Phase 1 Report | CS 6400 - Fall 2021 | Team 066

Table of Contents:

Data Types:

LoggedInUser

Attribute	Data Type	Nullable
UserName	String	Not Null
Password	String	Not Null
FirstName	String	Not Null
LastName	String	Not Null

Customer

Attribute	Data Type	Nullable
Address	String	Not Null
City	String	Not Null
State	String	Not Null
PostalCode	String	Not Null
PhoneNumber	String	Not Null
EmailAddress	String	Null

Person

Attribute	Data Type	Nullable
DriverLicenseNumber	String	Not Null
FirstName	String	Not Null
LastName	String	Not Null

Business

Attribute	Data Type	Nullable
TaxIdentificationNumber	String	Not Null
BusinessName	String	Not Null
Name	String	Not Null
Title	String	Not Null

Vehicle

Attribute	Data Type	Nullable
VIN	String	Not Null
Model	String	Not Null
InvoicePrice	Float	Not Null
ListPrice	Float	Not Null
Color	List	Not Null
Description	String	Null

SUV

Attribute	Data Type	Nullable
DrivetrainType	String	Not Null
NumCupholders	Int	Not Null

Car

Attribute	Data Type	Nullable
NumDoors	Int	Not Null

Truck

Attribute	Data Type	Nullable
NumRearAxles	Int	Not Null
CargoCoverType	String	Null
CargoCapacity	Float	Not Null

Convertible

Attribute	Data Type	Nullable
RoofType	String	Not Null
BackSeatCount	Int	Not Null

Van

Attribute	Data Type	Nullable
HasDriverSideBackDoor	Boolean	Not Null

Repair

Attribute	Data Type	Nullable
StartDate	Date	Not Null
DateCompleted	Date	Null
Odometer	Int	Not Null
LaborCharges	Float	Not Null
TotalRepairCost	Float	Not Null
Description	String	Not Null

Part

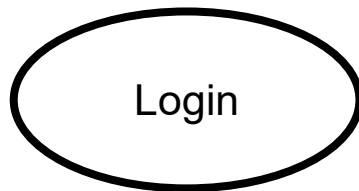| Attribute	Data Type	Nullable
VendorName	String	Not Null
PartNumber	String	Not Null
Quantity	Int	Not Null
Price	Float	Not Null

Manufacturer

Attribute	Data Type	Nullable
Name	String	Not Null

Business Logic Constraints:

- The Vehicle's model year cannot exceed the current year plus one.

- The Vehicle's description can contain information such as what accessories or equipment the vehicle has.

- The Vehicle's list prices are calculated as 125% of the invoice price.

- Customer can negotiate and receive a lower price.

- Market condition can also enable a Salesperson to sell a Vehicle at higher price.

- If Customer purchase several vehicles at the same time, it will be handled as separate sales transactions.

- The repair for a Vehicle is not assumed to be the Customer that originally bought it.

- The date the repair was completed could be the same date as start data or later. But it cannot be before.

- A Vehicle will never have more than one repair starting on the same date.

- A Repair for a Vehicle must be completed before a new one can be started.

- The total cost for Repair a Vehicle is the combination of labor charges and parts cost.

- All users will start on the public facing search screen, and employee can log in to access the functionality.

- The ability to look up and add customer will be available when performing various transactions.

- Look up a Customer can be done by using their driver's license or tax ID.

- If no Customer can be found. Then an option to add customer will be provided.

- All privileged users can search Vehicle by their VIN.

- After a Vehicle is added to inventory, it is immediately available for sale and search.

- If a sold price is less than or equal to 95% of the invoice price, the system will reject the sale.

- If a Vehicle has an unfinished repair, then the Repair form will only allow for updating labor charges, adding parts, or completing the repair.

- Any update to labor charges cannot be less than their previous value.

- The Manager can filter the search page by sold vehicles, unsold vehicles, or all vehicles.

- Roland can enter sold price of vehicle that is less than or equal to 95% of the invoice price.

- Roland can update the labor charges on repair form to a value less than their previous value.

Task Decomposition with Abstract Code:

Login

Task Decomposition

- **Lock Types**: Lookups for username and corresponding password. Both are read-only
- **Number of Locks**: Single
- **Enabling Conditions**: Right before entering the database
- **Frequency**: High
- **Consistency (ACID)**: Not applicable
- **Subtasks**: No decomposition is needed.

Abstract Code

- User type in username and password, click **Log in** button
- Find the user and corresponding password in the database
  - If they can match user's input:
    - Proceed to database with corresponding access
  - If they cannot match:
    - Show **Profile not matching our record**
  - if **Cancel** button is pressed:
    - return to previous page

Enter Customer Information

Task Decomposition

- **Lock Types**: Write lock on Customer table and person table or business table
- **Number of Locks**: 2
- **Enabling Conditions**: Successful login by the salespeople or Roland
- **Frequency**: High
- **Consistency (ACID)**: Critical.
- **Subtasks**: Mother Task is not needed. No decomposition needed.

Abstract Code

- If the salespeople or Roland selects the type of customer from a drop-down list, and click **Add customer** button (section 1):
  - If salespeople or Roland selects "person customer":
    - then if he/she input a valid combination of Address, City, State, PostalCode, PhoneNumber, EmailAddress, DriverLicenseNumber, FirstName, LastName:
      - When **Enter** button is clicked:
        - a person instance will be added into person table
        - a customer instance will be added into customer table
          - If **Go Back** is clicked:
            - Go back to the Section 1
  - If salespeople or Roland selects "business customer":
    - then if he/she input a valid combination of Address, City, State, PostalCode, PhoneNumber, EmailAddress, TaxIdentificationNumber, BusinessName, Name, Title:
      - When **Enter** button is clicked:
        - a business instance will be added into business table
        - a customer instance will be added into customer table
          - If **Go Back** is clicked:
            - Go back to the Section 1

Update Manufacturer List

Update Manufacturer List

Task Decomposition

- **Lock Types**: Write lock on manufacture table
- **Number of Locks**: Single
- **Enabling Conditions**: Successful login by Roland

- **Frequency**: Not often
- **Consistency (ACID)**: Critical.
- **Subtasks**: Mother Task is not needed. No decomposition needed.

Abstract Code

- If the Roland clicks "Update Manufacture List"(section 1):
  - then if Roland input a list of new Manufacture List:
    - When **Enter** button is clicked:
      - All instances in manufacture table will be deleted
      - manufacturers in the new manufacture list will be added as different instances into manufacture table
        - If **Go Back** is clicked:
          - Go back to the Section 1

Enter Sale Transaction

Enter Sale
Transaction

Task Decomposition

- **Lock Types**: Lookups for customer, vehicle details, inventory information, which are read-only. Edit date, sold price, which need editing access.
- **Number of Locks**: 3
- **Enabling Conditions**: Successful login by the salespeople or Roland
- **Frequency**: Low
- **Consistency (ACID)**: Consistency is not critical
- **Subtasks**: No need to separate to subtasks.
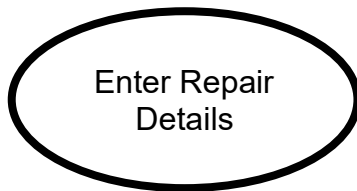
Abstract Code

- Enter customer name:
  - If customer can be found in existing database:
    - select
  - else:
    - pop up enter customer information form to add new customer
- Enter vehicle VIN:
  - If VIN can be found in database:
    - proceed to next step
  - Else:
    - return error message
- Lookup invoice price with VIN

- Enter date and sold price
  - If *Save* button hit:
    - validate all input field, if all validated:
      - save this transaction
    - else:
      - show invalid fields
  - Else:
    - Revert
- If *Cancel* button is hit:
  - return to previous page
- If *Save for Later* button is hit:
  - Save current process without validating

Enter Repair Details

Enter Repair
Details

Task Decomposition

- **Lock Types**: Lookups for customer, vehicle, sale transaction, which are read-only. Parts details, labor cost, repair start date and end date, need editing access
- **Number of Locks**: 5
- **Enabling Conditions**: Successful login by the service writer or Roland
- **Frequency**: Low
- **Consistency (ACID)**: Not critical.
- **Subtasks**: No need to separate to subtasks.

Abstract Code

- If VIN is entered and *Search* button is clicked:
  - Look up corresponding vehicle and customer
  - Show profile of both vehicle and customer
- Enter start date and end date, if start date larger than end date:
  - Show error message -Else
  - Proceed to next step
- Lookup parts details, if corresponding parts in database:
  - Show the details -Else
  - Proceed to enter parts details task
- Enter Labor cost
- Add labor cost and parts cost and save as total cost
- If *Save* button clicked,
  - Validate the input fields:

- if all validated:
  - save the form and input to database
- else:
  - show invalid fields
- If *Cancel* button is hit:
  - Go back to previous page

Search for Vehicle

```
        _____
      /                      \
     /     Search for          \
    (       Vehicle             )
     \                         /
      _____/
```

Task Decomposition

- **Lock Types**: Read-only on vehicle table
- **Number of Locks**: Single
- **Enabling Conditions**: None
- **Frequency**: often
- **Consistency (ACID)**: not critical
- **Subtasks**: Mother Task is not needed. No decomposition needed.

Abstract Code

- Anonymous User enters Vehicle type, Manufacturer, Model year, Color,List price and Keyword input fields.
- If user is login user, then user can enters VIN input fields
  - If data validation is successful for all input fields for Anonymous User, then:
    - When *Enter* button is clicked:
      - A vehicle with attributs VIN, Vehicle type, model year, manufacturer, model, color, keyword and list price will display.
  - If data validation is successful for VIN input fields for login user, then:
    - When *Enter* button is clicked:
      - A vehicle with attributs VIN, Vehicle type, model year, manufacturer, model, color, keyword and list price will display.
- ELse if no vehicles meet the search criteria, display no vehicle found message.

Update Vehicle Inventory

Update Vehicle
Inventory

Task Decomposition

- **Lock Types**: write to Vehicle form
- **Number of Locks**: Single
- **Enabling Conditions**: Once log in by Clerks and Roland
- **Frequency**: Low
- **Consistency (ACID)**: not critical
- **Subtasks**: Mother Task is not needed. No decomposition needed.

Abstract Code

- User log in:
    - Show *Add Vehicle* button.
- Once *Add Vehicle* button press:
    - if the user has write access to inventory form:
        - pop up inventory form
        - read the input and store in database
        - if the *Save* button is clicked:
            - Validate all input fields, if all valid:
                - store the input to data base, show *Successful Added*
            - Else:
                - Show the invalid fields with hint
    - Else the user do not have access:
        - Display error message, return to previous page

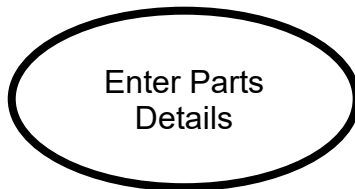## Get Vehicle Details

Get Vehicle
Details

Task Decomposition

- **Lock Types**: Read-only on Vehicle form
- **Number of Locks**: Single
- **Enabling Conditions**: Once the page the opened. Specific features can only be viewed by authenticated people
- **Frequency**: Low
- **Consistency (ACID)**: not critical
- **Subtasks**: Mother Task is not needed. No decomposition needed.

Abstract Code

- Find the current vehicle using VIN
- Store vehicle's color, description, list price, invoice price, model, manufacture, VIN
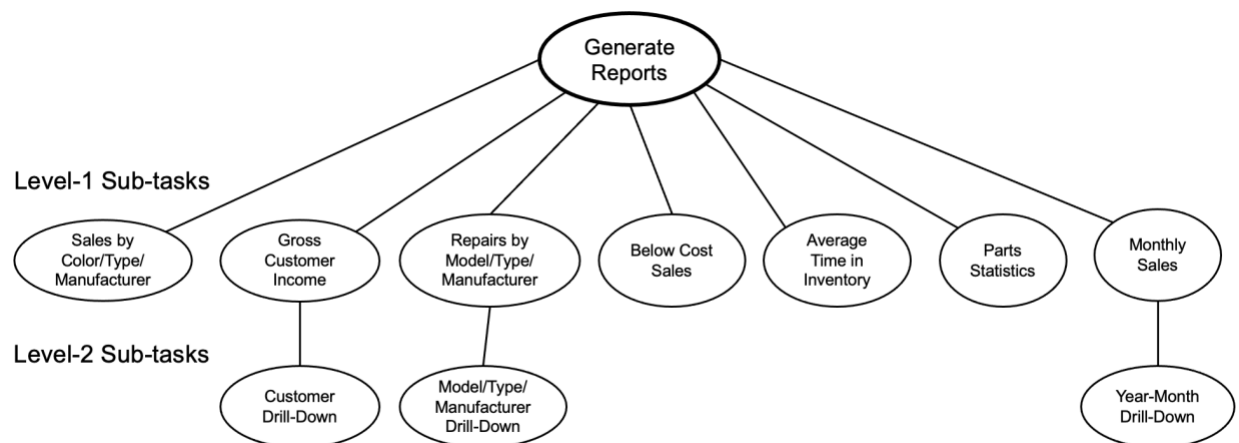
Enter Parts Details

Enter Parts
Details

Task Decomposition

- **Lock Types**: write access for parts form
- **Number of Locks**: single
- **Enabling Conditions**: Once parts details form is poped up from repair form
- **Frequency**: Low
- **Consistency (ACID)**: not critical
- **Subtasks**: No decomposition is needed

Abstract Code

- Once **_Add Parts_** button is pressed:
  - if the user is service writer or Roland:
    - write in all details about the part
    - if all fields are validated:
      - If **_Save_** button is clicked:
        - store the details in the database
    - Else:
      - Show invalid fields with hints
  - if the user does not have access:
    - show error message
    - bring the user to previous page

<u>Generate Reports</u>

Task Decomposition

- **Lock Types**: Read-only on the tables
- **Number of Locks**: It varies depending on which report is generated:
  - Sales by Color: 2
  - Sales by Type: 2
  - Sales by Manufacturer: 2
  - Gross Customer Income:
    - Part 1: 3
    - Part 2: 4
  - Repairs by Manufacturer/Type/Model:
    - Part 1: 2
    - Part 2: 3
  - Below Cost Sales: 3
  - Average Time in Inventory: 2

- Parts Statistics: 1
- Monthly Sales:
  - Part 1: 2
  - Part 2: 3

- **Enabling Conditions**: Successful login by the Manager or the Owner
- **Frequency**: Low
- **Consistency (ACID)**: Not critical
- **Subtasks**: Level-1 Subtasks can be done in parallel, and the order is not necessary. For the level-2 subtasks, its corresponding level-1 subtask is required.

Abstract Code

- The Owner selects the type of report from a drop-down list, and click ***Generate Report*** button:
  - If the Owner selects "Sales by Color":
    - The "Sales by Color" report will be generated and displayed.
  - If the Owner selects "Sales by Type":
    - The "Sales by Type" report will be generated and displayed.
  - If the Owner selects "Sales by Manufacturer":
    - The "Sales by Manufacturer" report will be generated and displayed.
  - If the Owner selects "Gross Customer Income":
    - The "Gross Customer Income" report (Section 1) will be generated and displayed.
      - If the customer's name is clicked:
        - The drill-down report (Section 2) will be generated and displayed.
          - If ***Go Back*** is clicked:
            - Go back to the Section 1
  - If the Owner selects "Repairs by Manufacturer":
    - The "Repairs by Manufacturer" report will be generated and displayed.
      - If the manufacturer's name is clicked:
        - The drill-down report (Section 2) will be generated and displayed.
          - If ***Go Back*** is clicked:
            - Go back to the Section 1
  - If the Owner selects "Repairs by Type":
    - The "Repairs by Type" report will be generated and displayed.
      - If the type's name is clicked:
        - The drill-down report (Section 2) will be generated and displayed.
          - If ***Go Back*** is clicked:
            - Go back to the Section 1
  - If the Owner selects "Repairs by Model":
    - The "Repairs by Model" report will be generated and displayed.
      - If the model's name is clicked:
        - The drill-down report (Section 2) will be generated and displayed.
          - If ***Go Back*** is clicked:
            - Go back to the Section 1
  - If the Owner selects "Below Cost Sales":
    - The "Below Cost Sales" report will be generated and displayed.
  - If the Owner selects "Average Time in Inventory":

- The "Average Time in Inventory" report will be generated and displayed.
    - o If the Owner selects "Parts Statistics":
        - The "Parts Statistics" report will be generated and displayed.
    - o If the Owner selects "Monthly Sales":
        - The "Monthly Sales" report will be generated and displayed.
            - If the year-month is clicked:
                - The drill-down report (Section 2) will be generated and displayed.
                    - If *Go Back* is clicked:
                        - Go back to the Section 1

- Upon:
    - o Click *Search for Vehicles* button - Jump to the **Search for Vehicle** task.
    - o Click *Add a Vehicle* button - Jump to the **Add Vehicle** task.
    - o Click *Sell a Vehicle* button - Jump to the **Sell Vehicle** task.
    - o Click *Add a Repair* button - Jump to the **Add Repair** task.
    - o Click *Log out* button - Invalidate the login session and go to the **Search for Vehicle** form.