Team 104 Phase 1 Report

CS6400 Spring 2021

Abhik Choudhury <achoudhury64@gatech.edu>

Joseph Tadros <jtadros3@gatech.edu>

Ritu Raj <rraj35@gatech.edu>

Shashvat Sinha <ssinha96@gatech.edu>

Table of Contents

Data Types

Entity	Attribute	Data Type	Description	Example
Store	**Store Number**	Integer	10-digit integer	1324605879
Store	**Phone Number**	Varchar	10-digit integer	5162243274
Store	**Street Address**	Varchar	Max 60-digit string	123 Abc Rd
Store	**Childcare Limit**	Integer	Max 3-digit integer to indicate minutes	60
Store	**Snack Bar**	Boolean	(Y/N) or (True/False)	Y or True
Store	**Restaurant**	Boolean	(Y/N) or (True/False)	Y or True
City	**Name**	Varchar	Max 30-character string	New York City
City	**State**	Varchar	2-character string	NY
City	**Population**	Integer	Max 15-digit integer	1528235
Sales	**Qty**	Integer	Max 15-digit integer	1420
Product	**PID**	Integer	Max 13-digit integer	1902348675
Product	**Name**	Varchar	Max 30-character string	Super Comfy Chair
Product	**Retail Price**	Decimal	Max 15-digit decimal with 2 decimal places	132.40
Category	**Name**	Varchar	Max 30-character string	Sofas
Discount	**Discount Price**	Decimal	Max 15-digit Decimal with 2 decimal places	98.23
Date	**Date**	Date	YYYY-MM-DD	2021-02-15
Campaign	**Description**	Varchar	Max 60-character string	Summer Radio Ads
Holiday	**Holiday Name**	Varchar	Max 300-character string	Christmas

We have used foundational data types. However, some data types may change in later phases of the project depending on our choice of database. For example, MySQL does not have a Boolean data type whereas PostgreSQL does.

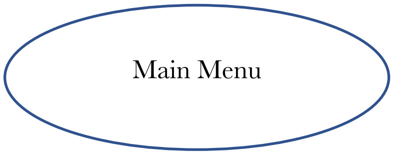
Business Logic Constraints

1. A **Store's** **Childcare Limit** must not be below 0
2. A **Store's** **Store Nbr**, **Phone Number**, **Street Address**, **Childcare Limit**, **Snackbar**, **Restaurant** cannot be Null
3. **City** **Name** must be in United States
4. **City** **State** must be in United States
5. **City** **Name**, **State**, and **Population** cannot be Null
6. **Product** cannot be sold at **Retail Price** and **Discount Price** for a single date
7. The **Discount Price** that is related to a **Product** must be less than the **Retail Price** of the **Product**
8. **Product** **PID**, **Name**, and **Retail Price** cannot be Null
9. Standard UPC/EAN codes should be used as **PID**
10. **Discount Price** and **Retail Price** should be greater than 0

Task Decomposition and Abstract Code

Main Menu:

Task Decomposition



Lock Types: Read only

Number of Locks: 1

Enabling Conditions: Accessing the URL

Frequency: NA

Consistency (ACID): Not critical

Subtasks: NA

Abstract Code

```
Display Count of Store Nbr from Store

Display Count of Store Nbr from Store where Restaurant = Y or Snack bar = Y.

Display Count of Store Nbr from Store where Childcare Limit greater than 0.

Display Count of PID from Product

Display Count of Description from Campaign.
```

Update Populations

Task Decomposition

Lock Types: One write-only on **City** **Population**

Number of Locks: 1

Enabling Conditions: Click on "Update Population"

Frequency: NA

Consistency (ACID): Until write operation finishes, no other user should be able to view **City** **Population**

Subtasks: NA

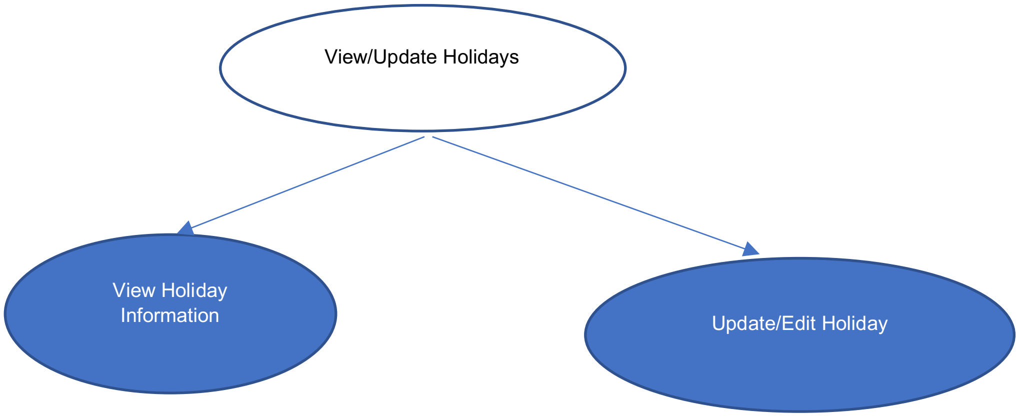
Abstract Code

Given the **Name**, **State** find the **Population** of **City**

Update **Population**

View/Update Holidays:

Task Decomposition



Lock Types: Ready-only & Write-only lock on **Holiday** **Holiday Name**

Number of Locks: 2

Enabling Conditions: Click on "View/Update Holiday" button enables "View Holiday Information" subtask. User submitting **Holiday Name** and **Date** enables "Update/Edit Holiday" subtask.

Frequency: Each subtask will have different frequency

Consistency (ACID): Until write operation finishes, no other user should be able to view **Holiday**

Subtasks: All tasks must be done. "View Holiday Information" occurs first, followed by "Update/Edit Information". Mother Task is needed.

Abstract Code

```
If user clicks "View/Update Holiday":
      Display list of Holiday Name and Date

      If user clicks "Update/Edit Holiday" and provides Date and Holiday
      Name:
            Add/update new Holiday Name and Date
```

Report 1:

Task Decomposition

Lock Types: 2 Read-only lock on **Product** and **Category**

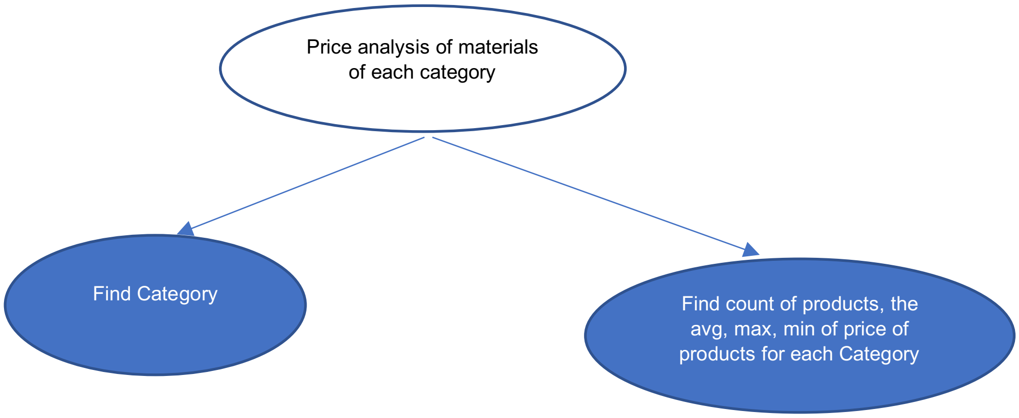
Number of Locks: 2

Enabling Conditions: Click on "Category Report"

Frequency: All 2 have the same frequency

Consistency (ACID): NA

Subtasks: All tasks must be done. "Find Category" occurs first, followed by second sub-task. Mother Task is needed.


Price analysis of materials of each category
Find Category
Find count of products, the avg, max, min of price of products for each Category

Abstract Code

```
Get List of Categories sorted alphabetically
For Each Category
      Get all Products and Retail Price that match the category
            Count all Products
            Average their Retail Price
            Find the Max Retail Price
            Find the Min Retail Price
      Display the four numbers
```

Report 2

Task Decomposition

Lock Types: 4 Read-only lock on **Product, Sales, Dates** and **Discount**

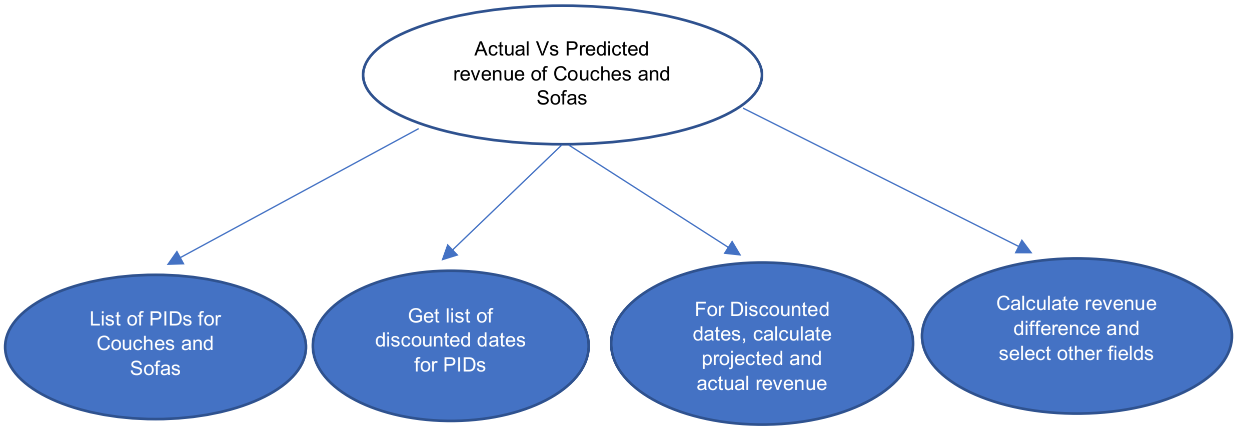
Number of Locks: 4

Enabling Conditions: Click on "Actual versus Predicted Revenue"

Frequency: All 4 have the same frequency

Consistency (ACID): NA

Subtasks: All tasks must be done in a sequential order from left to right as shown in TD diagram. Mother task is needed.


Actual Vs Predicted revenue of Couches and Sofas
List of PIDs for Couches and Sofas
Get list of discounted dates for PIDs
For Discounted dates, calculate projected and actual revenue
Calculate revenue difference and select other fields

Abstract Code

```
Get a list of PID in category "Couches and Sofas"
For each PID:
    Get the list of discounted Dates
    For each discounted Date:
        Get the Sales Qty for this PID for this date
        Get the discounted Price, Retail Price for this PID and Date
        Calculate Actual Revenue as discounted Price * Sales Qty
        Calculated Projected Qty as Sales Qty*0.75
        Calculate Projected Revenue as Retail Price * Projected Qty
    Sum up the Actual Revenue, Projected Revenue, Sales Qty, Projected Qty
    Calculate Revenue Difference as Actual Revenue – Projected Revenue
    Display PID, Product Name, Retail Price, Sales Qty, Actual Revenue,
    Predicted Qty, Projected Revenue
Order by Diff Desc
```

Report 3

Task Decomposition

Lock Types: 4 Read-only lock on Store, Sales, Dates and City

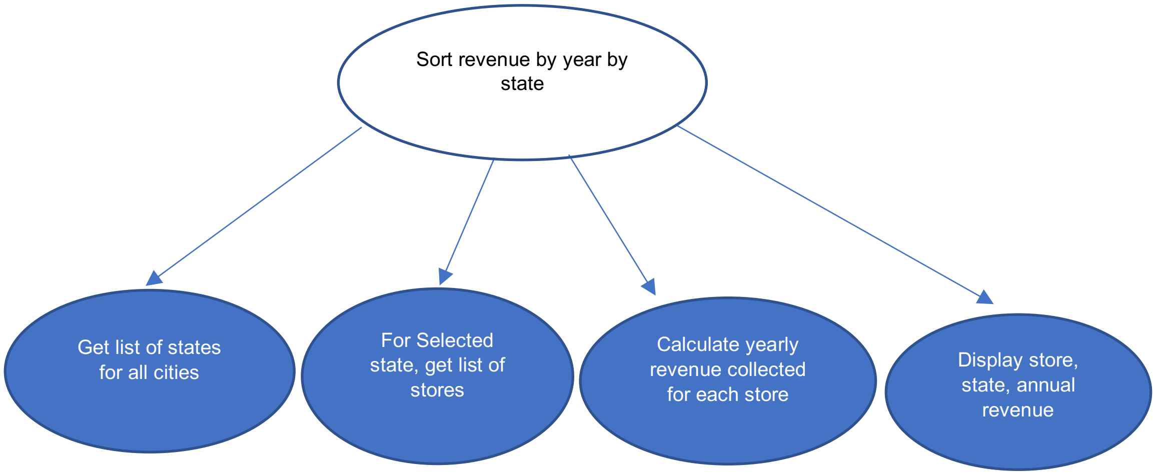
Number of Locks: 4

Enabling Conditions: Click on "Store Revenue by Year by State"

Frequency: All 4 have the same frequency

Consistency (ACID): NA

Subtasks: All tasks must be done in a sequential order from left to right as shown in TD diagram. Mother task is needed.


Sort revenue by year by state
Get list of states for all cities
For Selected state, get list of stores
Calculate yearly revenue collected for each store
Display store, state, annual revenue

Abstract Code

```
Get list of all State for all City
Display all State
When a button is pushed, then do the following:
Get list of Stores using the selected State
For each Store:
      Get Store Nbr and Store Address
      Get City Name from City
      Get list of Sales for Store
      Get list of Dates from Sales
      Calculate list of Years from Date
      For each Year:
            For each Sale within Year:
                  Get Date of Sale
                  Get PID of Sale
```

```
                    If Discount of Date and PID exists:
                          Get Discount Price as Price
                    Else:
                          Get Retail price as Price
                    Get Sales Qty of Sale
              Sum (Sales Qty * Price) for each Year AS Total Year Revenue
        Sum Total Year Revenue for each Store AS Total Revenue
        Display Store Nbr, Store Address, City Name, Year, Total Revenue
Sort by Total Revenue descending and Year ascending;
```

Report 4

Task Decomposition

Lock Types: 4 Read-only lock on Sales, Dates, Product and Category

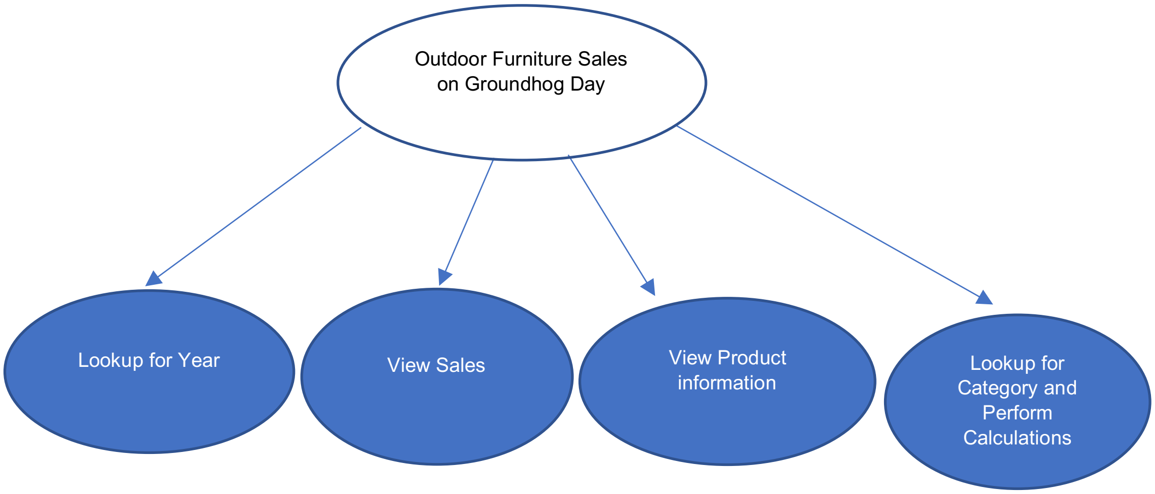
Number of Locks: 4

Enabling Conditions: Click on "Outdoor Furniture on Groundhog Day"

Frequency: All 4 have the same frequency

Consistency (ACID): NA

Subtasks: All tasks must be done in a sequential order from left to right as shown in TD diagram. Mother task is needed.


Outdoor Furniture Sales on Groundhog Day
Lookup for Year
View Sales
View Product information
Lookup for Category and Perform Calculations

Abstract Code

```
Get list of Years
For each Year:
    Display Year
    Find start Date and end Date of year from stored Dates
    Find the Quantity, Product PID, Category Name stored in Sales for the date range
    Filter the Sales data based on outdoor furniture product Category
        Calculate Total Units Sold in Year = Sum of Sales Quantity for all PID for each Date
        Display Total Units Sold in Year
        Calculate Avg. Units Sold per Day = Total Sales/365
        Display Avg. Units Sold per Day

    Get Feb 2nd as Date store in Dates for the Year
    Change start Date and end Date to Feb 2nd
    Find the Quantity, Product PID, Category Name stored in Sales for the date range
    Filter the Sales data based on outdoor furniture product Category Name
        Calculate Units Sold on Ground Hog Day = Sum of Sales Quantity for all PID for the Date
        Display Units Sold on Ground Hog Day

After iterating for all listed years:
    Sort the output display by ascending Order of Year
```

Report 5

Task Decomposition

Lock Types: 6 Read-only lock on **Dates, Product, Sales, Store, City** and **Category**

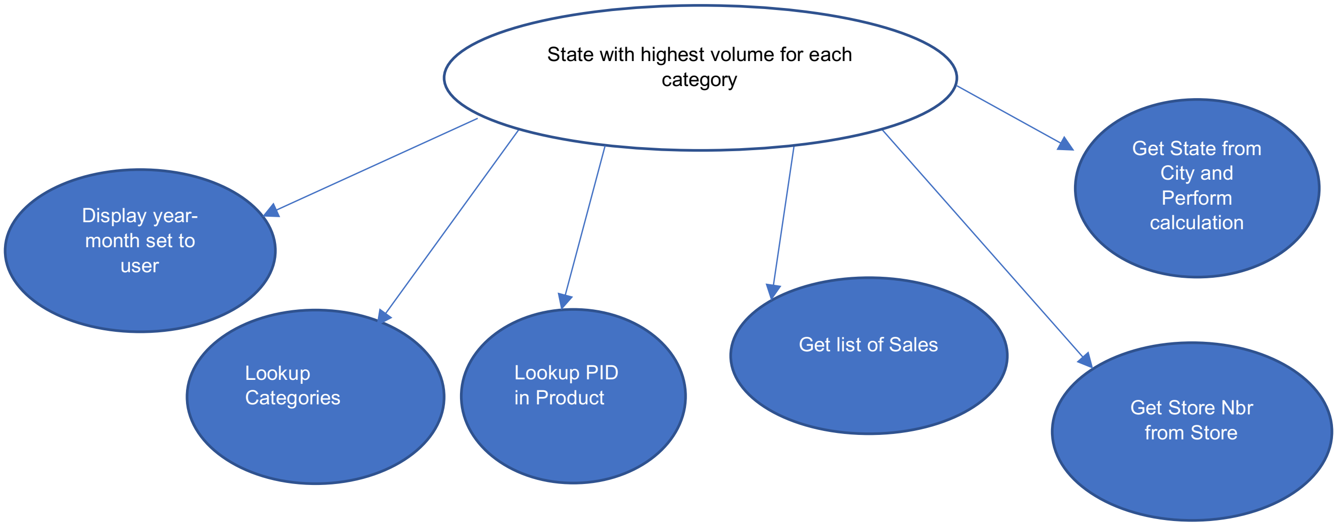
Number of Locks: 6

Enabling Conditions: Click on "State with Highest Volume for each Category"

Frequency: All 6 have the same frequency

Consistency (ACID): NA

Subtasks: All tasks must be done in a sequential order from left to right as shown in TD diagram. Mother task is needed.


State with highest volume for each category
Display year-month set to user
Lookup Categories
Lookup PID in Product
Get list of Sales
Get Store Nbr from Store
Get State from City and Perform calculation

Abstract Code

```
Get list Date from Dates
Calculate list of Months and Years from Date
Display the year and month
Let the user select one year-month set.
Get the list of Categories in ascending order.
With each Category
    Get the list of PID for that Category
    With each PID
```

```
        Get the Sales for that PID for the required Year and Month.
        For each Sale
            Get the Store Number for the sale
            Get the State for that Store Number
    Sum up all the Sales quantities by State
    Select the State (or states) with the Highest Total Unit Sale
    List out the top State or States
```

Report 6

Task Decomposition

Lock Types: 6 Read-only lock on Dates, Product, Sales, Store, City and Discount

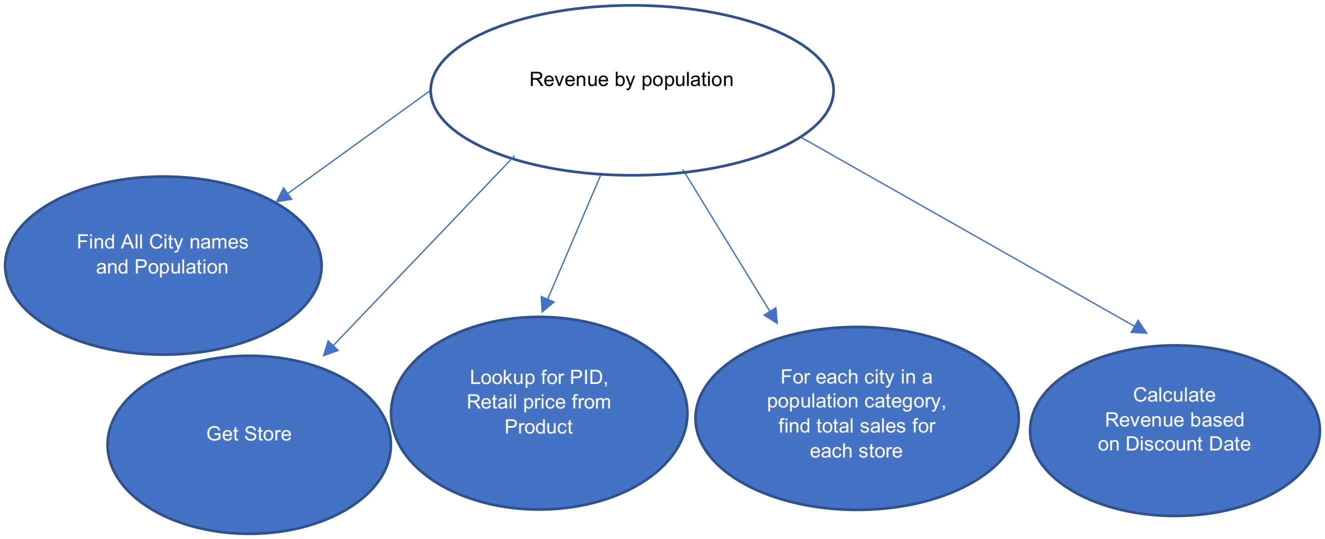
Number of Locks: 6

Enabling Conditions: Click on "Revenue by Population"

Frequency: All have the same frequency

Consistency (ACID): NA

Subtasks: All tasks must be done in a sequential order from left to right as shown in TD diagram. Mother task is needed.


Revenue by population
Find All City names and Population
Get Store
Lookup for PID, Retail price from Product
For each city in a population category, find total sales for each store
Calculate Revenue based on Discount Date

Abstract Code

```
Get list of all City Name and their Population

    For each City Name:
    Assign Each city to a population category using condition**

For each population category:

    Get the list of cities for that category

    For each city:

        Get the list of stores in the city

        For each Store:

            Get the total Sales by PID by Date
            For each PID:

                If the Sales happed on a Discount Date:

                    Then Revenue is Sales* Discount price

                Else:

                    Revenue is Sales* Retail price

        Sum up revenue by year

    Sum up annual revenues for this category
```

*** The categories for city size are: Small (population <3,700,000), Medium (population >=3,700,000 and <6,700,000), Large (population >=6,700,000 and <9,000,000) and Extra Large (population >=9,000,000).*

Report 7

Task Decomposition

Lock Types: 5 Read-only lock on Sales, Dates, Product, Store and Discount

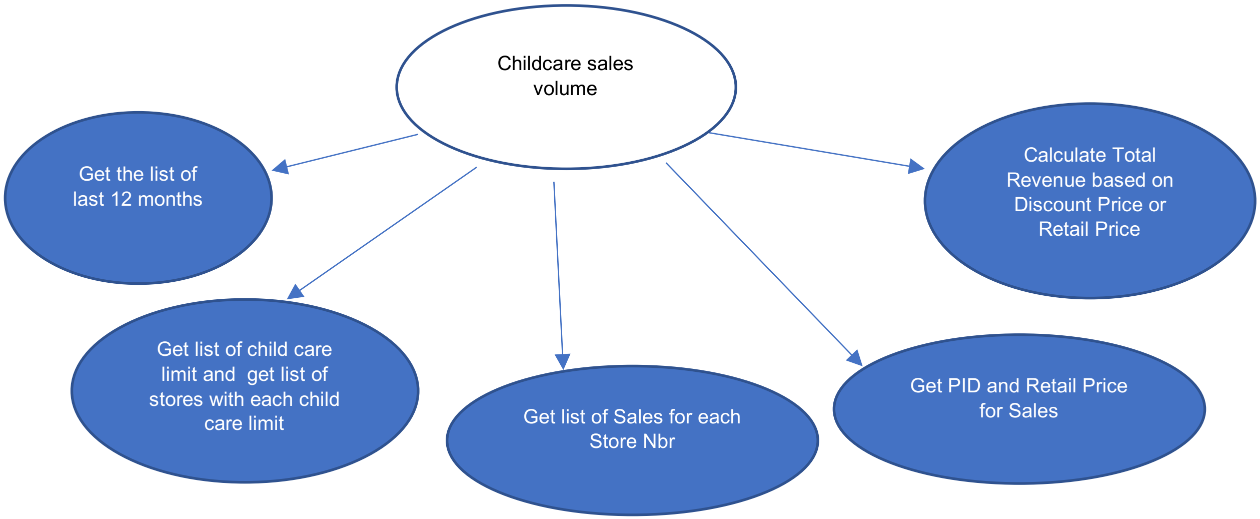
Number of Locks: 5

Enabling Conditions: Click on "Childcare Sales Volume"

Frequency: All have the same frequency

Consistency (ACID): NA

Subtasks: All tasks must be done in a sequential order from left to right as shown in TD diagram. Mother task is needed.


Childcare sales volume
Get the list of last 12 months
Calculate Total Revenue based on Discount Price or Retail Price
Get list of child care limit and get list of stores with each child care limit
Get list of Sales for each Store Nbr
Get PID and Retail Price for Sales

Abstract Code

```
Get list of Date of Sales
Calculate list of Months from Date
Limit Month list to most recent 12 months
Get list of Childcare Limits
For each Childcare Limit:
      Get list of Store Nbr with Childcare Limit
      For each Month:
            For each Store Nbr:
                  Get list of Sales
                  For each Sale:
                        Get Date of Sales
                        Get PID with Sales
                        If Discount of Date and PID exists:
                              Get Discount Price as Price
                        Else:
                              Get Retail price as Price
                              Get Sales Qty of Sales
```

```
        Sum (Sales Qty * Price) as Total Revenue
        Display Childcare Limit, Month, Total Revenue
    IF Childcare Limit = 0:
        Childcare Limit = "No Childcare"
```

Report 8

Task Decomposition

Lock Types: 4 Read-only lock on **Sales, Product, Category** and **Store**

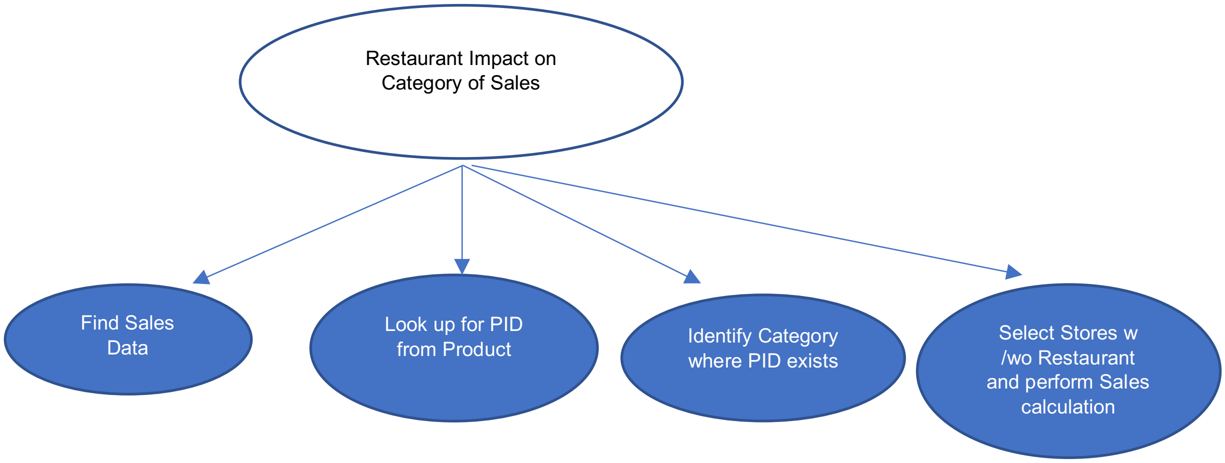
Number of Locks: 4

Enabling Conditions: Click on "Restaurant Impact on Category Sales"

Frequency: All have the same frequency

Consistency (ACID): NA

Subtasks: All tasks must be done in a sequential order from left to right as shown in TD diagram. Mother task is needed.


Restaurant Impact on Category of Sales
Find Sales Data
Look up for PID from Product
Identify Category where PID exists
Select Stores w /wo Restaurant and perform Sales calculation

Abstract Code

```
Get Quantity, Product PID, Category Name, Store Restaurant stored in Sales
Filter out the sales data where PID is not present
    Combine the data set based on Category Name
    For every Category Name:
        Display Name
        Classify each Store within Category based on Restaurant value
        Filter Restaurant = Y
            Display Store Type = Restaurant
            Sum all Quantity sold across Store
            Display as Quantity Sold

        Filter Restaurant = N
            Display Store Type = Non-restaurant
            Sum all Quantity sold across Store
            Display as Quantity Sold

    Repeat the step until all Categories completed
Arrange the report with ascending order of Category Name
```

Report 9

Task Decomposition

Lock Types: 5 Read-only lock on **Product, Discount, Dates, Sales** and **Campaign**

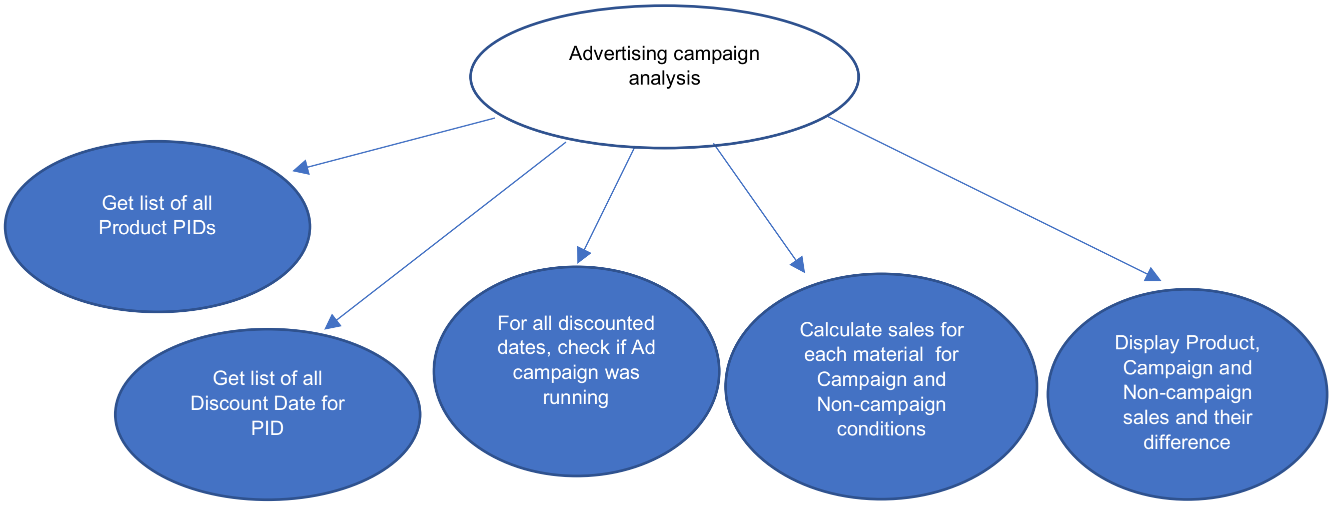
Number of Locks: 5

Enabling Conditions: Click on "Advertising Campaign Analysis"

Frequency: All have the same frequency

Consistency (ACID): NA

Subtasks: All tasks must be done in a sequential order from left to right as shown in TD diagram. Mother task is needed.


Advertising campaign analysis
Get list of all Product PIDs
Get list of all Discount Date for PID
For all discounted dates, check if Ad campaign was running
Calculate sales for each material for Campaign and Non-campaign conditions
Display Product, Campaign and Non-campaign sales and their difference

Abstract Code

```
Get the list of all PID
For each PID
    Get the Discount Date for the PID
    For each Discount Date
        Get the Sales for that PID for that Date
        Check to see if the Discount Date also had a Campaign running on
        the same Date.
        Assign the Sales to either the Campaign or non-Campaign bucket.
    Sum up the Sales for each bucket.
    Get the differences for each bucket
Put all the PID, Product Name, Campaign, non-campaign and difference numbers
in descending order by difference.
Display the top 10 and bottom 10.
```