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Data Types

Store

Attribute	Data Type	Null/ Not Null
Store Number	String	Not Null
Phone Number	String	Not Null
Street Address	String	Not Null
Childcare Flag	String	Not Null
Restaurant Flag	String	Not Null
Snack Bar Flag	String	Not Null

Sale

Attribute	Data Type	Null/ Not Null
Store Number	String	Not Null
Date of Sale	Date	Not Null
Product Sold (PID)	String	Not Null
Quantity	Integer	Not Null

Campaign

Attribute	Data Type	Null/ Not Null
Campaign Date	Date	Not Null
Description	String	Not Null

Holiday

Attribute	Data Type	Null/ Not Null
Holiday Date	Date	Not Null
Holiday Name	String	Not Null

Child Care Limit

Attribute	Data Type	Null/ Not Null
Limit	Integer	Not Null

City

Attribute	Data Type	Null/ Not Null
City Name	String	Not Null
Population	Integer	Not Null

State

Attribute	Data Type	Null/ Not Null
State Name	String	Not Null

Product

Attribute	Data Type	Null/ Not Null
PID	String	Not Null
Product Name	String	Not Null
Retail price	Float	Not Null

Discount

Attribute	Data Type	Null/ Not Null
Discount Date	Date	Not Null
Discount price	Float	Not Null

Category

Attribute	Data Type	Null/ Not Null
Category Name	String	Not Null

Date

Attribute	Data Type	Null/ Not Null
Date	Date	Not Null

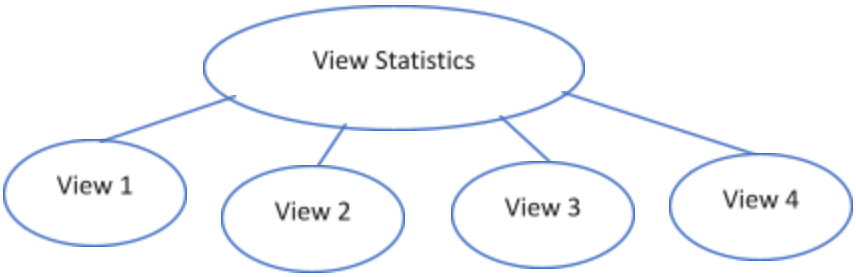
Business Logic Constraints

- The Childcare limit is chosen by each store from predetermined values, and all limits will need to be updated if it changes or a new limit requires manual updating outside of the data load.
- The values of Limit of Childcare limit have the unit: “minutes”.
- PID is like a UPC barcode.
- The retail price is in effect unless there is a discount price.
- If a product is discounted for multiple days in a row, then a record is stored for each day. It is possible that the same product is discounted multiple times (i.e., different days) with different prices.
- The units of the retail price and discount price are both “dollars”.
- If a day has multiple holidays, their names can be combined, such as “Halloween, Harry Potter Day” as we only need to know that the date had holidays associated with it.

- For reporting purposes sales tax values are ignored. Also, the system is not required to store which products were purchased together during a single sales transaction.
- Campaign dates may overlap.

Task Decomposition / Abstract Code

Main Menu Report



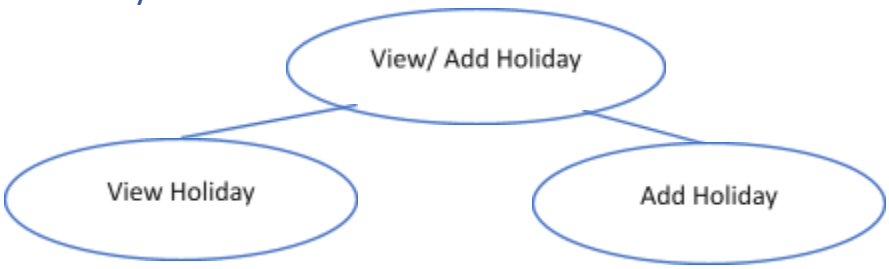
Task Decomposition

- **Lock Types:** Read only locks on Store, Product, Campaign
- **Number of Locks:** 3
- **Enabling Conditions:** When the main page/dashboard is loaded/logged in.
- **Frequency:** All lookups have the same frequency. Daily, Viewed on the main page after every login.
- **Consistency (ACID):** Not Critical, Order is not critical.
- **Subtasks:** Mother Task is needed to do all lookups.

Abstract Code

- User Enters the application to view the statistics on the dashboard.
- Find all Store; Count all Store; Count the Store whose Restaurant Flag is “Y” or Snack Bar Flag is “Y”; Count the Store whose Child Care Flag is “Y”.
- Find all Product; Count all Product.
- Find all Campaign; Count all Campaign.

Holiday Interface



Task Decomposition

- **Lock Types:** Write-only Lock on Holiday while writing and Read-only while viewing.
- **Number of Locks:** 2
- **Enabling Conditions:** When the main page/dashboard is loaded/logged in and the Holiday menu is clicked.
- **Frequency:** Occasional, when adding new holidays or to view holidays
- **Consistency (ACID):** Order is not critical.
- **Subtasks:** Mother task is required to coordinate subtasks. Order is not necessary.

Abstract Code

User Enters the application/Dashboard and clicks on the **Holiday** Menu, then the system runs **View/Add Holiday** task:

- User clicks on ***Add Holidays*** button.
- *Date selection* Form is enabled to select the date.
- *Holiday* Text Box is enabled to enter the holiday.
- Throw an error POP UP when the holiday is already in the database.
- ***Submit*** button has to be clicked to submit changes to the database.

For Viewing Holidays, user clicks on ***View Holidays*** button

- List of Holidays is displayed

Update City Population

Task Decomposition

- **Lock Types:** Write-only locks on City.
- **Number of Locks:** 1

- **Enabling Conditions:** When the main page/dashboard is loaded/logged in and Update City Population Menu is Clicked
- **Frequency:** Occasional, Viewed on the main page after every login
- **Consistency (ACID):** Not Critical, Order is not critical.
- **Subtasks:** Mother Task is not needed. No decomposition needed.

Abstract Code

User Enters the application/Dashboard and clicks on the **Update City Population** Menu, then the system runs **Update** task:

- *Update City* drop down form is enabled to select the city.
- *Select State* drop down form is enabled to select the state in which the city is.
- *Population* Text Box is enabled to enter the population.
- Throw an error POP UP when the population is not an integer.
- ***Submit*** button has to be clicked to submit changes to the database.

Report 1 Category Report

Task Decomposition

- **Lock Types:** Read-only locks on Category, Product.
- **Number of Locks:** 2.
- **Enabling Conditions:** When the main page/dashboard is loaded/logged in and Report 1 Category Report is Clicked.
- **Frequency:** All lookups have the same frequency.
- **Consistency (ACID):** Not Critical, Order is not critical.
- **Subtasks:** Mother Task is not needed.

Abstract Code

User Enters the application/Dashboard and clicks on the ***Report 1 Category Report*** button, then the system runs **Report 1** task:

- For each Category (including those without products), combine with Product to Display the category name, total number of products in that category, the minimum regular retail price, the average regular retail price, and the maximum regular retail price of all the products in that category, sorted by category name ascending.

Report 2 Actual versus Predicted Revenue for Couches and Sofas

Task Decomposition

- **Lock Types:** Read-only locks on Category, Product, Discount, Sale, Date.
- **Number of Locks:** 5.
- **Enabling Conditions:** When the main page/dashboard is loaded/logged in and Report 2 Actual versus Predicted Revenue for Couches and Sofas Clicked.
- **Frequency:** User Defined.
- **Consistency (ACID):** Not Critical, Order is not critical.
- **Subtasks:** Mother Task is not needed. No decomposition needed.

Abstract Code

User Enters the application/Dashboard and clicks on the ***Report 2 Actual versus Predicted Revenue for Couches and Sofas*** button, then the system runs **Report 2** task:

- Combine Product and Category to get the product ID, Product Name and Retail Price for Couches and Sofas Category.
- Combine the above results with Sale to get Total units Sold.
- Combine the above results with Discount and Date to get Discount Price by Dates.
- Combine the above results with Sale, Discount and Date to get the total units sold at a discount, the total units sold at retail price and the actual revenue.
- Calculate Predicted Revenue i.e., Retail Price times quantity for a particular PID vs actual revenue based considering there was no discount.
- Display records for which predicted revenue differences greater than $5000 (positive or negative) by filtering the records.
- Sort records by predicted revenue differences in descending order.

Report 3 Store Revenue by Year by State

Task Decomposition

- **Lock Types:** Read-only locks on City, State, Sale, Store, Date, Product, discount.
- **Number of Locks:** 7.

- **Enabling Conditions:** When the main page/dashboard is loaded/logged in and Store Revenue by Year by State button is clicked.
- **Frequency:** User Defined.
- **Consistency (ACID):** Not Critical, Order is not critical.
- **Subtasks:** Mother Task is not needed. No decomposition needed.

Abstract Code

User Enters the application/Dashboard and clicks on the ***Report 3 Store Revenue by Year by State*** button, then the system runs **Report 3** task:

- Select *State Name* from the drop down on the dashboard which is retrieved from State.
- Connect the Store entity with State via the City to get the store ID, store address, city name.
- Combine the above result with Sale and Date to get sales year.
- Combine with Product and Discount to get total revenue (quantity * price) with price either being retail price or discount price based on whether discount was given.
- Display the result by sorting by ascending Year and revenue descending.

Report 4 Outdoor Furniture on Groundhog Day

Task Decomposition

- **Lock Types:** Read-only locks on Date, Sale, Product, Category, Holiday.
- **Number of Locks:** 5.
- **Enabling Conditions:** When the main page/dashboard is loaded/logged in and Report 4 Outdoor Furniture on Groundhog Day button is clicked.
- **Frequency:** User Defined.
- **Consistency (ACID):** Not Critical, Order is not critical.
- **Subtasks:** Mother Task is not needed. No decomposition needed.

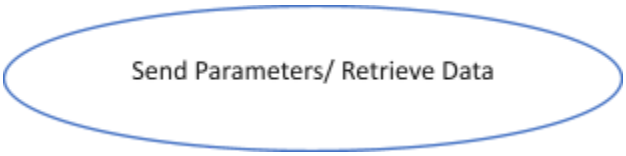
Abstract Code

User Enters the application/Dashboard and clicks on the ***Report 4 Outdoor Furniture on Groundhog Day*** button is clicked, then the system runs **Report 4** task:

- Use Date to find all Year.
- Combine the above results with Sale, Category, Product to find the total units sold in the outdoor category for each Year.
- Find the average number of sold per day (divide the total units sold by 365).

- For each Year, find the Date of the Groundhog Day and combines this Date with Sale, Category, Product to find the total units sold in outdoor category.
- Display the report by year ascending.

Report 5 State with Highest Volume for each Category



Task Decomposition

- **Lock Types:** Read-only locks on Store, Sale, Date, Category, State, City, Product.
- **Number of Locks:** 7.
- **Enabling Conditions:** When the main page/dashboard is loaded/logged in and Report 5 State with Highest Volume for each Category button is clicked.
- **Frequency:** Monthly Report.
- **Consistency (ACID):** Not Critical, Order is not critical.
- **Subtasks:** Mother Task is not needed. No decomposition needed.

Abstract Code

User Enters the application/Dashboard and clicks on the ***Report 5 State with Highest Volume for each Category*** button, then the system runs **Report 5** task:

- Choose *Year* from the drop down and *Month* from the Month Drop down which is populated by combining Date and Sale.
- From Category select Category Name.
- Combine Category with Store Via Product.
- Combine with City and State to get State Name for each Category Name**.**
- Combine with Sale to get the state name that sold the highest number of units in each category Name, and the number of units that were sold by stores in that state.

Report 6 Revenue by Population

Task Decomposition

- **Lock Types:** Read-only locks on Sale, Store, City, Product, Discount, Date.
- **Number of Locks:** 6.
- **Enabling Conditions:** When the main page/dashboard is loaded/logged in and Report 6 Revenue by Population button is clicked.
- **Frequency:** User Defined.
- **Consistency (ACID):** Not Critical, Order is not critical.
- **Subtasks:** Mother Task is not needed. No decomposition needed.

Abstract Code

User Enters the application/Dashboard and clicks on the ***Report 6 Revenue by Population*** button, then the system runs **Report 6** task:

- Select population from City and display conditionally the category as 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) of each city name.
- Combine with Store to get Store Number which can be used to combine with Sale.
- Retrieve Quantity and PID from Sale and combine on PID with Product and Discount to Calculate. Total Revenue (Product ID Price * Quantity). Use Discount price if there is a discount else use Retail Price.
- Aggregate to get Total Revenue by City Name and Year by combining with Date.
- Display Total Revenue broken down on an annual basis with year ascending and city size category ascending order.

Report 7 Childcare Sales Volume

Task Decomposition

- **Lock Types:** Read-only locks on Sale, Store, Childcare Limit, Date.
- **Number of Locks:** 4.

- **Enabling Conditions:** When the main page/dashboard is loaded/logged in and Report 7 Childcare Sales Volume button is clicked.
- **Frequency:** User Defined.
- **Consistency (ACID):** Not Critical, Order is not critical.
- **Subtasks:** Mother Task is not needed. No decomposition needed.

Abstract Code

User Enters the application/Dashboard and clicks on the ***Report 7 Childcare Sales Volume*** button, then the system runs **Report 7** task:

- Combine Store and Childcare Limit to retrieve store names which have childcare along with childcare time limit values.
- Conditionally format and group retrieved data with stores having No Childcare as "No childcare" as category.
- Retrieve Quantity and PID from Sale and combine on PID with Product and Discount to Calculate Total Sales (Product ID Price * Quantity). Use Discount price if there is a discount else use Retail Price.
- Combine with Date on date of sale to filter the last 12 months of data and aggregate (sum) the revenues by month.
- Display in a tabular format, with row values for each month, and column values based on the grouped childcare time limit values for stores, showing the total sales by month and by childcare category.

Report 8 Restaurant Impact on Category Sales

Task Decomposition

- **Lock Types:** Read-only locks on Sale, Store, Category, Product.
- **Number of Locks:** 4.
- **Enabling Conditions:** When the main page/dashboard is loaded/logged in and Report 8 Restaurant Impact on Category Sales button is clicked.
- **Frequency:** User Defined.
- **Consistency (ACID):** Not Critical, Order is not critical.
- **Subtasks:** Mother Task is not needed. No decomposition needed.

Abstract Code

User Enters the application/Dashboard and clicks on the ***Report 8 Restaurant Impact on Category Sales*** button, then the system runs **Report 8** task:

- Get Store Names from Store with and without Restaurant and conditionally format it as Store Type.
- Combine on Product ID via Product to Category to get the Category Name.
- Combine with Sale to get count of Quantity of products sold by Category Name by Store Type.
- Filter out Category Names without Product Names in it.
- Display by category Name ascending and Store Type Ascending.

Report 9 Advertising Campaign Analysis

Task Decomposition

- **Lock Types:** Read-only locks on Product, Discount, Campaign, Store, Date, Sale.
- **Number of Locks:** 6.
- **Enabling Conditions:** When the main page/dashboard is loaded/logged in and Report 9 Advertising Campaign Analysis button is clicked.
- **Frequency:** User Defined.
- **Consistency (ACID):** Not Critical, Order is not critical.
- **Subtasks:** Mother Task is not needed. No decomposition needed.

Abstract Code

User Enters the application/Dashboard and clicks on the ***Report 9 Advertising Campaign Analysis*** button, then the system runs **Report 9** task:

- Retrieve Product ID, Product Name from Product
- Combine with Discount to filter Product IDs that had a discount price.
- Combine with Store to get Store Number.
- Combine with Campaign to get the campaign dates.
- Combine with Date and filter on Sale to get count of products sold during and outside campaign dates.
- Calculate the difference between the two totals which have been calculated above.
- Sort the results by difference in descending.
- Display the top 10 followed by bottom 10 from the above result.