Phase 1 Report

Team 054
02/28/2021

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Data Types

CHILDCARE

Attribute	**Data type**	**Nullable**
MaximumTime	Int	Not null

STORE

Attribute	**Data type**	**Nullable**
StoreNumber	String	Not null
PhoneNumber	String	Not null
Address	String	Not null
Restaurant	Boolean	Not null
SnackBar	Boolean	Not null

CITY

Attribute	**Data type**	**Nullable**
Location	String	Not null
State	String	Not null
CityName	String	Not null
CityPopulation	Int	Not null

DATE

Attribute	**Data type**	**Nullable**
Date	Date	Not null
Holiday	Boolean	Not null

Campaign	Boolean	Not null
HolidayName	String	Null
CampaignDescription	String	Null

TRANSACTION

Attribute	**Data type**	**Nullable**
TranscationID	String	Not null
DateTime	Timestamp	Not null
Price	Float	Not null
Quantity	Int	Not null

PRODUCT

Attribute	**Data type**	**Nullable**
PID	String	Not null
RegularPrice	Float	Not null
ProductName	String	Not null

CATEGORY

Attribute	**Data type**	**Nullable**
CategoryName	String	Not null

DISCOUNT

Attribute	**Data type**	**Nullable**
DiscountPrice	Float	Not null

Business Logic Constraints

- MaximumTime of ChildCare must not exceed 120 minutes.
- All products are available and sold at all stores.
- All products can be discounted at different time with different price
- Discount price cannot be more than 80% of regular price
- Discount price is applied to all store with the same product

Task Decomposition & Abstract Code

Abstract Code Markups:

Bold Italics: Buttons

Bold underline: forms

BLUE UPPERCASE: TABLE NAME

Green: Report

Main Menu

Task Decomposition:

Lock Types: Lookup count of stores, count of stores that offer food (have a restaurant, a snack bar, or both), count of stores offering childcare, count of products, and count of distinct advertising campaigns--Read only.

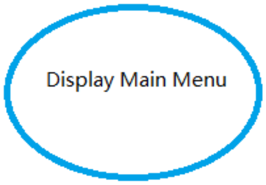
Number of Locks: Several different schema constructs are needed.

Enabling Conditions: None

Frequency: High

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

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



Abstract code:

- Upon open main menu, display a generated view from STORE, CHILDCARE,PRODUCTS, DATE table and get a read-only report contain*:* count of stores, count of stores that offer food (have a restaurant, a snack bar, or both), count of stores offering childcare, count of products, and count of distinct advertising campaigns.
- Show "***Holiday Information***", "***City Population Information***", "***Category Report***" and "***Couches and Sofas Report***", "***Store Revenue by Year by State Report", "Outdoor Furniture on Groundhog Day vs Avg", "Sale Report State with Highest Volume for Each Category by Month", "Revenue by Population Report Childcare Sales Volume", "Report Advertising Campaign Analysis Report"*** buttons*.*
- Upon:
    - Click ***Holiday Information***, direct to the **View and Add Holiday Information** task .

- Click ***City Population Information***, direct to the **View and Update the City Population** task.
- Click ***Category Report***, direct to the **Generate Category Report** task.
- Click ***Couches and Sofas Report***, direct to **General Actual vs Predict Revenue for Couches and Sofas Report** task.
- Click ***Store Revenue by Year by state report***, direct to **View Store Revenue by Year and State** task.
- Click ***Outdoor Furniture on Groundhog Day vs Avg Sale Report***, direct to **Generate Groundhog Day Report** task.
- Click on ***State with Highest Volume for Each Category by Month***, direct to **Show State with Highest Volume for Each Category Report** task.
- Click ***Revenue by Population Report***, direct to **Show Revenue by Population Report** task.
- Click ***Childcare Sales Volume Report***, direct to **Generate Childcare Sales Volume Report** task.
- Click ***Restaurant Impact***, direct to **Generate Restaurant Impact Report** task.
- Click ***Advertising Campaign Analysis Report***, direct to **Generate Advertising Campaign Report** task.

View and Add Holiday Information

Task Decomposition:

Lock Types: Lookup Holiday and HolidayName and Date in DATE table; Update Date and HolidayName and Holiday in DATE table. Read and write.

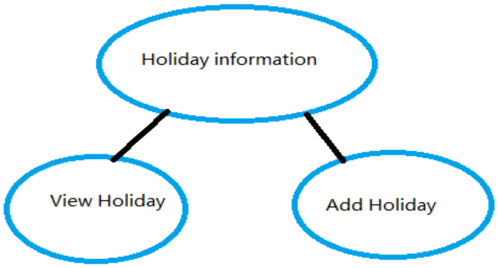
Number of Locks: Single

Enabling Conditions: None

Frequency: Low

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

Subtasks: Tasks can be done in parallel. Mother task is required to coordinate subtasks. Order is not necessary.



Abstract code:

- Click on the ***Holiday Information*** button from the Main Menu.
- Click on the ***View Holiday*** button from the **Holiday Information** form.
    - Choose Holiday or Date
    - Enter *HolidayName* ('$HolidayName') or *Date*('$Date')
    - Display HolidayName and Date from DATE table
- Click on the ***Add Holiday*** button.
    - Enter *Date*('$Date')
    - Enter *HolidayName*('$HolidayName')
    - Store HolidayName and Date

Update City Population

Task Decomposition:

Lock Types: Read and write, lookup city population by CityName; update city population by typing in information in the CITY table.

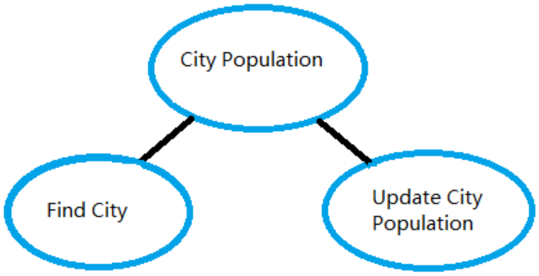
Number of Locks: Single

Enabling Conditions: None

Frequency: Low

Consistency (ACID): a single value can only be kept by multi users.

Subtasks: Mother task is required to coordinate subtasks. Find City subtask beforeUpdate City Population subtask.



Abstract Code:

- Click on the ***Update City Population*** button from the Main Menu.
- Click on the ***Find City*** button: find the number of populations on a particular city, display CityName and CityPopulation from the CITY table.
- Click on ***Update City Population*** botton and type in the updated number.
    - Enter *Date*('$Date')
    - Enter *CityPopulation*('$CityPopulation')

1- Generate Category Report

Task Decomposition:

Lock Types: Lookup from CATEGORY table, and PRODUCT table, all are read-only.

Number of Locks: Several different schema constructs are needed.

Enabling Conditions: None

Frequency: Low

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

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

Abstract Code:

- User clicked on the Category ***Report*** button from the Main Menu.
- Run the **Generate Category Report** task:
    - Find the CATEGORY for each product in PRODUCT using CATEGORY.CategoryName.
    - If a product belongs to multiple CategoryName:
        - Meltdown the table by listing each CategoryName for this product.
    - Display only the CategoryName and RegularPrice.
    - Group by CategoryName with aggregate functions on RegularPrice for Ct, Min, Avg, Max of the products.
        - For each CategoryName:
            - Ct: count the number products that belong to the CategoryName.
            - Min: the minimum RegularPrice in the CategoryName.
            - Avg: the sum of RegularPrice divided by the count of RegularPrice in the CategoryName. If there is no product, display “0”.
            - Max: the maximum RegularPrice in the CategoryName.
    - Sort the rows by CategoryName ascending.
- Display the Category Report.

2- Generate Actual vs Predict Revenue for Couches and Sofas Report

Task Decomposition:

Lock Types: Lookup of TRANSACTION table, DATE table, PRODUCT table, CATEGORY table and DISCOUNT table. All are read only.

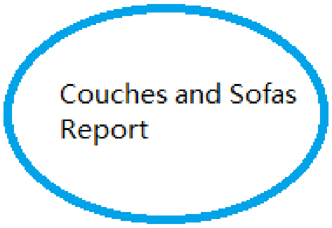
Number of Locks: Several different schema constructs are needed.

Enabling Conditions: None

Frequency: Low

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

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



Abstract Code:

- User clicks on ***Couches and Sofas Report*** from Main Menu.
- Run **Generate Actual vs Predict Revenue for Couches and Sofas Report** task:
    - Query information about the product (couches and sofas) using product ID.
    - Filter all the products that belong to couches and sofas based on CATEGORY.Name.
    - Gather information of DATE.Date of transaction, DATE.Date of discount, TRANSACTION.quantity, and PRODUCT.RegularPrice and “Actual Revenue/Predicted Revenue” for each product, calculate actual revenue and predicted revenue.
        - If no discount is applied to the product at the specified date:
            - Revenue is Actual Revenue, which is calculated as the product of TRANSACTION.quantity times PRODUCT.RegularPrice.
        - Else:
            - Revenue is Predicted Revenue, which is calculated as 75% of the product of TRANSACTION.quantity times PRODUCT.DiscountPrice.
    - Calculate revenue difference as subtraction of predicted revenue from actual revenue.
- Display report of Actual Revenue and Predicted Revenue of the Product, for product with revenue difference higher than $5000 (positive or negative) in descending order of revenue difference, including product ID, product name and retail price, total quantity of item sold, quantity of item sold at regular price, quantity of item sold at discounted price and difference between actual revenue and predicted revenue.

3- View Store Revenue by Year by State

Task Decomposition:

Lock Types: Read-only, lookup table of STORE table, TRANSACTION table, DATE table and CITY table

Number of Locks: Several different schema constructs are needed.

Enabling Conditions: None

Frequency: Low

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

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

Abstract Code:

- Click on ***View Store Revenue by Year by State*** botton on Main Menu.
- Run the view report task on screen:
    - Drop down displayed for States:
        - Users select a specific state.
            - Upon drop down selection: select data from CITY.State.
            - In the selected state, select the current year by combining TRANSACTION.ID with the DATE table.
            - For each year, get SUM from TRANSACTION.price * TRANSACTION.quantity by STORE.StoreNumber.
    - Sort the report first by year in ascending order and then by revenue in descending order.
- Display the Store Revenue by Year by State report showing the store ID, store address, city name, sales year, and total revenue.

4- Generate Outdoor Furniture on Groundhog Day vs Average Sale Report

Task Decomposition:

Lock Types: Read-only, lookup transactions on Outdoor Furniture category by Date from TRANSACTION and CATEGORY tables.

Number of Locks: Several different schema constructs are needed.

Enabling Conditions: None

Frequency: Low

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

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

View outdoor Furniture Category Sales on Groundhog Day Report

Abstract Code:

- Click on ***View Outdoor Furniture Category Sales on Groundhog Day Report*** button from the Main Menu.
- Run the **Generate Outdoor Furniture on Groundhog Day vs Average Sale Report** task:
    - Run count all products subtask: count all products which belong to the "Outdoor Furniture" category from the TRANSACTION table and CATEGORY table.
    - Run Find all years subtask: find all years which have Outdoor Furniture sold.
    - For each Year:
        - Count the total number of quantities which Date falls in this year as TotalNumber.
        - Calculate the AverageNumber: TotalNumber / 365.
        - Count the total number of quantities which Date is on February 2nd this year as GroundhogDayNumber.
        - If no sales made on that year, return year on the year column, and 0 for all columns.
    - Sort the report on Year ascending order.
- Display Year, TotalNumber, AverageNumber, and GroundhogDayNumber in Outdoor Furniture on Groundhog Day vs Average Sale Report.

5- Show State with Highest Volume for Each Category by Month

Task Decomposition:

Lock Types: Read-only lookup of CITY table, PRODUCT table,DATE table, CATEGORY table and TRANSACTION table for city.state,date, category ID, transaction ID and Quantity.

Number of Locks: Several different schema constructs are needed.

Enabling Conditions: None

Frequency: Low

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

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

Abstract Code:

- Click on the ***State with Highest Volume for Each Category by Month*** button from the Main Menu.
- Enter *Date*('$Year-Month').
- Run the **Show State with Highest Volume for Each Category by Month** task:
    - Find the quantity of the selected month in each store of each product by combining the TRANSACTION table with the DATE table.
    - Find the CATEGORY for each product in PRODUCT using CATEGORY.CategoryName.
    - Find store location for each transaction using CITY.State.
    - Group the count of transactions for each product by CATEGORY.CategoryName and CITY.State.
    - Find the HighestVolume product in each category in all states.
    - Sort the rows by CategoryName ascending.
- Display monthly HighestVolume, CategoryName and State in State with Highest Volume for Each Category by Month.

6- Show Revenue by Population Report

Task Decomposition:

Lock Types: Read-only lookup of DATE table, CITY table, STORE table, and TRANSACTION table for date, state, store number, price and quantity.

Number of Locks: Several different schema constructs are needed.

Enabling Conditions: None

Frequency: Low

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

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

Abstract Code:

- Click on the ***Revenue by Population Report*** button from the Main Menu.
- Run the ***Show Revenue by Population Report*** task:
    - Find the yearly revenue in each store by combining the TRANSACTION table with the DATE table.
    - Find store location for each transaction using CITY.Cityname.
    - Calculate the yearly revenue for each city.
    - Find the yearly population information in each City by combining the CITY table with the DATE table.
    - Find the city.size for each depending on following the conditions:

        Small (population <3,700,000)
        Medium (population >=3,700,000 and <6,700,000)
        Large (population >=6,700,000 and <9,000,000)
        Extra Large (population >=9,000,000)
    - Combine the yearly revenue by the city.size.
    - Sort the rows by year ascending and sort the columns by city.size ascending.
- Display Revenue, City.Size and Year in Revenue by Population Report.

7- Generate Childcare Sales Volume Report

Task Decomposition:

Lock Types: Lookup of CHILDCARE table, STORE table, TRANSACTION table. All are read-only.

Number of Locks: Several different schema constructs are needed.

Enabling Conditions: None

Frequency: Low

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

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

Abstract Code:

- Click on the ***Childcare Sales Volume Report*** button from the Main Menu.
- Run the **Generate Childcare Sales Volume Report** task:
    - Query for information about store childcare time and their revenue in the last 12 months.
    - Find the MaximumTime using CHILDCARE.MaximumTime.

    - Limit the CHILDCARE.Date within the last 12 months.
    - Create a new column of “ChildCareCategory” with possible elements from “No childcare” (0), “Low” (1~30), “Medium” (31~60), “High” (61~120) based on the MaximumTime.
    - Name this view as CHILDCARE_MONTH.
    - Group by StoreNumber, the month of Date and calculate the mode (most frequent) occurrence of ChildCareCategory for each store each month as the value, name the attribute as Month.
    - Sort the CHILDCARE_MONTH by StoreNumber and Month.
    - Display StoreNumber, Month, and ChildCareCategory.
    - Join the TRANSACTION and CHILDCARE_MONTH table based on StoreNumber.
    - Group by Month, ChildCareCategory with an aggregate function of the sum of Quantity as “SalesVolume”; Display Month, ChildCareCategory, and SalesVolume.
    - Casting the table into rows as Month, four columns as ChildCareCategory with the SalesVolume as value.
    - Sort the report of Month in ascending order and ChildCareCategory in “No childcare”, “Low”, “Medium”, “High” order.
- Display the Childcare Sales Volume Report which has Month as rows and ChildCareCategory as columns.

8- Generate Restaurant impact on Category Sales Report

Task Decomposition:

Lock Types: Lookup STORE table, PRODUCT table, TRANSACTION table, and CATEGORY table. All are read-only.

Number of Locks: Single

Enabling Conditions:None

Frequency: Low

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

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

Abstract Code:

- Click on the ***Restaurant impact on Category Sales Report*** button from the Main Menu.

- Run the **Generate Restaurant Impact on Category Sales Report** task.
    - Find the restaurant information in each store using the STORE table, group stores as Restaurant or Non-restaurant.
    - Find all transaction information in each store by combining the STORE table and TRANSACTION table.
    - Calculate each the sold quantity for each category in each store using CATEGORY table and PRODUCT table.
    - Group together the sold quantities for each category based on the non-restaurant and restaurant store types.
    - Order the report by the category name ascending and list the non-restaurant group information firstly.
- Display Restaurant impact on Category Sales Report showing quantity sold by store type and product category.

9- Generate Advertising Campaign Analysis Report

Task Decomposition:

Lock Types: Read-only lookup of DATE table, PRODUCT table, TRANSACTION table, DISCOUNT table.

Number of Locks: Single

Enabling Conditions: None

Frequency: Low

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

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

Abstract Code:

- Click on the ***Advertising Campaign Analysis Report*** button from the main menu.
- Run the **Generate Advertising Campaign Analysis Report** task.
    - Combine the TRANSACTION table and DATE table and create a new column IsCampaign for campaign and non-campaign category.
    - Find date and PID of the discounted product by the DISCOUNT table. Filter out all the transactions in the TRANSACTION table when the product is not discounted.
    - Find product name for each product through PID key using the PRODUCT table.

  - Aggregate the quantity of campaign group and non-campaign group for each product using the TRANSACTION table, then calculate the difference.
  - Sort the report by the difference in descending order, keep the top 10 rows followed by bottom 10 rows.
- Display Advertising Campaign Analysis Report showing table of product ID, product name, quantity sold during campaign and outside campaign and difference.