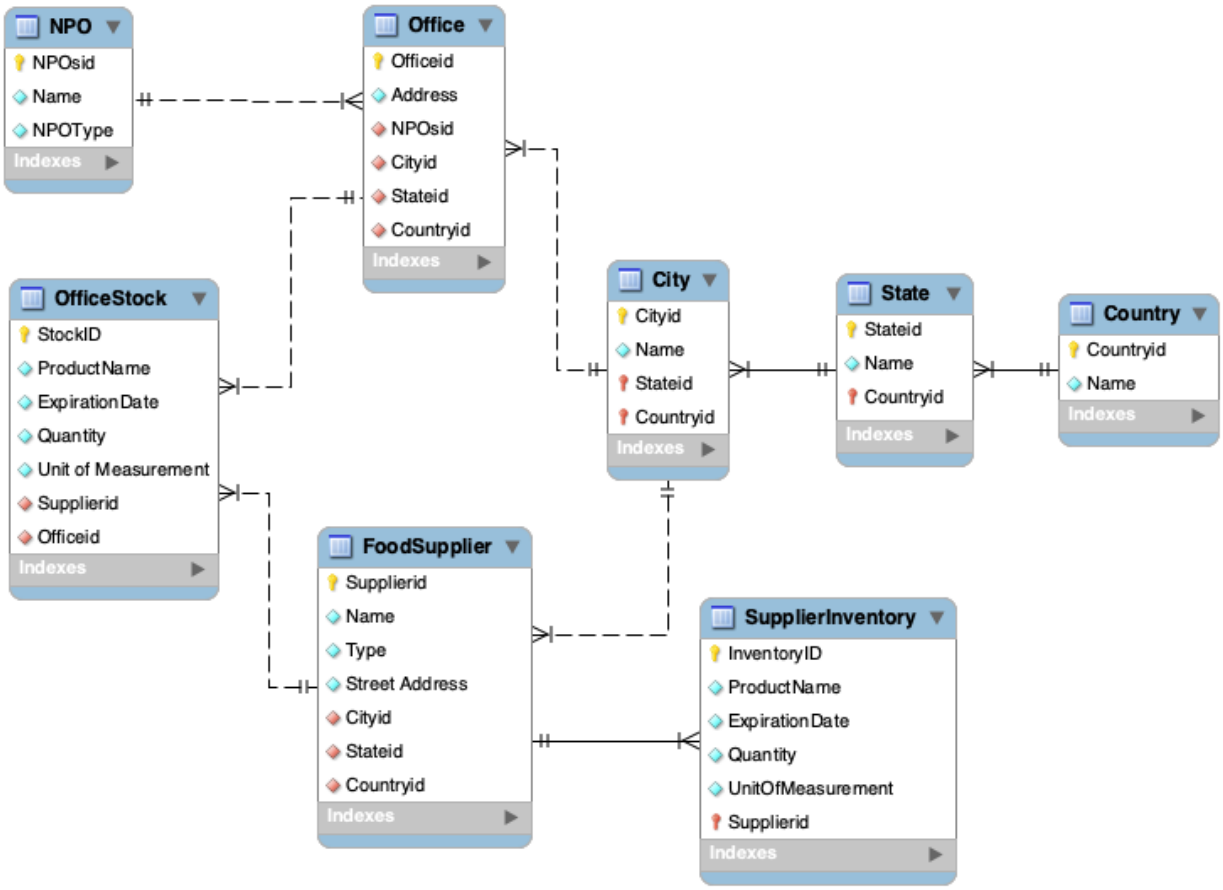
# Food Waste - Database Design and SQL

## Description:

Grocery stores and other food retailers often have left over food stock in their shelves that are near expiration. Unfortunately, these stores are left to throw out these expired and near-expired food leading to a large amount of food waste. This database is designed to tackle the problem of food waste by allowing non-profit organizations (NPOs) like food banks to query information about nearby food retailers. Using this designed database, they may query which food suppliers near them have specific types of food and when it expires. So, they can offer to purchase the foods that will be expiring soon at bulk discounts to eliminate waste. They can also keep track of what products in their office stock are going to run out. Assuming these queries are performed in late September, i.e., food with expiration date in October is close to expiration.

## Data Model:



## Queries:

### #1: Our NPO realizes that tomatoes are in high demand. He wants to check if his primary sources, Jusgo or GW has at least 15lbs of tomatoes in one of the stores that have the expiration date of 29th of November. Order by total tomato volume.

Execute:

```
> SELECT
   foodSupplier.supplierName AS Name,
   SUM(supplierInv.quantity) AS AvailablePoundOfTomato
FROM
   supplierInv,
   foodSupplier
WHERE
   supplierInv.supplierID = foodSupplier.supplierID
      AND foodSupplier.supplierName REGEXP 'Jusgo|GW'
      AND supplierInv.expDate = '2022-11-29'
      AND (SELECT
         SUM(supplierInv.quantity)
      FROM
         supplierInv,
         foodSupplier
      WHERE
         supplierInv.supplierid = foodSupplier.supplierID
            AND supplierInv.productName REGEXP 'Tomato|tomato'
            AND foodSupplier.supplierName REGEXP 'Jusgo|GW') > 15
GROUP BY foodSupplier.supplierName
ORDER BY AvailablePoundOfTomato DESC;
```

Output:

```
+ --------- + -------------------------- +

| Name      | AvailablePoundOfTomato     |

+ --------- + -------------------------- +

| Jusgo | 64                         |

| GW      | 28                        |

+ --------- + -------------------------- +
```

### #2: Our NPO FoodForEveryone wants to find all the addresses of Food Suppliers in the same city as their Athens office. Order by supplier names.

Execute:

```
> SELECT
   foodSupplier.supplierName,
   foodSupplier.streetAddress,
   city.cityName
FROM
   foodSupplier
      JOIN
   city ON city.cityID = foodSupplier.cityID
WHERE
   city.cityName REGEXP 'Athens'
ORDER BY foodSupplier.supplierName;
```

Output:

```
+ ----------------- + ------------------ + ------------- +

| supplierName      | streetAddress      | cityName      |

+ ----------------- + ------------------ + ------------- +

| Earth Fare        | 1689 S Lumpkin St  | Athens        |

| Kroger            | 191 Alps Rd        | Athens        |

| Hmart       | 171 International Dr | Athens        |

+ ----------------- + ------------------ + ------------- +
```

**#3: Our NPO wants to see how much milk in Publix in Atlanta, GA is expiring soon in October that they may be able to purchase.**

Execute:

```
> SELECT
   supplierName,
   cityName,
   productName,
   SUM(quantity) AS totalAmount,
   expDate
FROM
   state
      JOIN
   city ON state.stateID = city.cityID
      JOIN
   foodSupplier ON city.cityID = foodSupplier.cityID
      JOIN
   supplierInv ON foodSupplier.supplierID = supplierInv.supplierID
WHERE
   cityName = 'Atlanta'
```

```
    AND stateName = 'Georgia'
    AND productName = 'Milk'
    AND expDate >= '2022-10-01'
    AND expDate < '2022-10-31'
    AND supplierName REGEXP 'publix|Publix'
GROUP BY supplierName , cityName , productName , expDate;
```

Output:

```
+ ----------------- + ------------- + ---------------- + ---------------- + ------------ +
| supplierName      | cityName      | productName      | totalAmount      | expDate      |
+ ----------------- + ------------- + ---------------- + ---------------- + ------------ +
| Publix at Piedmont | Atlanta      | Milk             | 1                | 2022-10-15   |
| Publix at Piedmont | Atlanta      | Milk             | 2                | 2022-10-26   |
+ ----------------- + ------------- + ---------------- + ---------------- + ------------ +
```

**#4: NPO wants to find products that have the maximum amount among all foods and at least 10 units in inventory at all suppliers in GA state, So, NPO can know where to easily order large amounts of certain foods.**

Execute:

```
> SELECT
   supplierName,
   streetAddress,
   stateName,
   productName,
   MAX(supplierInv.quantity) AS Total
FROM
   state
      JOIN
   city ON state.stateID = city.cityID
      JOIN
   foodSupplier ON city.cityID = foodSupplier.cityID
      JOIN
   supplierInv ON foodSupplier.supplierID = supplierInv.supplierID
WHERE
   stateName REGEXP 'Georgia'
GROUP BY supplierName , streetAddress , stateName , productName
HAVING MAX(supplierInv.quantity) > 10
ORDER BY MAX(supplierInv.quantity) DESC;
```

Output:

```
+ ----------------- + ------------------ + -------------- + ---------------- + ---------- +
| supplierName      | streetAddress      | stateName      | productName      | Total      |
+ ----------------- + ------------------ + -------------- + ---------------- + ---------- +
| Publix at Piedmont | 595 Piedmont Ave NE | Georgia       | Eggs             | 27         |
| Sprouts Farmers Market | 1845 Piedmont Ave NE Ste 500 | Georgia | Eggs | 27 |
| Sprouts Farmers Market | 1845 Piedmont Ave NE Ste 500 | Georgia | Honey | 21 |
| Sprouts Farmers Market | 1845 Piedmont Ave NE Ste 500 | Georgia | Cookies | 21 |
```

```
| Publix at Piedmont | 595 Piedmont Ave NE | Georgia        | Tomatoes         | 13        |
+ ----------------- + ------------------ + ------------- + ---------------- + ---------- +
```

**#5: Our NPO hears that across their locations, eggs are not selling very well at the local food suppliers. They are interested in buying eggs. However, they only want to purchase eggs that are expiring soon (October). So, they want to find which food suppliers have near-expired eggs and their exact expiration dates.**

Execute:

```
> SELECT
   supplierInv.productName AS Product,
   supplierInv.expDate,
   supplierInv.quantity,
   supplierInv.unitOfMeasurement,
   foodSupplier.supplierName AS Supplier,
   foodSupplier.streetAddress,
   foodSupplier.cityID,
   foodSupplier.stateID
FROM
   supplierInv
      JOIN
   foodSupplier ON supplierInv.supplierID = foodSupplier.supplierID
WHERE
   productName REGEXP 'eggs|Eggs'
      AND expDate < '2022-11-01';
```

Output:

```
+ ------------ + ------------ + ------------- + ---------------------- + ------------- + ------------------ + ----------- + ------------
+

| Product          | expDate          | quantity          | unitOfMeasurement     | Supplier          |   streetAddress
          | cityID  | stateID          |

+ ------------ + ------------ + ------------- + ---------------------- + ------------- + ------------------ + ----------- + ------------
+

| Eggs             | 2022-10-30   | 27        | Oz                | Publix at Piedmont | 595 Piedmont Ave NE | 1
          | 1       |

| Eggs             | 2022-10-24   | 27        | Oz                | Kroger            | 191 Alps Rd     | 2        |        1
          |

+ ------------ + ------------ + ------------- + ---------------------- + ------------- + ------------------ + ----------- + ------------
+
```

**#6: A NPO in GA wants to run a sandwich donation at the end of September. So, they want to know how many pounds of tomatoes that are expiring in the October or later they can buy. Since the amount of sandwiches they can provide depends on the amount tomatoes they can buy. Assuming each pound of tomatoes can make ten sandwiches.**

Execute:

```
> SELECT
   productName,
   SUM(supplierInv.quantity) AS Total,
   unitOfMeasurement AS Unit,
   (10 * (SUM(supplierInv.quantity))) AS Sandwich
FROM
   state
      JOIN
   city ON state.stateID = city.cityID
      JOIN
   foodSupplier ON city.cityID = foodSupplier.cityID
      JOIN
   supplierInv ON foodSupplier.supplierID = supplierInv.supplierID
WHERE
   stateName REGEXP 'Georgia'
      AND productName REGEXP 'Tomato|tomato'
      AND expDate >= '2022-10-01'
GROUP BY productName , unitOfMeasurement;
```

Output:

```
+ ---------------- + ---------- + --------- + ------------- +

| productName      | Total      | Unit      | Sandwich      |

+ ---------------- + ---------- + --------- + ------------- +

| Tomatoes         | 18         | Lbs       | 180           |

+ ---------------- + ---------- + --------- + ------------- +
```

**#7: Our NPO wants to know which suppliers supplied food for all their offices and what they have in inventory currently with expiration date later than 09/20/2022 ordered by supplier names, product names, expiration date. So, it may be faster and easier to order certain items for all offices later from these suppliers.**

Execute:

```
> SELECT
   supplierName,
   productName,
   expDate,
   SUM(quantity) AS quantity
```

```
FROM
   foodSupplier
      JOIN
   supplierInv ON foodSupplier.supplierID = supplierInv.supplierID
WHERE
   NOT EXISTS( SELECT
         *
      FROM
         office
      WHERE
         NOT EXISTS( SELECT
               *
            FROM
               officeStock
            WHERE
               officeStock.supplierID = foodSupplier.supplierID
                  AND officeStock.officeID = office.officeID))
      AND supplierInv.expDate > '2022-09-20'
GROUP BY supplierName , productName , expDate
ORDER BY supplierName , productName , expDate;
```

Output:

```
+ ----------------- + ---------------- + ------------ + ------------- +
| supplierName      | productName      | expDate      | quantity      |
+ ----------------- + ---------------- + ------------ + ------------- +
| Kroger            | Bananas          | 2022-09-25   | 2             |
| Kroger            | Eggs             | 2022-09-24   | 27            |
| Kroger            | Rice             | 2022-11-01   | 5             |
| Kroger            | Rice             | 2022-11-11   | 2             |
| Kroger            | Tomatoes         | 2022-11-29   | 1             |
| Publix at Piedmont | Apples          | 2022-10-01   | 3             |
| Publix at Piedmont | Apples          | 2022-10-05   | 2             |
| Publix at Piedmont | Bread           | 2022-10-15   | 1             |
| Publix at Piedmont | Eggs            | 2022-09-30   | 27            |
| Publix at Piedmont | Eggs            | 2022-11-01   | 27            |
| Publix at Piedmont | Milk            | 2022-10-15   | 1             |
| Publix at Piedmont | Milk            | 2022-10-26   | 2             |
```

| Publix at Piedmont | Tomatoes | 2022-11-29 | 13 |

+ ---------- + ---------- + ---------- + ---------- +

**#8: Our NPO office at Atlanta, GA wants to find the name and address of the supplier that has the largest amount of milk in their inventory among all suppliers at the same city for an upcoming large purchase of milk.**

Execute:

```
> SELECT
    supplierName,
    streetAddress,
    cityName,
    stateName,
    productName,
    SUM(quantity) AS totalAmount,
    unitOfMeasurement
FROM
    state
        JOIN
    city ON state.stateID = city.cityID
        JOIN
    foodSupplier ON city.cityID = foodSupplier.cityID
        JOIN
    supplierInv ON foodSupplier.supplierID = supplierInv.supplierID
WHERE
    cityName = 'Atlanta'
        AND stateName = 'Georgia'
        AND productName = 'Milk'
GROUP BY supplierName , streetAddress , cityName , stateName , productName , unitOfMeasurement
HAVING totalAmount = (SELECT
        SUM(quantity)
    FROM
        state
            JOIN
        city ON state.stateID = city.cityID
            JOIN
        foodSupplier ON city.cityID = foodSupplier.cityID
            JOIN
        supplierInv ON foodSupplier.supplierID = supplierInv.supplierID
    WHERE
        cityName = 'Atlanta'
            AND stateName = 'Georgia'
            AND productName = 'Milk'
    GROUP BY supplierName
    ORDER BY SUM(quantity) DESC
     LIMIT 1);
```

Output:

```
+ ---------------- + ----------------- + ------------ + ------------- + --------------- + --------------- + ---------------------
+

| supplierName      | streetAddress     | cityName     | stateName     | productName     | totalAmount     |
unitOfMeasurement     |

+ ---------------- + ----------------- + ------------ + ------------- + --------------- + --------------- + ---------------------
+

| Publix at Piedmont | 595 Piedmont Ave NE | Atlanta      | Georgia       | Milk            | 30              | Gallons
|

+ ---------------- + ----------------- + ------------ + ------------- + --------------- + --------------- + ---------------------
+
```

**#9: Execute: Our NPO office at 1111 S Figueroa St, Los Angeles wants to know what products are not available in the office stock, but available in local supplying stores, their expiration dates, quantities, supplier names, and street addresses, ordered by product names and expiration dates. So, the NPO office can purchase new products and increase the diversity of their food stock.**

```
> SELECT
   productName, expDate, quantity, supplierName, streetAddress
FROM
   supplierInv
      JOIN
   foodSupplier ON foodSupplier.supplierID = supplierInv.supplierID
WHERE
   cityID = (SELECT
         cityID
      FROM
         city
      WHERE
         cityName = 'Los Angeles')
      AND NOT EXISTS( SELECT
         *
      FROM
         officeStock
      WHERE
         supplierInv.productName = officeStock.productName
            AND officeStock.officeID = (SELECT
               officeID
            FROM
               office
            WHERE
               address = '1111 S Figueroa St')
            AND cityID = (SELECT
               cityID
            FROM
               city
```

```
            WHERE
                cityName = 'Los Angeles'))
ORDER BY productName , expDate;
```

Output:

```
+ ---------------- + ------------ + ------------- + ----------------- + ------------------ +
| productName      | expDate      | quantity      | supplierName      | streetAddress      |
+ ---------------- + ------------ + ------------- + ----------------- + ------------------ +
| Almond Milk      | 2022-10-20   | 10            | Ralphs            | 11922 S Vermont Ave |
| Black Beans      | 2022-10-02   | 10            | Ralphs            | 11922 S Vermont Ave |
| Yogurt           | 2022-10-10   | 14            | Ralphs            | 11922 S Vermont Ave |
+ ---------------- + ------------ + ------------- + ----------------- + ------------------ +
```

**#10: Our NPO in Atlanta, GA was offered a purchasing discount by Publix, so they want to know whether Publix stores in Atlanta, GA have high-demand foods: eggs, bread or apple in stock, if so, what are their quantities and expiration dates? Order by product names and expiration dates.**

Execute:

```
> SELECT
    productName,
    expDate,
    quantity,
    unitOfMeasurement,
    supplierName
FROM
    supplierInv
        JOIN
    foodSupplier ON foodSupplier.supplierID = supplierInv.supplierID
WHERE
    productName IN ('Apples' , 'Bread', 'Eggs')
        AND supplierName REGEXP 'Publix|publix'
        AND foodSupplier.cityID = (SELECT
            city.cityID
        FROM
            city
        WHERE
            cityName = 'Atlanta'
                AND stateID = (SELECT
                    state.stateID
                FROM
                    state
```

```
            WHERE
                stateName = 'Georgia'))
ORDER BY productName , expDate;
```

Output:

```
+ ---------------- + ------------ + ------------- + ---------------------- + ----------------- +
| productName      | expDate      | quantity      | unitOfMeasurement      | supplierName      |
+ ---------------- + ------------ + ------------- + ---------------------- + ----------------- +
| Apples           | 2022-10-01   | 3             | Lbs                    | Publix at Piedmont |
| Apples           | 2022-10-05   | 2             | Lbs                    | Publix at Piedmont |
| Bread            | 2022-10-15   | 1             | Lbs                    | Publix at Piedmont |
| Eggs             | 2022-09-30   | 27            | Oz                     | Publix at Piedmont |
| Eggs             | 2022-11-01   | 27            | Oz                     | Publix at Piedmont |
+ ---------------- + ------------ + ------------- + ---------------------- + ----------------- +
```

### Condensed SQL Query Feature Matrix

| Query / SQL Feature | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| Multiple Table Join | x | x | x | x | x | x | x | x | x | x |
| Subquery | x | | | | | | x | x | x | x |
| Correlated Subquery | x | | | | | | | x | x | x |
| Group by | x | | x | | | x | x | x | | |
| Group by with Having | | | | x | | | | x | | |
| Order by | x | x | | x | | | x | x | | x |
| Divide | | | | | | | x | | | |
| In or Not In | | | | | | | | | | x |
| Built-In Function/ Calculated Field | x | | | | | x | | | | |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Regexp | x | x | x | | x | x | | | | x |
| Exists or Not Exist | | | | | | | x | | x | |