

Retail Food Store Management System

Group 60

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1. Problem Statement and Objective

The objective of the retail food shop project is to build a database that will help in managing the data for a grocery store. Several tables and stored procedures were created with varied attributes as part of the database's design using MySQL Workbench.

As the store grows and changes its activities, the database schema was created to be scalable and able to handle growth and alterations in the future. This indicates that the database is adaptable enough to accommodate adjustments to the store's operations, such as the introduction of new products or services. The database's design also makes it simple to retrieve and update data. By allowing employees to easily access data about goods, clients, and sales, this helps enhance the store's operations and customer service. The database may be used to create reports and identify trends, giving the shop the information, it needs to make strategic decisions about how to run its business.

The project not only built the database but also found opportunities for enhancement and optimization. For instance, the project might advocate tuning queries to boost efficiency or introducing new tables to more effectively keep tabs on sales and inventory. Future editions of the database can implement these recommendations to further enhance its functionality.

Overall, the database design used for the retail food store project can offer several advantages to a grocery store's operations. The database can assist the store in providing better customer service and helping it make wise decisions regarding its operations by making it simpler to handle information and track trends.

2. Why Database over excel?

Databases are significantly more effective at storing information than excel files are, and they can handle larger datasets that a spreadsheet would find difficult to handle. Also, unlike Excel, databases can preserve consistency as data changes.

Databases have significant advantages over spreadsheets like Excel when it comes to storing and handling vast volumes of data, despite the fact that spreadsheets like Excel are a helpful tool for managing data.

Large datasets that would be challenging or impossible to manage with a spreadsheet can be handled by databases, which is one of its key advantages. Excel can only manage a certain number of rows and columns, which can be problematic for managing very large datasets. Contrarily, databases are built to manage massive amounts of data, making them considerably more scalable than spreadsheets.

Additionally, databases are better at maintaining data accuracy and consistency as it ages. Making sure the data is accurate and consistent when several people are working on the same spreadsheet can be difficult. But with databases, data may be viewed and altered by numerous users at once, and there are processes built in to make sure that changes are tracked and handled properly. In order to ensure that everyone is using the same accurate data, databases can be utilized to establish a single source of truth for data.

Databases also have the benefit of being more secure than spreadsheets. Using a database, it is feasible to set up user rights to limit who can access and modify data. This lowers the possibility of data being changed maliciously or unintentionally. Spreadsheets can be corrupted or mistakenly deleted, whereas databases can be replicated and backed up to prevent data loss.

Finally, databases provide strong tools for data analysis and querying. A database makes it easy to create intricate queries that extract certain data points from the dataset, enabling robust analysis and reporting. While databases allow for considerably more advanced analysis and data manipulation, spreadsheets only provide the most basic capabilities for sorting and filtering data.

Overall, databases offer numerous important advantages when it comes to storing and handling a huge amount of information, even though spreadsheets like Excel are a helpful tool for organizing data. They offer more potent tools for analysis and reporting and are more scalable, accurate, secure, and powerful.

Scalability: Compared to Excel, databases can manage significantly larger datasets.

Data Consistency: As information evolves, databases provide data consistency.

Databases provide more security than spreadsheets.

Databases may be accessed and modified by numerous users at once thanks to multi-user access.

Databases include tools, such as constraints and triggers, to assure data integrity.

Databases provide strong tools for data processing and querying.

Backup and Replication: Databases may be backed up and replicated for disaster recovery.

Databases can be altered to suit certain company requirements.

Databases can be integrated with other software programs and desktop programs.

Reporting: For better decision making, databases can produce complicated reports and dashboards.

3. Target User

The managers and staff of the grocery shop would be the database's main target audience. The store's management would have access to the data and be able to manage the store's operations, including checking inventory, examining sales patterns, and organizing employee schedules.

Managers may optimize the operations of the business with the help of the database, which can help to lower expenses and increase customer satisfaction.

The database would be helpful to the managers as well as the staff at the grocery store. The information would be used by store staff members like cashiers and stock clerks to help them be more efficient in their day-to-day work. The database might be used, for instance, to monitor deliveries, verify inventory levels, and guarantee that products are refilled promptly. This would increase their effectiveness and productivity, enabling them to offer better customer care and guarantee that customers can find the products they require when they visit the store.

Overall, the database for retail food stores has been designed to make it simple for managers and staff to access data with the intention of improving the overall customer experience. The database can assist managers in making knowledgeable decisions about how to enhance the store's operations while also enabling employees to carry out their duties more successfully by giving access to real-time data on inventory levels, sales patterns, and customer behavior. The outcome is a more effective store that prioritizes the requirements of its clients and is better positioned to do so.

4. Database Schema/Design

The retail food store dataset consists of 15 columns and 28.5K rows of data, providing a comprehensive view of the grocery stores that are part of the database.

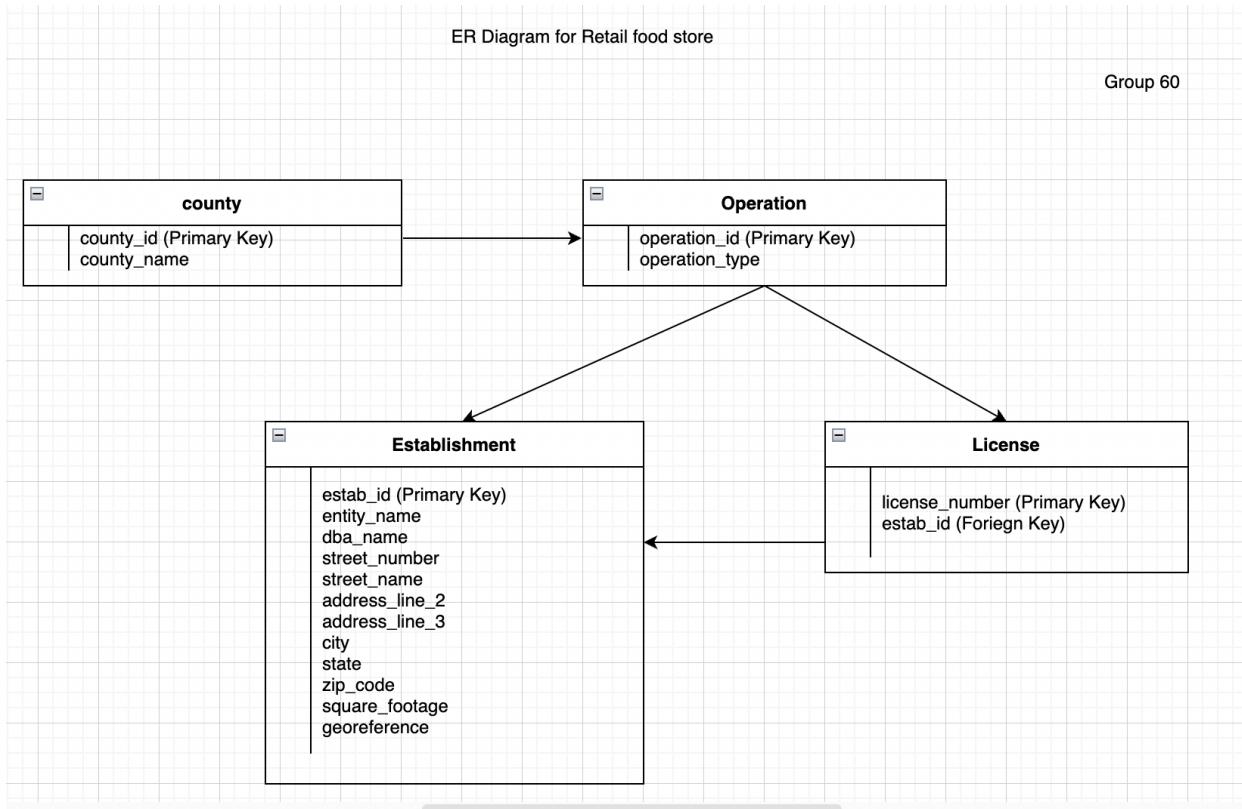
Here is a brief description of each attribute:

1. County - The county in which the grocery store is located.
2. License_Number - The unique identifier assigned to the store by the licensing authority.
3. Operation_Type - The type of food operation, such as a grocery store, restaurant, or catering business.
4. Establishment_Type - The establishment type, such as a chain store or independent business.
5. Entity_Name - The legal name of the business entity that owns the store.
6. DBA_Name - The name of the store that is displayed to the public.
7. Street_Number - The street number of the store's address.
8. Street_Name - The name of the street on which the store is located.
9. Addressline2 - Additional information about the store's address, such as suite or unit numbers.
10. Addressline3 - Additional information about the store's address, such as building or complex names.
11. City - The city in which the store is located.
12. State - The state in which the store is located.
13. Zip_Code - The postal code of the store's address.
14. Square_Footage - The total square footage of the store's physical location.
15. Georeference - The geographical coordinates of the store's location, such as latitude and longitude.

Overall, this dataset offers an abundance of insights on the grocery stores in the database, including information about their locations, sizes, and sorts of businesses. This information can be utilized to identify market trends, assess the competition, and make wise business decisions in the future.

5. ER Diagram

The ER diagram for the retail food store is shown below.

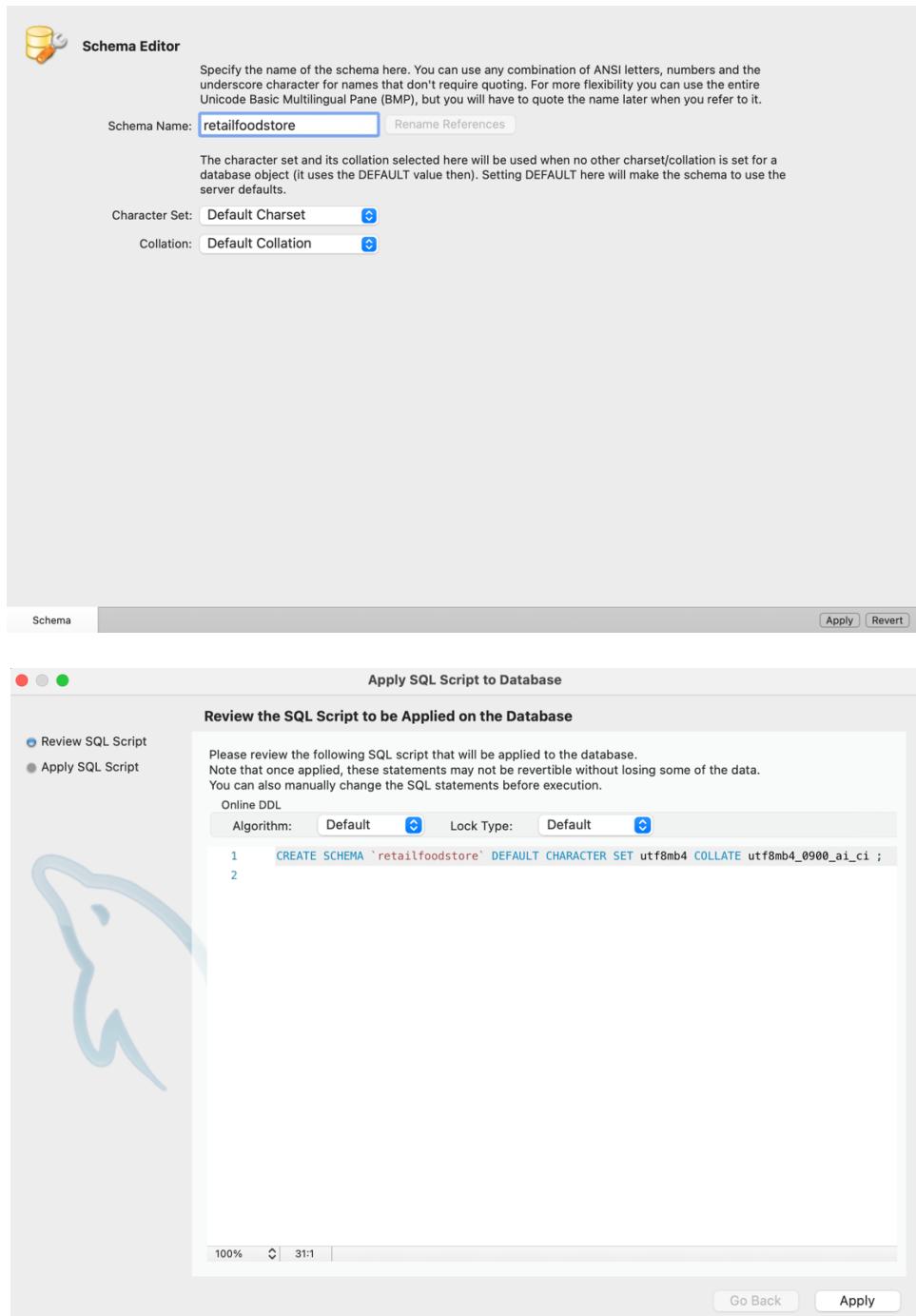


Explanation:

- The ER diagram consists of two entities: "County" and "Operation".
- The "County" entity has two attributes: "county_id" (primary key) and "county_name".
- The "Operation" entity has two attributes: "operation_id" and "operation_type".
- The "Establishment" entity has several attributes, including "estab_id" (*primary key*), "entity_name", "dba_name", "street_number", "street_name", "address_line_2", "address_line_3", "city", "state", "zip_code", "square_footage", and "georeference". The "estab_id" attribute is a "*foreign key*" that references the "estab_id" attribute in the "License" entity.
- The "License" entity has one attribute: "license_number".
- There is a one-to-many relationship between "County" and "Operation", as one county can have many operations.
- There is a one-to-many relationship between "Operation" and "Establishment", as one operation can have many establishments.
- There is a one-to-one relationship between "Establishment" and "License", as one establishment can have only one license.

6. Implementing dataset

We import and load our dataset using MySQL workbench and then we transform our csv file into it.



Then by using Table Data Import, we load our CSV dataset into our database.

Table Data Import

Select File to Import

Table Data Import allows you to easily import CSV, JSON datafiles.
You can also create destination table on the fly.

File Path: /Users/abhignatanguturi/Desktop/dataset/Retail_Food_Stores.csv

Result Grid Export/Import:

County	License_Number	Operation_Type	Establishment_Ty...	Entity_Name	DBA_Name	Street_Numb...	Street_Name	City
Bronx	755970	Store	JAC	942 E GUN HILL DELI CORP	942 E GUN HILL DELI	942	E GUN HILL RD	BRONX
Steuben	756126	Store	JAC	7-ELEVEN INC	7 ELEVEN STORE #35111J	26	MAIN ST	ARKPORT
St. Lawrence	755786	Store	JAC	DOLLINGER HOLDINGS LLC	FALLS MARKET & DELI	102	CANTON STREET	RENSSELAER
Bronx	755969	Store	JAC	GOLDEN PRODUCE III CORP	GOLDEN PRODUCE III	368	E 204TH ST	BRONX
Kings	755965	Store	A	LOOVE LLC	BOOPS	238-240	N 12 ST	BROOKLYN
Queens	756125	Store	JAC	7-ELEVEN INC	7-ELEVEN STORE #35026H	253-02	UNION TPKE.	GLEN OAKS
New York	755629	Store	JAC	LILLY'S SHAKES AND CREPES 1 CORP	LILLY'S SHAKES AND CREP	699	10TH AVE	NEW YORK
Delaware	755964	Store	A	LOUCKS FARM LLC	LOUCKS FARM	61838	ST HWY 10	HOBART
Suffolk	756123	Store	JAC	7-ELEVEN INC	7-ELEVEN STORE #39557H	210	MASTIC BEACH RD	MASTIC BEAC
Tioga	755785	Store	JAC	MOJOS SAUCE LLC	MOJOS SAUCE	116	WHIG STREET	NEWARK VAL
Kings	755963	Store	A	PITKIN SUPER DEALS INC	USA SUPERSTORES	1592	PITKIN AVE	BROOKLYN
Richmond	756121	Store	JAC	LA ROCA FUERTE DELI & GROCERY...	LA ROCA FUERTE DELI & G	570	MIDLAND AVE	STATEN ISLA
Bronx	755962	Store	A	EXOTIC CAMPUS CONVENIENCE ST...	EXOTIC CAMPUS CONVE...	1470	WILLIAMSBRIDGE...	BRONX
Kings	755784	Store	JAC	AHEHUETE DELI & GROCERY CORP	AHEHUETE DELI & GROC...	340	WILSON AVE	BROOKLYN
New York	755783	Store	JAC	AAND H ORGANIC GOURMET DELI...	AAND H ORGANIC GOUR...	2750	FREDERICK DOU...	NEW YORK
Kings	755782	Store	JAC	416 INLET MARKET CORP	416 INLET MARKET	416	MONROE ST	BROOKLYN
New York	755781	Store	JAC	467 SANAA STAR INC	467 SANAA STAR	467	W 125TH ST	NEW YORK
Bronx	755780	Store	JAC	WILLIAMSBRIDGE RD GOURMET DE...	WILLIAMSBRIDGE RD GO...	2101A	WILLIAMSBRIDGE...	BRONX
Sullivan	755779	Store	A	EXTRA MART INC	EXTRA MART	27	MILL STREET	LIBERTY
Queens	756120	Store	JAC	JACKSONS DELI INC	MILLIE'S DELI	13-01	JACKSON AVENUE	LONG ISLAND
New York	755778	Store	A	1804 3RD AVE DISCOUNT CORP	1804 3RD AVE DISCOUNT	1804	3RD AVE	NEW YORK
Queens	756118	Store	JAC	PRODUCTOS MEXICANOS LA GUAD...	PRODUCTOS MEX LA GU...	92-24	CORONA AVE	ELMHURST
Kings	755777	Store	A	JOJO GROCERY INC	JOJO GROCERY	7718	18TH AVE	BROOKLYN
Kings	755961	Store	A	FLAIR SHOP INC	FLAIR SHOP	1132	BROADWAY AVE	BROOKLYN
Nassau	755774	Store	A	STAR COFFEE & TOBACCO INC	STAR COFFEE & TOBACCO	139	NORTH MAIN STR...	FREEPORT
Onondaga	756116	Store	JAC	MOONLIGHT DELI LLC	MOONLIGHT DELI	2829	JAMES ST	SYRACUSE
Bronx	755960	Store	A	LA PHARMACY FITNESS LLC	LA FARMACIA	709	EAST TREMONT A...	BRONX
Albany	756115	Store	JAC	HILLBELLY'S LLC	HILLBELLY'S	585	STATE RT 143	WESTERLO
Kings	755771	Store	JAC	AMER DELI CONVENIENCE CORPOR...	AMER DELI CONVENIENCE	409	UTICA AVE	BROOKLYN
New York	756114	Store	JAC	NY A&M 1990 CORP	NY A&M 1990	1187	1ST AVE	NEW YORK
New York	755770	Store	JAC	SOHO LEMONTREE INC	SOHO OLIVE BRANCH DELI	143	GRAND ST	NEW YORK
Nassau	756113	Store	JAC	SRIKAJAN CORP	7-ELEVEN STORE #38095A	315-333	OAK ST	UNIONDALE
Richmond	755959	Store	A	ANTHONY'S PANINOTECA LLC	ANTHONY'S PANINOTECA	3994	AMBOY RD	STATEN ISLA
Queens	755769	Store	JAC	R DELI CORP	R DELI	552	BEACH 25TH ST	FAR ROCKAWAY
Kings	756111	Store	JAC	ARIAS DELI CORP	ARIAS DELI	235	SCHEMECTADY AVE	BROOKLYN
Bronx	755957	Store	JAC	LOS DOS CARNALES DELI GRCY CO...	LOS DOS CARNALES DELI...	380	E GUN HILL ROAD	BRONX
New York	755767	Store	JAC	LOHO DELI CORP	LOHO DELI	204	CLINTON ST	NEW YORK
Bronx	755956	Store	A	165 CONVENIENCE CORP	165 CONVENIENCE	200	E 165TH STREET	BRONX
Queens	755766	Store	JAC	ASIANA MANAGEMENT GROUP INC	ACE SUSHI@FOOD BAZAAR	242-02	61ST AVE	LITTLE NECK

retail_food_stores 1

Data is successfully imported and now we perform our queries and build the database model.

7. Dataset Lookup

1 • `SELECT * FROM retailfoodstore.retail_food_stores;`

100% | 50:1 |

Result Grid Filter Rows: Search Export: Fetch rows:

County	License_Number	Operation_Type	Establishment_Ty...	Entity Name	DBA_Name	Street_Numb...	Street_Name
Steuben	756126	Store	JAC	7-ELEVEN INC	7 ELEVEN STORE #35111J	26	MAIN ST
Queens	756125	Store	JAC	7-ELEVEN INC	7-ELEVEN STORE #35026H	253-02	UNION TPKE
Suffolk	756123	Store	JAC	7-ELEVEN INC	7-ELEVEN STORE #39557H	210	MASTIC BEA
Richmond	756121	Store	JAC	LA ROCA FUERTE DELI & GROCERY COR	LA ROCA FUERTE DELI & G	570	MIDLAND AV
Queens	756120	Store	JAC	JACKSONS DELI INC	MILLIE'S DELI	13-01	JACKSON AV
Queens	756118	Store	JAC	PRODUCTOS MEXICANOS LA GUADU	PRODUCTOS MEX LA GUDALU	92-24	CORONA AVI
Onondaga	756116	Store	JAC	MOONLIGHT DELI LLC	MOONLIGHT DELI	2829	JAMES ST
Albany	756115	Store	JAC	HILLBELLYS LLC	HILLBELLYS	585	STATE RT 14
New York	756114	Store	JAC	NY A&M 1990 CORP	NY A&M 1990	1187	1ST AVE
Nassau	756113	Store	JAC	SRIKAJAN CORP	7-ELEVEN STORE #38095A	315-333	OAK ST
Kings	756111	Store	JAC	ARIAS DELI CORP	ARIAS DELI	235	SCHENECTA
Kings	756110	Store	JAC	RAMZY CONVENIENCE CORP	RAMZY CONVENIENCE	9801	AVENUE L
Kings	756109	Store	JAC	BOYLAND CONVENIENCE CORP	BOYLAND CONVENIENCE	203	THOMAS S E
Westche...	756108	Store	JAC	SIM SIM DRINKS CORP	SIM SIM DRINKS	508	FRANKLIN A
Kings	756107	Store	JAC	395 DELI CORP	MUNCH GOURMET MARKET	395	FLATBUSH A
Bronx	756105	Store	JAC	NEW STAR DELI AND FOOD CORP	NEW STAR DELI AND FOOD	45	RICHMAN PL

Dropping columns with no data:

1 • `SELECT * FROM retailfoodstore.retail_food_stores;`

2 • `ALTER TABLE retail_food_stores DROP COLUMN 'AddressLine2', DROP COLUMN 'AddressLine3';`

100% | 87:2 |

Result Grid Filter Rows: Search Export: Fetch rows:

Entity Name	DBA_Name	Street_Numb...	Street_Name	AddressLine2	Address...	City	State	Zip_Co	Entity Name	DBA_Name	Street_Numb...	Street_Name	City	State	Zip_Code	Square_Footage	Georef
7-ELEVEN INC	7-ELEVEN STORE #35111J	26	MAIN ST			7-ELEVEN INC	7-ELEVEN STORE #35111J	26	MAIN ST	7-ELEVEN INC	7-ELEVEN STORE #35026H	253-02	UNION TPKE	NY	14807	0	POINT
7-ELEVEN INC	7-ELEVEN STORE #35026H	253-02	UNION TPKE			GLEN OAKS	7-ELEVEN INC	7-ELEVEN STORE #35026H	253-02	UNION TPKE	GLEN OAKS	NY	11004	0	POINT		
7-ELEVEN INC	7-ELEVEN STORE #39557H	210	MASTIC BEACH RD			MASTIC BEACH	7-ELEVEN INC	7-ELEVEN STORE #39557H	210	MASTIC BEACH RD	MASTIC BEACH	NY	11951	0	POINT		
LA ROC FUERTE DELI & GROCERY COR	LA ROC FUERTE DELI & G	13-01	JACKSON AVE			LONG ISLAND CITY	LA ROC FUERTE DELI & G	13-01	JACKSON AVE	LA ROC FUERTE DELI & G	LONG ISLAND CITY	NY	11030	0	POINT		
JACKSONS DELI INC	MILLIE'S DELI	13-01	JACKSON AVE			JACKSON AVE	MILLIE'S DELI	13-01	JACKSON AVE	MILLIE'S DELI	LONG ISLAND CITY	NY	11101	0	POINT		
PRODUCTOS MEXICANOS LA GUADU	PRODUCTOS MEX LA GUADU	92-24	CORONA AVE			ELMHURST	PRODUCTOS MEXICANOS LA GUADU	92-24	CORONA AVE	PRODUCTOS MEX LA GUADU	ELMHURST	NY	11373	1100	POINT		
MOONLIGHT DELI LLC	MOONLIGHT DELI	203	CORONA AVE			WESTERLO	MOONLIGHT DELI	203	CORONA AVE	MOONLIGHT DELI	WESTERLO	NY	12020	0	POINT		
HILLBELLYS LLC	HILLBELLYS	585	STATE RT 143			HILLBELLYS	HILLBELLYS	585	STATE RT 143	HILLBELLYS	WESTERLO	NY	12193	2000	POINT		
NY A&M 1990 CORP	NY A&M 1990	1187	1ST AVE			NY A&M 1990	NY A&M 1990	1187	1ST AVE	NY A&M 1990	NY A&M 1990	NY	10065	0	POINT		
SRIKAJAN CORP	7-ELEVEN STORE #38095A	315-333	OAK ST			7-ELEVEN STORE #38095A	7-ELEVEN STORE #38095A	315-333	OAK ST	7-ELEVEN STORE #38095A	7-ELEVEN STORE #38095A	NY	10066	0	POINT		
ARIAS DELI CORP	ARIAS DELI	235	SCHENECTADY AVE			ARIAS DELI	ARIAS DELI	235	SCHENECTADY AVE	ARIAS DELI	UNIVERSITY	NY	11550	0	POINT		
RAMZY CONVENIENCE CORP	RAMZY CONVENIENCE	9801	AVENUE L			BROOKLYN	RAMZY CONVENIENCE CORP	9801	AVENUE L	RAMZY CONVENIENCE CORP	BROOKLYN	NY	11213	0	POINT		
BOYLAND CONVENIENCE CORP	BOYLAND CONVENIENCE	203	THOMAS S BOY...			BROOKLYN	BOYLAND CONVENIENCE CORP	203	THOMAS S BOY...	BOYLAND CONVENIENCE CORP	BROOKLYN	NY	11233	0	POINT		
SIM SIM DRINKS CORP	SIM SIM DRINKS	508	FRUITWOOD AVE			BROOKLYN	SIM SIM DRINKS CORP	508	FRUITWOOD AVE	SIM SIM DRINKS CORP	BROOKLYN	NY	10820	0	POINT		
395 DELI CORP	MUNCH GOURMET MARKET	395	FLATBUSH AVE E...			BROOKLYN	MUNCH GOURMET MARKET	395	FLATBUSH AVE E...	MUNCH GOURMET MARKET	BROOKLYN	NY	11201	0	POINT		
NEW STAR DELI AND FOOD CORP	NEW STAR DELI AND FOOD	45	RICHMAN PLZ			BRONX	NEW STAR DELI AND FOOD	45	RICHMAN PLZ	NEW STAR DELI AND FOOD	BRONX	NY	10453	0	POINT		

8. Different types of SQL queries with SELECT clause

8.1 GROUP BY: To group the data by a specific column, we use the GROUP BY clause.

Group the data by "City" and count the number of stores in each city:

The screenshot shows a MySQL Workbench interface. At the top, there's a toolbar with various icons. Below it is a text editor containing the following SQL code:

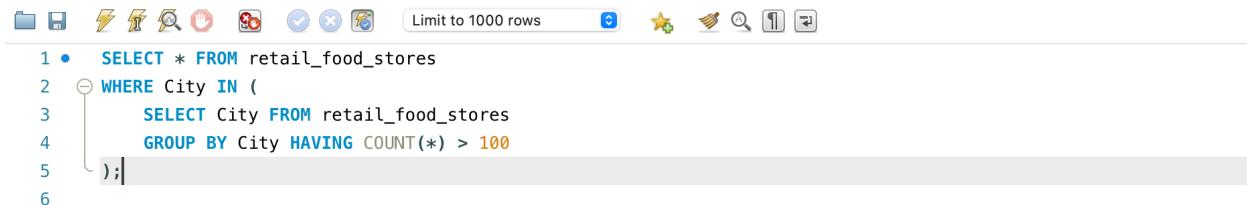
```
1 •  SELECT City, COUNT(*) AS CountOfStores
2   FROM retail_food_stores
3   GROUP BY City;|
```

Below the code editor is a result grid titled "Result Grid". The grid has two columns: "City" and "CountOfStor...". The data is as follows:

City	CountOfStor...
ARKPORT	4
GLEN OAKS	16
MASTIC BEACH	14
STATEN ISLAND	574
LONG ISLAND CITY	145
ELMHURST	114
SYRACUSE	360
WESTERLO	4
NEW YORK	2432
UNIONDALE	38
BROOKLYN	4945
MOUNT VERNON	104
BRONX	2612
WOODHAVEN	58
HUNTINGTON STA...	63
HAMBURG	54
SOUTH GLOGNE R	47

8.2 Sub-query: A sub-query is a query that is nested inside another query.

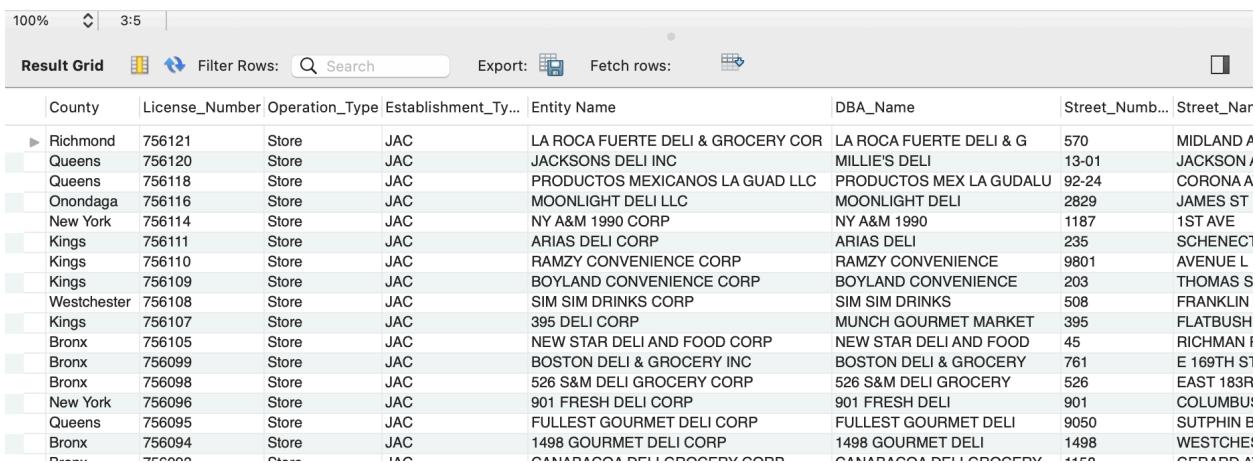
Select all stores located in cities that have more than 100 stores:



The screenshot shows a MySQL Workbench interface with a query editor window. The query is:

```
1 •  SELECT * FROM retail_food_stores
2   WHERE City IN (
3     SELECT City FROM retail_food_stores
4     GROUP BY City HAVING COUNT(*) > 100
5   );
6
```

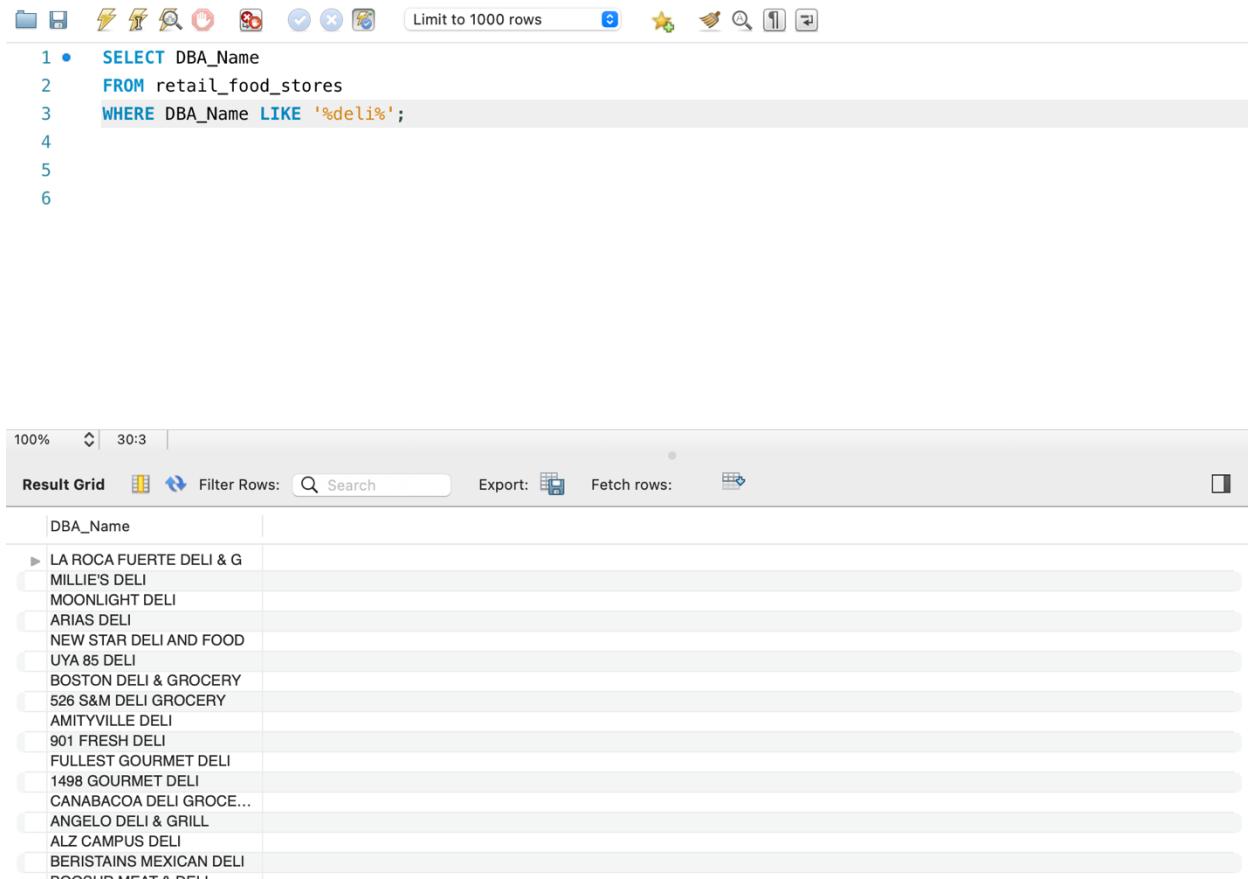
The second line contains a subquery that is highlighted with a yellow circle and a bracket, indicating it is being used in a WHERE clause.



The screenshot shows the results of the executed query in a Result Grid. The columns are:

County	License_Number	Operation_Type	Establishment_Ty...	Entity Name	DBA_Name	Street_Numb...	Street_Na...
Richmond	756121	Store	JAC	LA ROCA FUERTE DELI & GROCERY COR	LA ROCA FUERTE DELI & G	570	MIDLAND A
Queens	756120	Store	JAC	JACKSONS DELI INC	MILLIE'S DELI	13-01	JACKSON J
Queens	756118	Store	JAC	PRODUCTOS MEXICANOS LA GUAD LLC	PRODUCTOS MEX LA GUDALU	92-24	CORONA A
Onondaga	756116	Store	JAC	MOONLIGHT DELI LLC	MOONLIGHT DELI	2829	JAMES ST
New York	756114	Store	JAC	NY A&M 1990 CORP	NY A&M 1990	1187	1ST AVE
Kings	756111	Store	JAC	ARIAS DELI CORP	ARIAS DELI	235	SCHENECI
Kings	756110	Store	JAC	RAMZY CONVENIENCE CORP	RAMZY CONVENIENCE	9801	AVENUE L
Kings	756109	Store	JAC	BOYLAND CONVENIENCE CORP	BOYLAND CONVENIENCE	203	THOMAS S
Westchester	756108	Store	JAC	SIM SIM DRINKS CORP	SIM SIM DRINKS	508	FRANKLIN
Kings	756107	Store	JAC	395 DELI CORP	MUNCH GOURMET MARKET	395	FLATBUSH
Bronx	756105	Store	JAC	NEW STAR DELI AND FOOD CORP	NEW STAR DELI AND FOOD	45	RICHMAN F
Bronx	756099	Store	JAC	BOSTON DELI & GROCERY INC	BOSTON DELI & GROCERY	761	E 169TH ST
Bronx	756098	Store	JAC	526 S&M DELI GROCERY CORP	526 S&M DELI GROCERY	526	EAST 183R
New York	756096	Store	JAC	901 FRESH DELI CORP	901 FRESH DELI	901	COLUMBU
Queens	756095	Store	JAC	FULLEST GOURMET DELI CORP	FULLEST GOURMET DELI	9050	SUTPHIN B
Bronx	756094	Store	JAC	1498 GOURMET DELI CORP	1498 GOURMET DELI	1498	WESTCHE
Bronx	756093	Store	JAC	CANADAGOA DELI GROCERY CORP	CANADAGOA DELI GROCERY	4450	GARDEN A

3.3 LIKE query: This query will display the names of all stores that contain the word "deli" in their name.



The screenshot shows the MySQL Workbench interface. At the top, there is a toolbar with various icons. Below the toolbar, a query editor window displays the following SQL code:

```
1 •  SELECT DBA_Name
2   FROM retail_food_stores
3  WHERE DBA_Name LIKE '%deli%';
4
5
6
```

Below the query editor is a results grid titled "Result Grid". The grid has a single column labeled "DBA_Name" and contains a list of store names. The names listed are:

- LA ROCA FUERTE DELI & G
- MILLIE'S DELI
- MOONLIGHT DELI
- ARIAS DELI
- NEW STAR DELI AND FOOD
- UYA 85 DELI
- BOSTON DELI & GROCERY
- 526 S&M DELI GROCERY
- AMITYVILLE DELI
- 901 FRESH DELI
- FULLEST GOURMET DELI
- 1498 GOURMET DELI
- CANABACOA DELI GROCE...
- ANGELO DELI & GRILL
- ALZ CAMPUS DELI
- BERISTAINS MEXICAN DELI
- DOUGIE MEAT & DELI

8.4 JOIN : We use JOIN to find the license number and city of the store with the smallest square footage:

The screenshot shows the MySQL Workbench interface. At the top, there's a toolbar with various icons. Below it is a query editor window containing the following SQL code:

```
1 •  SELECT t1.License_Number, t1.City, t1.Square_Footage
2   FROM retail_food_stores t1
3   JOIN (
4     SELECT MIN(Square_Footage) AS MinSqFt FROM retail_food_stores
5   ) t2
6   ON t1.Square_Footage = t2.MinSqFt;
```

Below the query editor is a result grid titled "Result Grid". It has columns for "License_Number", "City", and "Square_Footage". The data shows 10 rows of results, all with a "Square_Footage" value of 0. The results are as follows:

License_Number	City	Square_Footage
756126	ARKPORT	0
756125	GLEN OAKS	0
756123	MASTIC BEACH	0
756121	STATEN ISLAND	0
756120	LONG ISLAND CITY	0
756116	SYRACUSE	0
756114	NEW YORK	0
756113	UNIONDALE	0
756111	BROOKLYN	0
756110	BROOKLYN	0
756109	BROOKLYN	0
756108	MOUNT VERNON	0
756107	BROOKLYN	0
756105	BRONX	0
756104	WOODHAVEN	0
756103	HUNTINGTON STA...	0

8.5 ORDER BY: we use ORDER BY to list the stores in descending order of their NYS_Municipal_Boundaries:

The screenshot shows a database query editor and a result grid. The query is:

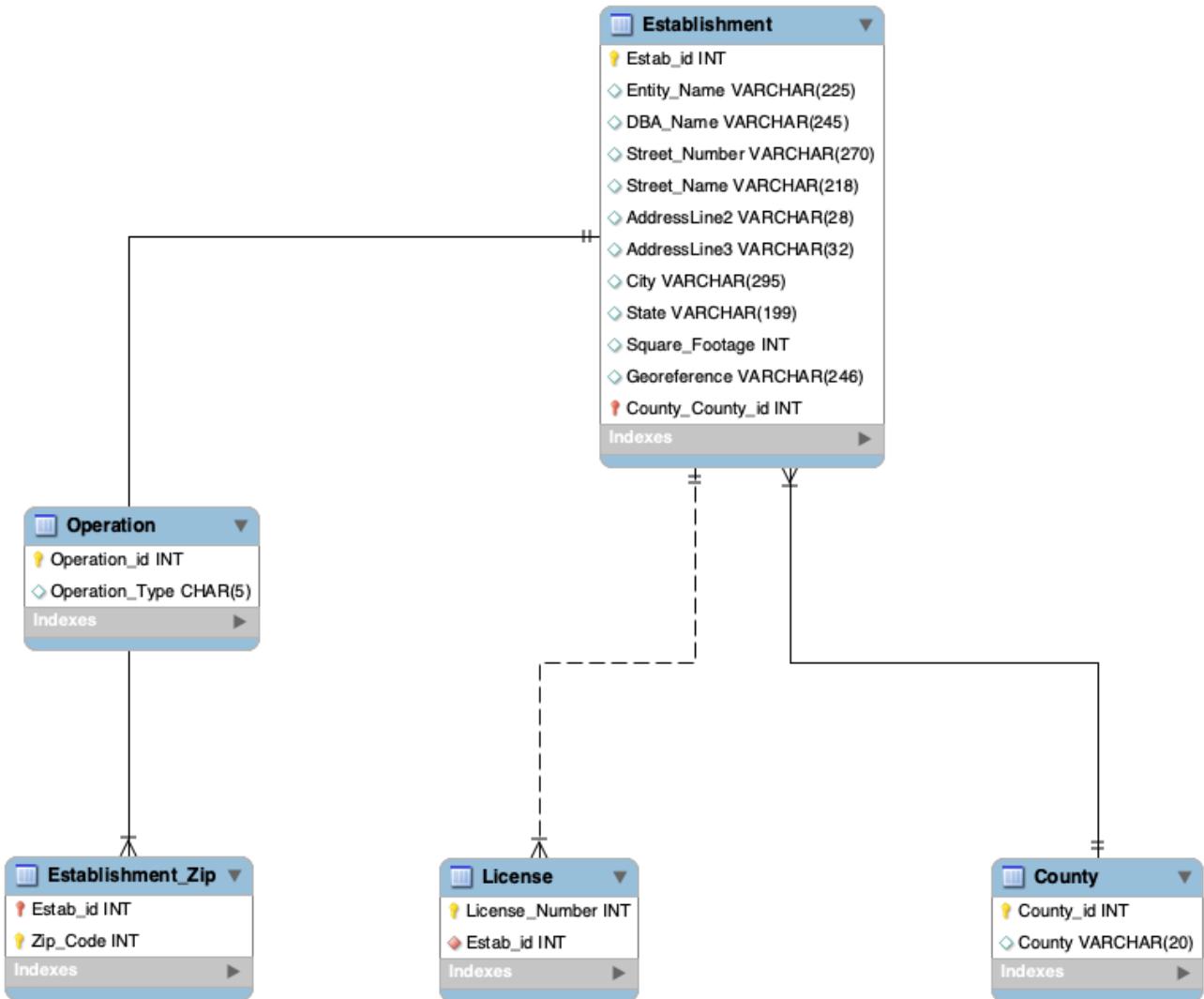
```
1 •  SELECT License_Number, Entity_Name, DBA_Name, NYS_Municipal_Boundaries
2   FROM retail_food_stores
3   ORDER BY NYS_Municipal_Boundaries DESC;
```

The result grid displays the following data:

	License_Number	Entity_Name	DBA_Name	NYS_Municipal_Boundaries
▶	470019	EURO DELI INC	EURO DELI POLSKA KLBASA	1023
	470050	CVS ALBANY LLC	CVS PHARMACY 04452	1023
	470157	AMITYVILLE FOOD CORP	C TOWN	1023
	470195	DEER PARK MACARONI CO INC	DEER PARK RAVIOLI	1023
	470215	DHAVAL INC	MINI MART	1023
	470275	FERRARA RAVIOLI&PASTA CORP	PASTOSA RAVIOLI	1023
	470322	GEMELLI FINE FOODS INC	GEMELLI PORK STORE	1023
	470524	N&F SICILIAN DELI INC	J&G DELI	1023
	470525	JOES ITALIAN FOOD MARKET INC	JOES ITALIAN FOOD MKT	1023
	470659	LA VAQUITA DELI CORP	LA VAQUITA DELI	1023
	470817	1185 STRAIGHT PATH CORP	1185 STRAIGHT PATH	1023
	470867	SHERRYS MARKET LLC	SHERRYS THE HEALTHY G...	1023
	470940	TARGET CORPORATION	TARGET 1147	1023
	470946	CVS ALBANY LLC	CVS PHARMACY 07621	1023
	471025	PATEL DEVEN A	7-ELEVEN FD STR 16369G	1023
	471050	KRISTYS SMOKE INC	KRISTYS SMOKE	1023
	471177	KEDCO INC	KEDCO	1023

9. Finalized E/R diagram

Updated ER diagram from milestone 1 with all the tables to be in bcnf



10 BCNF

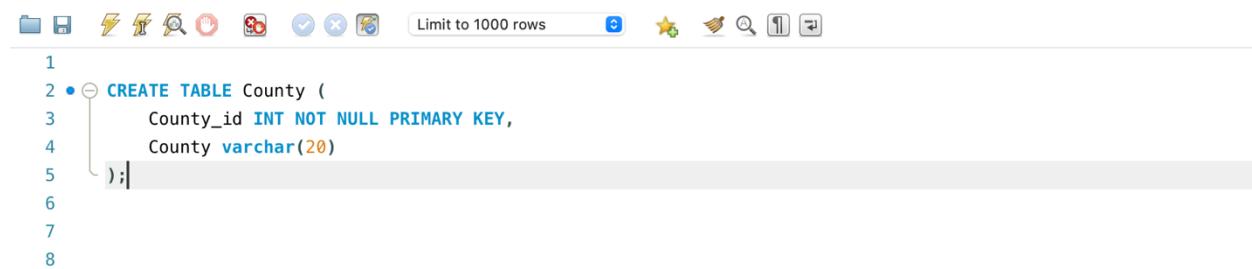
The Boyce-Codd Normal Form (BCNF) is a normal form used in database normalization that is based on the idea of functional relationships. A table is said to be in BCNF if and only if for every non-trivial functional dependency $X \rightarrow Y$, where X is a super key of the table and Y is a prime attribute (an attribute that is part of a candidate key). In other words, a table is in BCNF if every determinant is a potential key.

Functional dependencies between non-prime attributes, which can result in data duplication and update anomalies, are avoided by the BCNF. A table is guaranteed to be free of these abnormalities when it is in BCNF. We need to apply normalization rules to a connection by decomposing it into smaller relations that fulfill BCNF in order to achieve BCNF. Decomposition entails locating non-trivial functional dependencies and building new tables based on these relationships.

10.1 County table

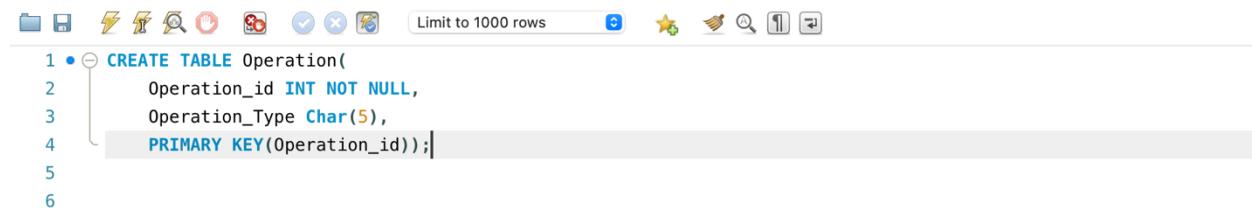
This table has a primary key **id** and a single attribute **name**, which is functionally dependent on the primary key. There are no transitive dependencies, so this table is already in BCNF.

The County table is already in BCNF (Boyce-Codd Normal Form) because it only contains one candidate key, which is the County_id column. This means that all non-key attributes, in this case, the County column, are functionally dependent on the primary key. There are no non-trivial functional dependencies between non-key attributes. Therefore, there are no partial dependencies or transitive dependencies in the County table, and it is already in BCNF.



A screenshot of a MySQL query editor interface. The toolbar at the top includes icons for file operations, search, and refresh. A dropdown menu shows 'Limit to 1000 rows'. Below the toolbar, the SQL code for creating the County table is displayed:

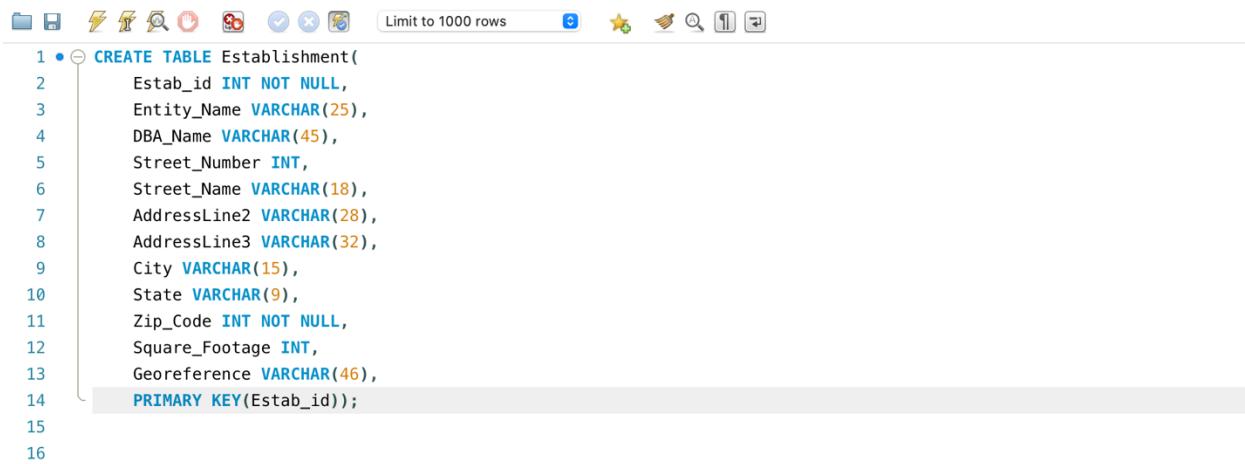
```
1
2 • CREATE TABLE County (
3     County_id INT NOT NULL PRIMARY KEY,
4     County varchar(20)
5 );
```



A screenshot of a MySQL query editor interface. The toolbar at the top includes icons for file operations, search, and refresh. A dropdown menu shows 'Limit to 1000 rows'. Below the toolbar, the SQL code for creating the Operation table is displayed:

```
1 • CREATE TABLE Operation(
2     Operation_id INT NOT NULL,
3     Operation_Type Char(5),
4     PRIMARY KEY(Operation_id));
5
6
```

10.2 Establishment table



The screenshot shows the MySQL Workbench interface with the SQL editor tab active. The code area contains the following SQL statement:

```
1 • CREATE TABLE Establishment(
2     Estab_id INT NOT NULL,
3     Entity_Name VARCHAR(25),
4     DBA_Name VARCHAR(45),
5     Street_Number INT,
6     Street_Name VARCHAR(18),
7     AddressLine2 VARCHAR(28),
8     AddressLine3 VARCHAR(32),
9     City VARCHAR(15),
10    State VARCHAR(9),
11    Zip_Code INT NOT NULL,
12    Square_Footage INT,
13    Georeference VARCHAR(46),
14    PRIMARY KEY(Estab_id));
15
16
```

Our previous table **Establishment** is not in BCNF (Boyce-Codd Normal Form) because it has a partial dependency on the primary key.

The primary key is **Estab_id**, and it appears that the non-key attribute **Zip_Code** is functionally dependent on only a part of the primary key, specifically the first digit of the **Estab_id**. This means that there are dependencies between non-key attributes that are not fully dependent on the primary key.

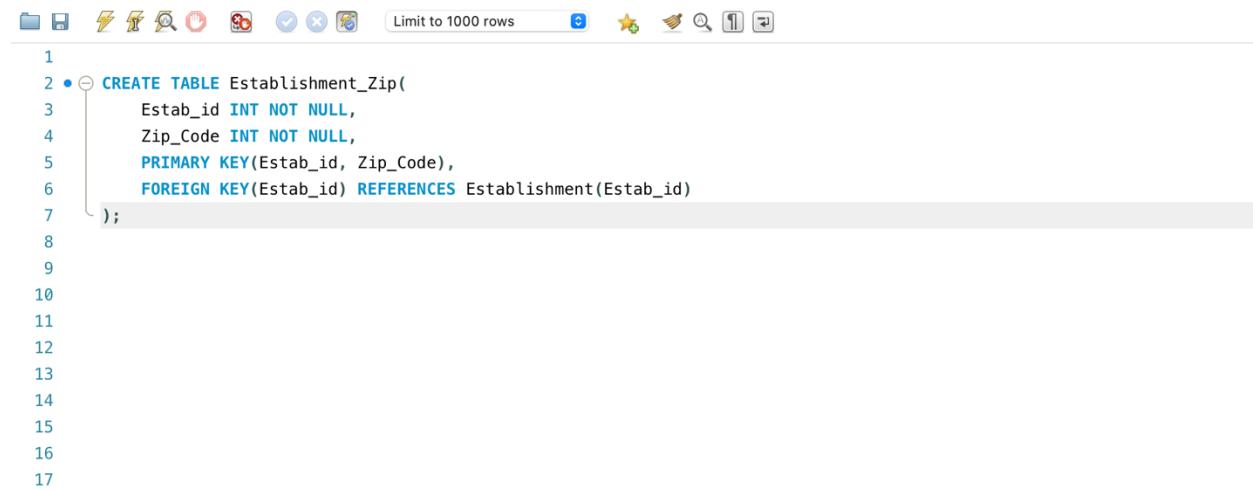
To bring this table to BCNF, we will decompose and split it into two tables, one containing the **Estab_id** and the other containing the **Zip_Code** and any other attributes that are functionally dependent on it.



The screenshot shows the MySQL Workbench interface with the SQL editor tab active. The code area contains the following SQL statement, ending with a semicolon:

```
1 • CREATE TABLE Establishment(
2     Estab_id INT NOT NULL,
3     Entity_Name VARCHAR(25),
4     DBA_Name VARCHAR(45),
5     Street_Number INT,
6     Street_Name VARCHAR(18),
7     AddressLine2 VARCHAR(28),
8     AddressLine3 VARCHAR(32),
9     City VARCHAR(15),
10    State VARCHAR(9),
11    Square_Footage INT,
12    Georeference VARCHAR(46),
13    PRIMARY KEY(Estab_id)
14 );
15
16
17
18
19
20
```

10.3 Establishment_Zip table



The screenshot shows the MySQL Workbench interface with a query editor window. The code in the editor is:

```
1
2 • CREATE TABLE Establishment_Zip(
3     Etab_id INT NOT NULL,
4     Zip_Code INT NOT NULL,
5     PRIMARY KEY(Etab_id, Zip_Code),
6     FOREIGN KEY(Etab_id) REFERENCES Establishment(Etab_id)
7 );
```

The line numbers 1 through 7 are visible on the left. The code is highlighted in blue, indicating it is SQL. A status bar at the top right says "Limit to 1000 rows". Below the code are several standard MySQL Workbench toolbar icons.

In this new design, the **Establishment** table contains all attributes that are fully dependent on the primary key **Etab_id**, and the **Establishment_Zip** table contains the **Etab_id**, **Zip_Code**, and any other attributes that are functionally dependent on the **Zip_Code**. The **Establishment_Zip** table uses a composite primary key that includes both **Etab_id** and **Zip_Code**, and has a foreign key constraint to the **Etab_id** column in the **Establishment** table.

In the **Establishment** table, the primary key is **Etab_id**, which uniquely determines all the other attributes in the table. Therefore, this table is in BCNF.

In the **Establishment_Zip** table, the composite primary key is **(Etab_id, Zip_Code)**, which uniquely determines all the other attributes in the table. The **Etab_id** column has a foreign key constraint to the **Etab_id** column in the **Establishment** table, ensuring that all values in **Establishment_Zip** correspond to a valid **Etab_id** in the **Establishment** table. Therefore, this table is also in BCNF.

10.4 License table

```
1
2 • CREATE TABLE License(
3     License_Number INT NOT NULL PRIMARY KEY,
4     Estab_id INT NOT NULL,
5     FOREIGN KEY (Estab_id)
6     REFERENCES Establishment (Estab_id));|
```

License table is in BCNF

- The table has a single primary key attribute, License_Number, which uniquely identifies each row in the table.
- The foreign key attribute, Estab_id, references the primary key attribute of the Establishment table, Estab_id.
- Both attributes are atomic, meaning they cannot be decomposed further.
- There are no transitive dependencies between the attributes, so the table satisfies the conditions of BCNF.

11 Inserting into tables

```

1 • ALTER TABLE retail_food_stores ADD COLUMN County_id SERIAL
2
3
4

```

```

1 • ALTER TABLE retail_food_stores ADD COLUMN Operation_id INT;
2
3
4

```

```

1
2 • UPDATE retail_food_stores SET Operation_id = CONCAT('101', Operation_id) WHERE Operation_id IS NULL;
3
4

```

```

1
2 • ALTER TABLE retail_food_stores ADD COLUMN Estab_id INT;
3

```

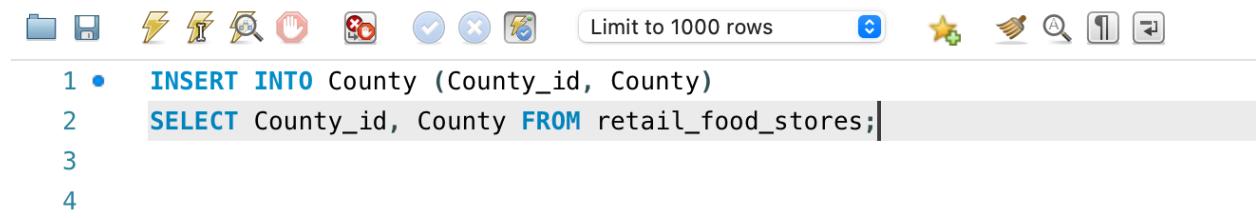
```

1
2 • UPDATE retail_food_stores SET Estab_id = CONCAT('9170', County_id) WHERE Estab_id IS NULL;
3
4

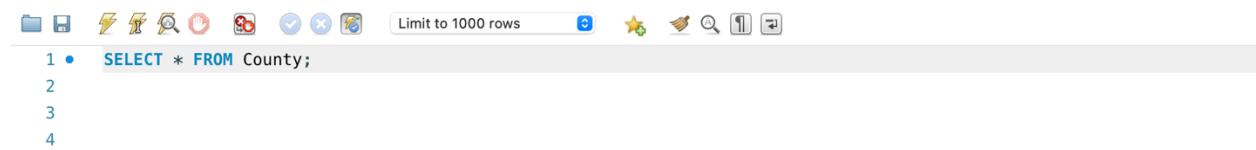
```

Street_Name	City	State	Zip_Code	Square_Footage	Georeference	NYS_Municipal_Boundari...	County_id	Operation_...	Estab_id
E GUN HILL RD	BRONX	NY	10469	0	POINT (-73.85902 40.87505)	307	1	1011	91701
MAIN ST	ARKPORT	NY	14807	0	POINT (-77.69553 42.39369)	31	2	1012	91702
CANTON STREET	RENSSELAER FALLS	NY	13680	1000	POINT (-75.31801 44.59069)	339	3	1013	91703
E 204TH ST	BRONX	NY	10467	0	POINT (-73.87726 40.87158)	307	4	1014	91704
N 12 ST	BROOKLYN	NY	11211	0	POINT (-73.95273 40.71933)	894	5	1015	91705
UNION TPKE.	GLEN OAKS	NY	11004	0	POINT (-73.71744 40.74408)	196	6	1016	91706
10TH AVE	NEW YORK	NY	10036	0	POINT (-73.99287 40.76321)	749	7	1017	91707
ST HWY 10	HOBART	NY	13788	0	POINT (-74.65974 42.38154)	564	8	1018	91708
MASTIC BEACH RD	MASTIC BEACH	NY	11951	0	POINT (-72.84823 40.77852)	1022	9	1019	91709
WHIG STREET	NEWARK VALLEY	NY	13811	1000	POINT (-76.18543 42.23286)	55	10	10110	917010
PITKIN AVE	BROOKLYN	NY	11212	0	POINT (-73.91478 40.66909)	894	11	10111	917011
MIDLAND AVE	STATEN ISLAND	NY	10306	0	POINT (-74.09327 40.5724)	585	12	10112	917012
WILLIAMSBRIDGE...	BRONX	NY	10461	0	POINT (-73.84547 40.84368)	307	13	10113	917013
WILSON AVE	BROOKLYN	NY	11221	0	POINT (-73.91686 40.69566)	894	14	10114	917014
FREDERICK DOU...	NEW YORK	NY	10039	0	POINT (-73.94137 40.8236)	749	15	10115	917015
MONROE ST	BROOKLYN	NY	11221	0	POINT (-73.9418 40.68645)	894	16	10116	917016
W 125TH ST	NEW YORK	NY	10027	0	POINT (-73.95604 40.81311)	749	17	10117	917017
WILLIAMSBRIDGE...	BRONX	NY	10461	1800	POINT (-73.85539 40.85549)	307	18	10118	917018
MILL STREET	LIBERTY	NY	12754	0	POINT (-74.74122 41.79668)	655	19	10119	917019
JACKSON AVE	LONG ISLAND CITY	NY	11101	0	POINT (-73.94959 40.74412)	196	20	10120	917020

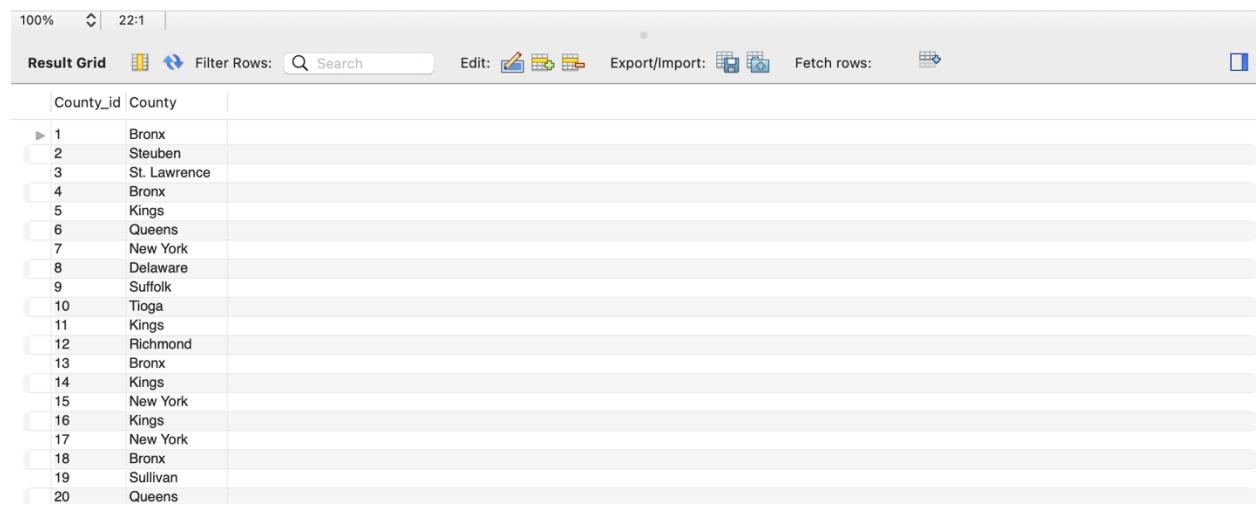
11.1 Inserting into County table



```
1 • INSERT INTO County (County_id, County)
2   SELECT County_id, County FROM retail_food_stores;
3
4
```



```
1 • SELECT * FROM County;
2
3
4
```

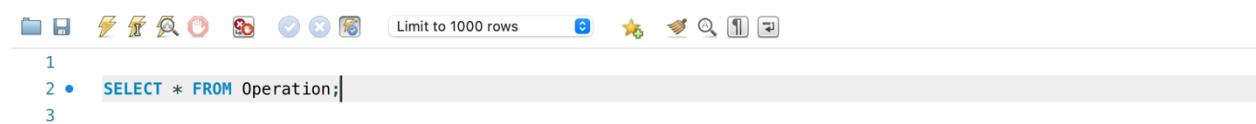


County_id	County
1	Bronx
2	Steuben
3	St. Lawrence
4	Bronx
5	Kings
6	Queens
7	New York
8	Delaware
9	Suffolk
10	Tioga
11	Kings
12	Richmond
13	Bronx
14	Kings
15	New York
16	Kings
17	New York
18	Bronx
19	Sullivan
20	Queens

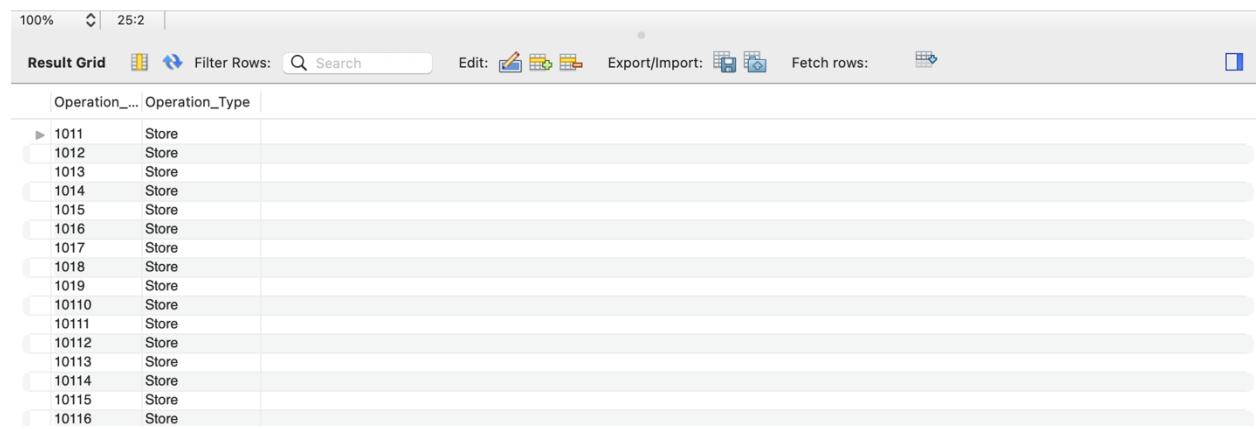
11.2 Inserting into Operation table:



```
1
2 •  INSERT INTO Operation (Operation_id, Operation_Type)
3   SELECT Operation_id, Operation_Type FROM retail_food_stores;
```



```
1
2 •  SELECT * FROM Operation;
3
```



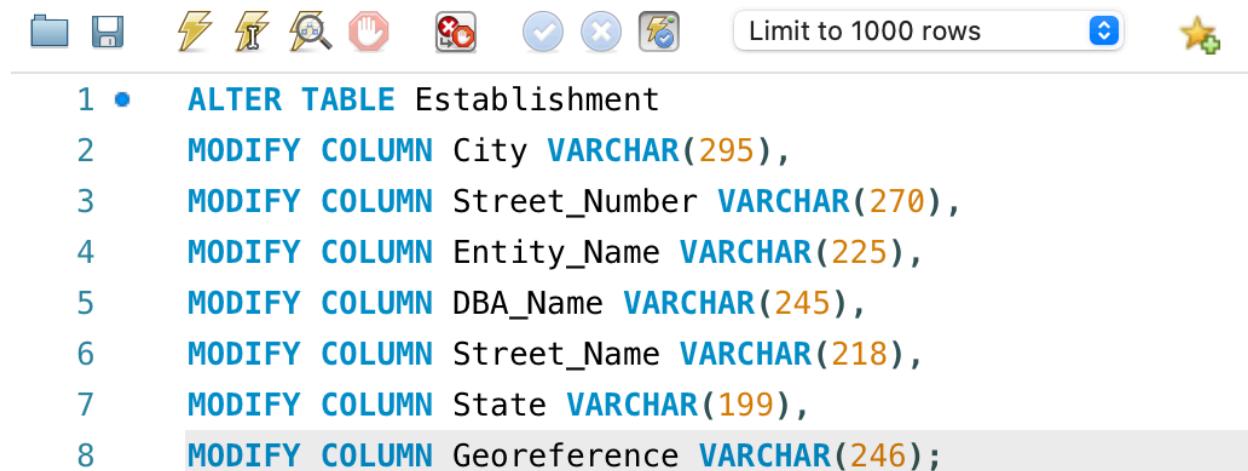
Operation_id	Operation_Type
1011	Store
1012	Store
1013	Store
1014	Store
1015	Store
1016	Store
1017	Store
1018	Store
1019	Store
10110	Store
10111	Store
10112	Store
10113	Store
10114	Store
10115	Store
10116	Store

11.3 DELETE FROM Establishment;



```
1  DELETE FROM Establishment;
2
```

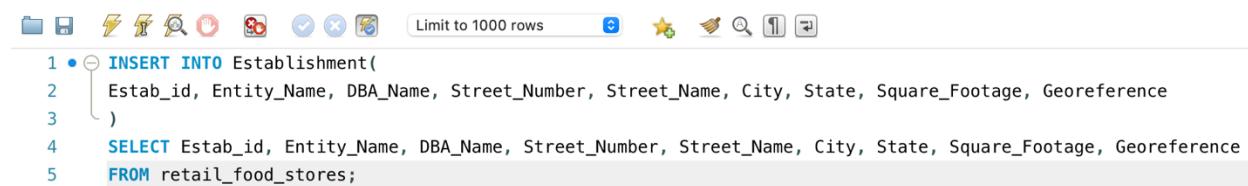
11.4 Inserting into Establishment table:



```

1 • ALTER TABLE Establishment
2     MODIFY COLUMN City VARCHAR(295),
3     MODIFY COLUMN Street_Number VARCHAR(270),
4     MODIFY COLUMN Entity_Name VARCHAR(225),
5     MODIFY COLUMN DBA_Name VARCHAR(245),
6     MODIFY COLUMN Street_Name VARCHAR(218),
7     MODIFY COLUMN State VARCHAR(199),
8     MODIFY COLUMN Georeference VARCHAR(246);

```



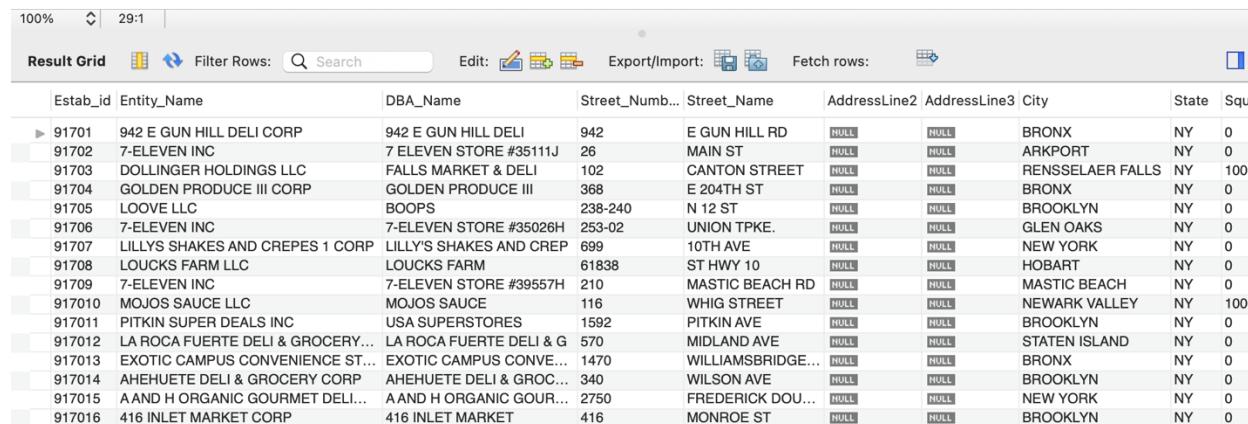
```

1 • INSERT INTO Establishment(
2     Estab_id, Entity_Name, DBA_Name, Street_Number, Street_Name, City, State, Square_Footage, Georeference
3 )
4     SELECT Estab_id, Entity_Name, DBA_Name, Street_Number, Street_Name, City, State, Square_Footage, Georeference
5     FROM retail_food_stores;

```



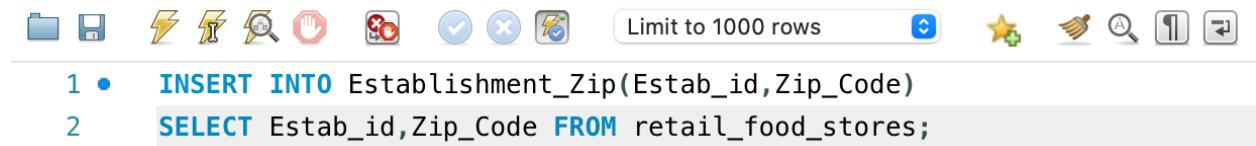
```
1 • SELECT * FROM Establishment;
```



Result Grid

Estab_id	Entity_Name	DBA_Name	Street_Numb...	Street_Name	AddressLine2	AddressLine3	City	State	Squa
91701	942 E GUN HILL DELI CORP	942 E GUN HILL DELI	942	E GUN HILL RD	NULL	NULL	BRONX	NY	0
91702	7-ELEVEN INC	7 ELEVEN STORE #3511J	26	MAIN ST	NULL	NULL	ARKPORT	NY	0
91703	DOLLINGER HOLDINGS LLC	FALLS MARKET & DELI	102	CANTON STREET	NULL	NULL	RENSSELAER FALLS	NY	1000
91704	GOLDEN PRODUCE III CORP	GOLDEN PRODUCE III	368	E 204TH ST	NULL	NULL	BRONX	NY	0
91705	LOOVE LLC	BOOPS	238-240	N 12 ST	NULL	NULL	BROOKLYN	NY	0
91706	7-ELEVEN INC	7-ELEVEN STORE #35026H	253-02	UNION TPKE.	NULL	NULL	GLEN OAKS	NY	0
91707	LILLY'S SHAKES AND CREPES 1 CORP	LILLY'S SHAKES AND CREP	699	10TH AVE	NULL	NULL	NEW YORK	NY	0
91708	LOUCKS FARM LLC	LOUCKS FARM	61838	ST HWY 10	NULL	NULL	HOBART	NY	0
91709	7-ELEVEN INC	7-ELEVEN STORE #39557H	210	MASTIC BEACH RD	NULL	NULL	MASTIC BEACH	NY	0
917010	MOJOS SAUCE LLC	MOJOS SAUCE	116	WHIG STREET	NULL	NULL	NEWARK VALLEY	NY	1000
917011	PITKIN SUPER DEALS INC	USA SUPERSTORES	1592	PITKIN AVE	NULL	NULL	BROOKLYN	NY	0
917012	LA ROCA FUERTE DELI & GROCERY...	LA ROCA FUERTE DELI & G	570	MIDLAND AVE	NULL	NULL	STATEN ISLAND	NY	0
917013	EXOTIC CAMPUS CONVENIENCE ST...	EXOTIC CAMPUS CONVE...	1470	WILLIAMSBRIDGE...	NULL	NULL	BRONX	NY	0
917014	AHEHUETE DELI & GROCERY CORP	AHEHUETE DELI & GROC...	340	WILSON AVE	NULL	NULL	BROOKLYN	NY	0
917015	A AND H ORGANIC GOURMET DELI...	A AND H ORGANIC GOUR...	2750	FREDERICK DOU...	NULL	NULL	NEW YORK	NY	0
917016	416 INLET MARKET CORP	416 INLET MARKET	416	MONROE ST	NULL	NULL	BROOKLYN	NY	0

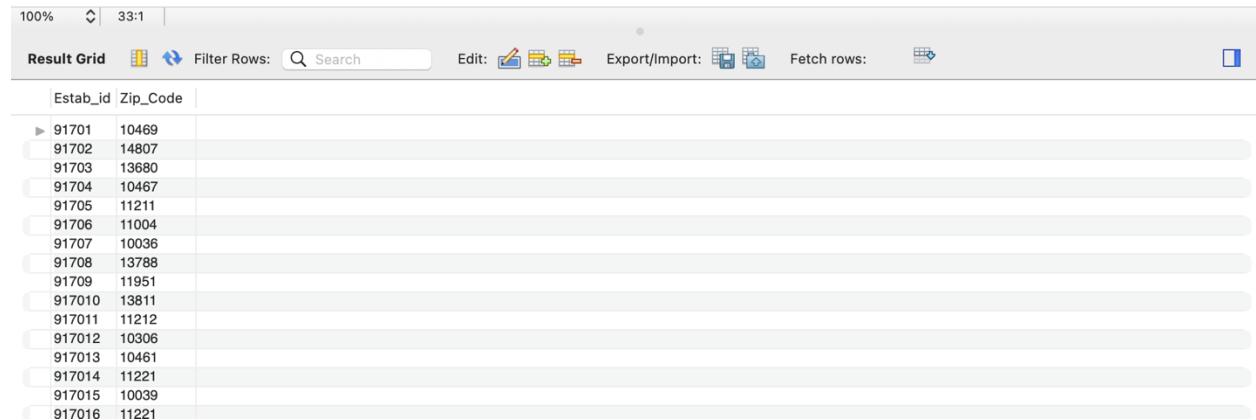
11.5 Inserting into Establishment_Zip table:



```
1 • INSERT INTO Establishment_Zip(Estab_id,Zip_Code)
2   SELECT Estab_id,Zip_Code FROM retail_food_stores;
```



```
1 • SELECT * FROM Establishment_Zip;
```



Estab_id	Zip_Code
91701	10469
91702	14807
91703	13680
91704	10467
91705	11211
91706	11004
91707	10036
91708	13788
91709	11951
917010	13811
917011	11212
917012	10306
917013	10461
917014	11221
917015	10039
917016	11221

11.6 Inserting into License table:

```
1  INSERT INTO License(License_Number,Estab_id)
2  SELECT License_Number,Estab_id FROM retail_food_stores;
```

```
1 •  SELECT * FROM License;
```

License_Number	Estab_id
755970	91701
756126	91702
755786	91703
755969	91704
755965	91705
756125	91706
755629	91707
755964	91708
756123	91709
755785	917010
755963	917011
756121	917012
755962	917013
755784	917014
755783	917015
755782	917016

12 Indexing

12.1 Creating an index on the "City" column:

The screenshot shows the MySQL Workbench interface with the SQL editor tab active. The toolbar at the top includes icons for file operations, search, and database navigation. A dropdown menu says "Limit to 50000 rows". The SQL code is:

```
1 CREATE INDEX idx_establishment_city ON Establishment (City);|  
2
```

12.2 Creating an index on the "Georeference" column:

The screenshot shows the MySQL Workbench interface with the SQL editor tab active. The toolbar at the top includes icons for file operations, search, and database navigation. A dropdown menu says "Limit to 50000 rows". The SQL code is:

```
1  
2 • CREATE INDEX idx_establishment_georeference ON Establishment (Georeference);|  
3
```

12.3 Creating a composite index on the "City" and "State" columns:

The screenshot shows the MySQL Workbench interface with the SQL editor tab active. The toolbar at the top includes icons for file operations, search, and database navigation. A dropdown menu says "Limit to 50000 rows". The SQL code is:

```
1  
2 • CREATE INDEX idx_establishment_city_state ON Establishment (City, State);|  
3
```

13 More queries

13.1 average square footage of food establishments by state:

The screenshot shows the MySQL Workbench interface with the SQL editor tab active. The toolbar at the top includes icons for file operations, search, and database navigation. A dropdown menu says "Limit to 50000 rows". The SQL code is:

```
1  
2 • SELECT State, AVG(Square_Footage) AS AvgSqFt  
3   FROM Establishment  
4   GROUP BY State;|  
5  
6
```

At the bottom, there is a "Result Grid" section showing the results of the query:

State	AvgSqFt
NY	4953.2646

13.2 top 30 cities with the highest number of food establishments:

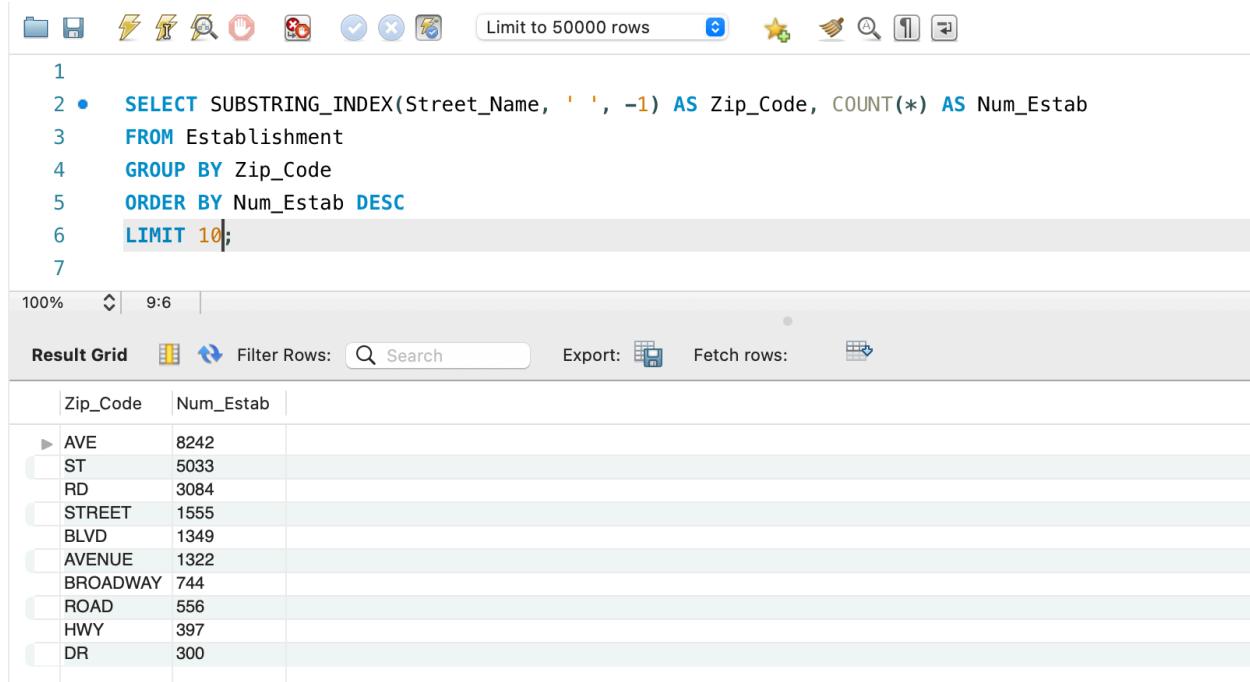
The screenshot shows a MySQL Workbench interface. At the top, there are various icons for database management. Below them is a toolbar with buttons for saving, running, and filtering. A dropdown menu says "Limit to 50000 rows". To the right are icons for marking rows as favorites, copying, and other operations. The main area contains a numbered SQL query and its results.

```
1
2 •  SELECT City, COUNT(*) AS Num_Estab FROM Establishment
3   GROUP BY City
4   ORDER BY Num_Estab DESC
5   LIMIT 30;
6
```

Result Grid

City	Num_Estab
BROOKLYN	4945
BRONX	2612
NEW YORK	2432
BUFFALO	691
ROCHESTER	670
STATEN ISLAND	574
SYRACUSE	360
JAMAICA	345
YONKERS	286
ALBANY	274
ASTORIA	242
FLUSHING	231
CORONA	192
RIDGEWOOD	184
SCHENECTADY	182
POUGHKEEPSIE	145
LONG ISLAND...	145
JACKSON HEI...	135
UTICA	129
WOODSIDE	125
ELMHURST	114
NEWBURGH	113
BINGHAMTON	112
NIAGARA FALLS	107
TROY	107

13.3 10 zip codes with the highest number of food establishments:



The screenshot shows a MySQL Workbench interface. At the top, there are various icons for database management. Below them, a toolbar includes 'Limit to 50000 rows' and other standard database tools. The main area displays a SQL query and its results.

```
1
2 •  SELECT SUBSTRING_INDEX(Street_Name, ' ', -1) AS Zip_Code, COUNT(*) AS Num_Estab
3   FROM Establishment
4   GROUP BY Zip_Code
5   ORDER BY Num_Estab DESC
6   LIMIT 10;
7
```

The results grid shows the following data:

Zip_Code	Num_Estab
AVE	8242
ST	5033
RD	3084
STREET	1555
BLVD	1349
AVENUE	1322
BROADWAY	744
ROAD	556
HWY	397
DR	300

14 Problems while handling the larger dataset and its solution

Performance can be a big problem when working with this dataset. On small datasets, queries can run in just a few milliseconds, but on huge datasets, they can take many seconds or even minutes to finish. This is so that the database can find the information that answers the query without having to search through every record in the table. So, to overcome this we found that Indexing is one approach to solving this issue.

Indexes are used to speed up data retrieval procedures. They offer an efficient method for finding data based on the contents of one or more columns. You can decrease the time it takes to retrieve data from the database by building indexes on the columns that are often searched.

But a table's speed can actually be slowed down by adding too many indexes because it takes longer to insert, update, or delete data. A balance between the quantity of indexes and the frequency of queries using them must be achieved. Other methods, such as partitioning, caching, using more potent technology, or distributed systems, can be utilized in conjunction to indexing to increase performance when working with enormous datasets.

15 Retail Store website

A retail food store website can use the county, city, and state fields to help customers find stores that are located in their area.

More specific information about the store's location can be provided by using the county field. Customers who live in areas where several cities have the same name may find this useful. Customers are ensured that they are discovering stores in the right place by giving the county information. You can offer a list of stores that are located in a particular city by using the city field. Customers looking for a store in a specific city neighborhood may find this useful. An inventory of stores in a certain state can be provided using the state field. This can be useful for clients who are visiting a new state and want to find a store in their area.

Retail Store Management

County:

State:

City:

Add

County	State	City	Action
Lewis	NY	LOWVILLE	Edit Delete
Delaware	NY	HOBART	Edit Delete
Albany	NY	WESTERLO	Edit Delete
Eric	NY	HAMBURG	Edit Delete

After adding the details of County, state, city the entries will be retrieved as below:

Retail Store Management

County: Lewis

State: NY

City: LOWVILLE

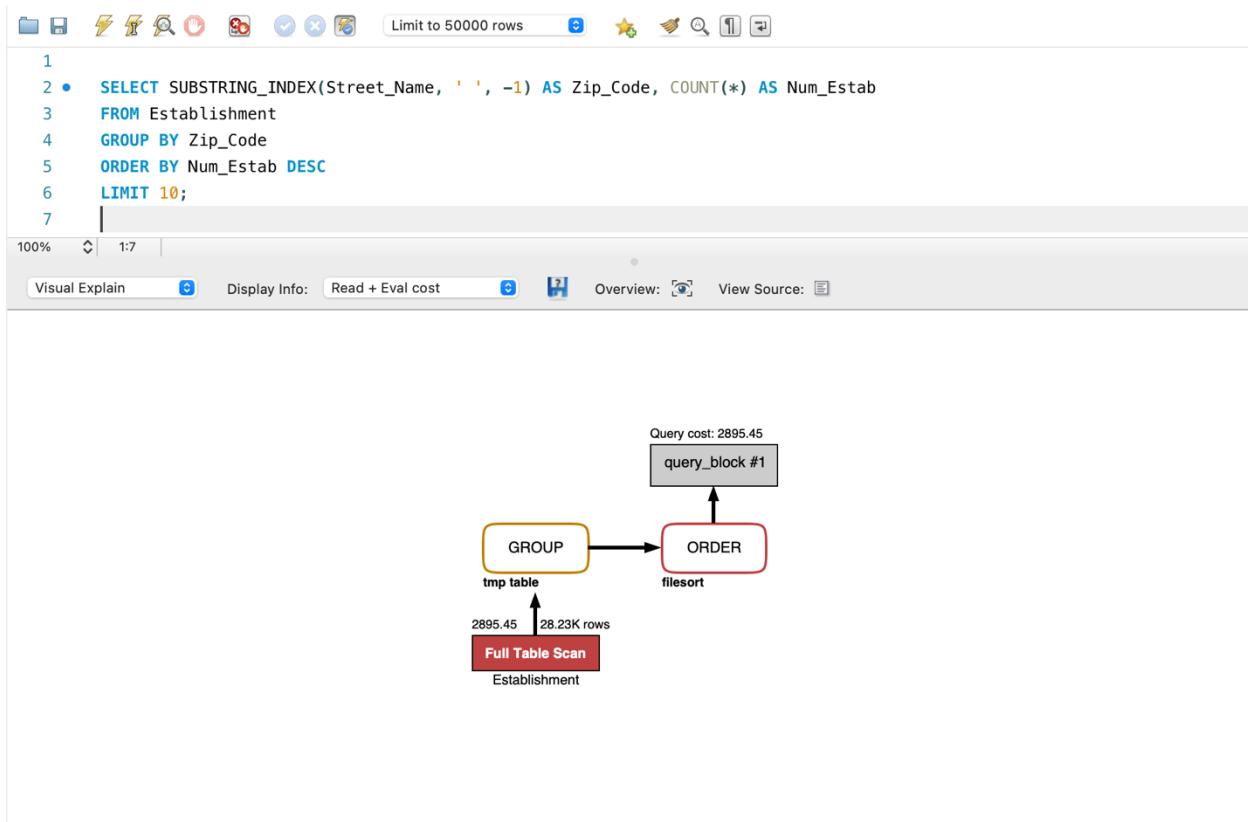
Add

County	State	City	Action
Lewis	NY	LOWVILLE	Edit Delete
Delaware	NY	HOBART	Edit Delete
Albany	NY	WESTERLO	Edit Delete
Eric	NY	HAMBURG	Edit Delete

16 Query execution analysis

The EXPLAIN command will run once you click the "Execute" button in Query tab.

The EXPLAIN command's outcomes will be shown in a table in the results panel. The data in the table can be examined to find any potential performance problems with your query, such as complete table scans or ineffective index utilization.



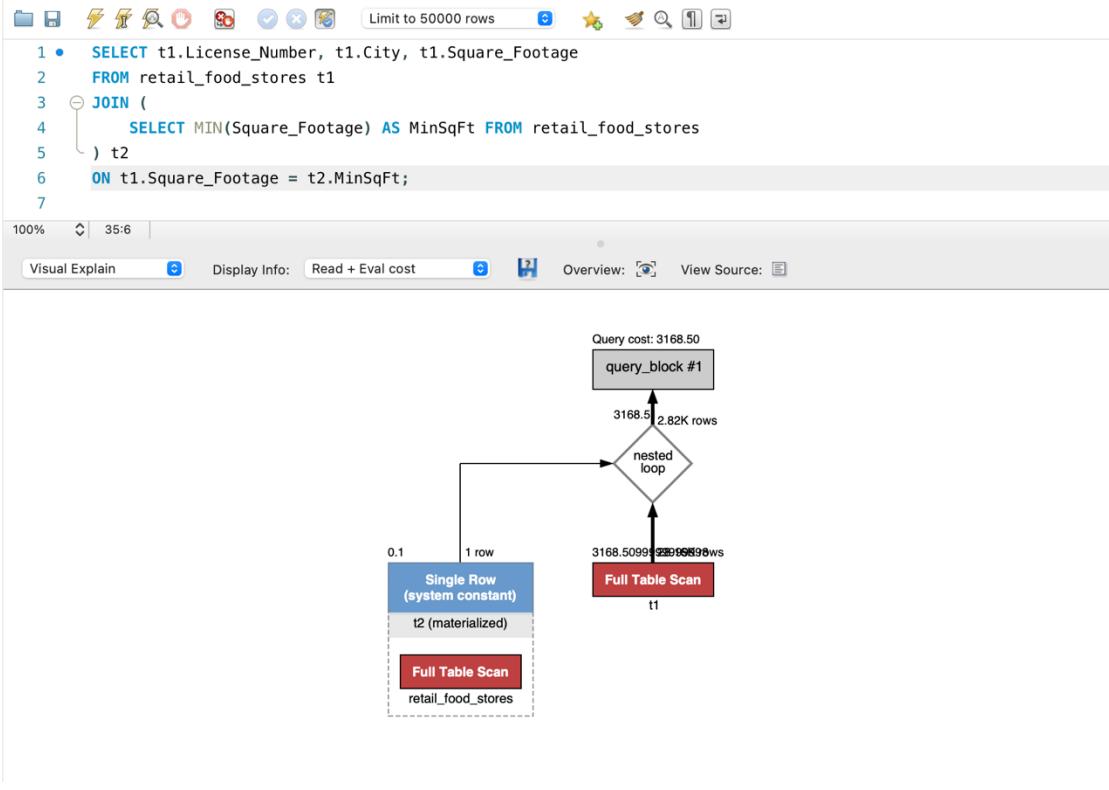
A screenshot of the MySQL Workbench interface showing the results of an EXPLAIN command. The query is:

```
1 • EXPLAIN SELECT * FROM Establishment WHERE City = 'New York' AND Square_Footage > 5000;
```

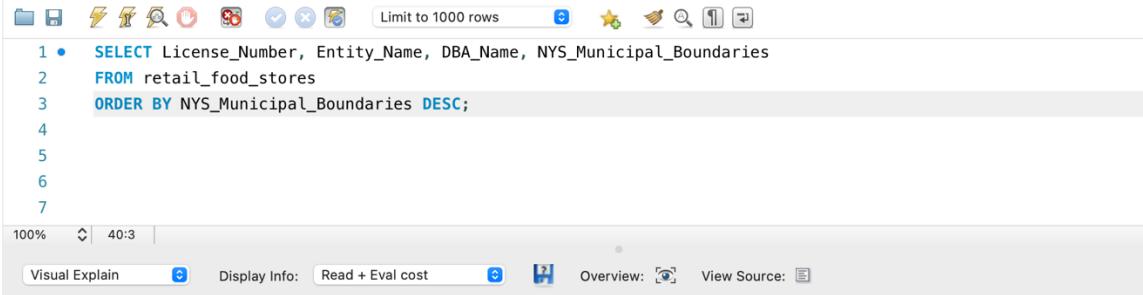
The result grid shows the following data:

	id	select_ty...	table	partitions	type	possible_keys	key	key_len	ref	rows	filtered	Extra
▶ 1	1	SIMPLE	Establishment		ref	idx_establishment_city, idx_establishment_city_...	idx_establishment_city	1183	const	2432	33.33	Using where

JOIN Execution analysis



ORDER BY Execution analysis



Conclusion

In conclusion, the project to create a database that can manage the data for a grocery store was effective in achieving its goal. The database design is flexible and expandable to accommodate business expansion and changes. The database's layout also enables data retrieval and updating data, which helps to enhance business operations and customer service. There are other chances for improvement and optimization, like fine-tuning queries to increase effectiveness and adding additional tables to better track sales and inventory.

Overall, the database design utilized in the retail food store project can benefit a grocery shop's operations in a number of ways, making it simpler to manage information and track trends so that decisions can be made with confidence.

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