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RESEARCH LABS

INNOVATION. AUTOMATION. ANALYTICS

SQL PROJECT ON GROCERY STORE MANAGEMENT

PRESENTED BY

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LET'S GO TO THE GROCEREASE

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INTRODUCTION

In today's competitive retail environment, grocery stores must efficiently manage vast amounts of data related to products, suppliers, employees, customers, and transactions. This project focuses on designing and implementing a comprehensive relational database system for a grocery store using SQL (Structured Query Language) to enable streamlined operations and data-driven decision-making.

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LET'S SEE TABLES

Category Table

	Field	Type	Null	Key	Default	Extra
▶	cat_id	tinyint	NO	PRI	NULL	
	cat_name	varchar(255)	YES		NULL	

Customer Table

	Field	Type	Null	Key	Default
▶	cust_id	smallint	NO	PRI	NULL
	cust_name	varchar(255)	YES		NULL
	address	text	YES		NULL

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Employee Table

Field	Type	Null	Key	Default
emp_id	tinyint	NO	PRI	NULL
emp_name	varchar(255)	YES		NULL
hire_date	varchar(255)	YES		NULL

Order Deatils Table

Field	Type	Null	Key	Default	Extra
ord_det_id	smallint	NO	PRI	NULL	auto_increment
ord_id	smallint	YES	MUL	NULL	
prod_id	tinyint	YES	MUL	NULL	
quantity	tinyint	YES		NULL	
each_price	decimal(10,2)	YES		NULL	
total_price	decimal(10,2)	YES		NULL	

Orders Table

Field	Type	Null	Key	Default
ord_id	smallint	NO	PRI	NULL
cust_id	smallint	YES	MUL	NULL
emp_id	tinyint	YES	MUL	NULL
order_date	varchar(255)	YES		NULL
date_converted	date	YES		NULL

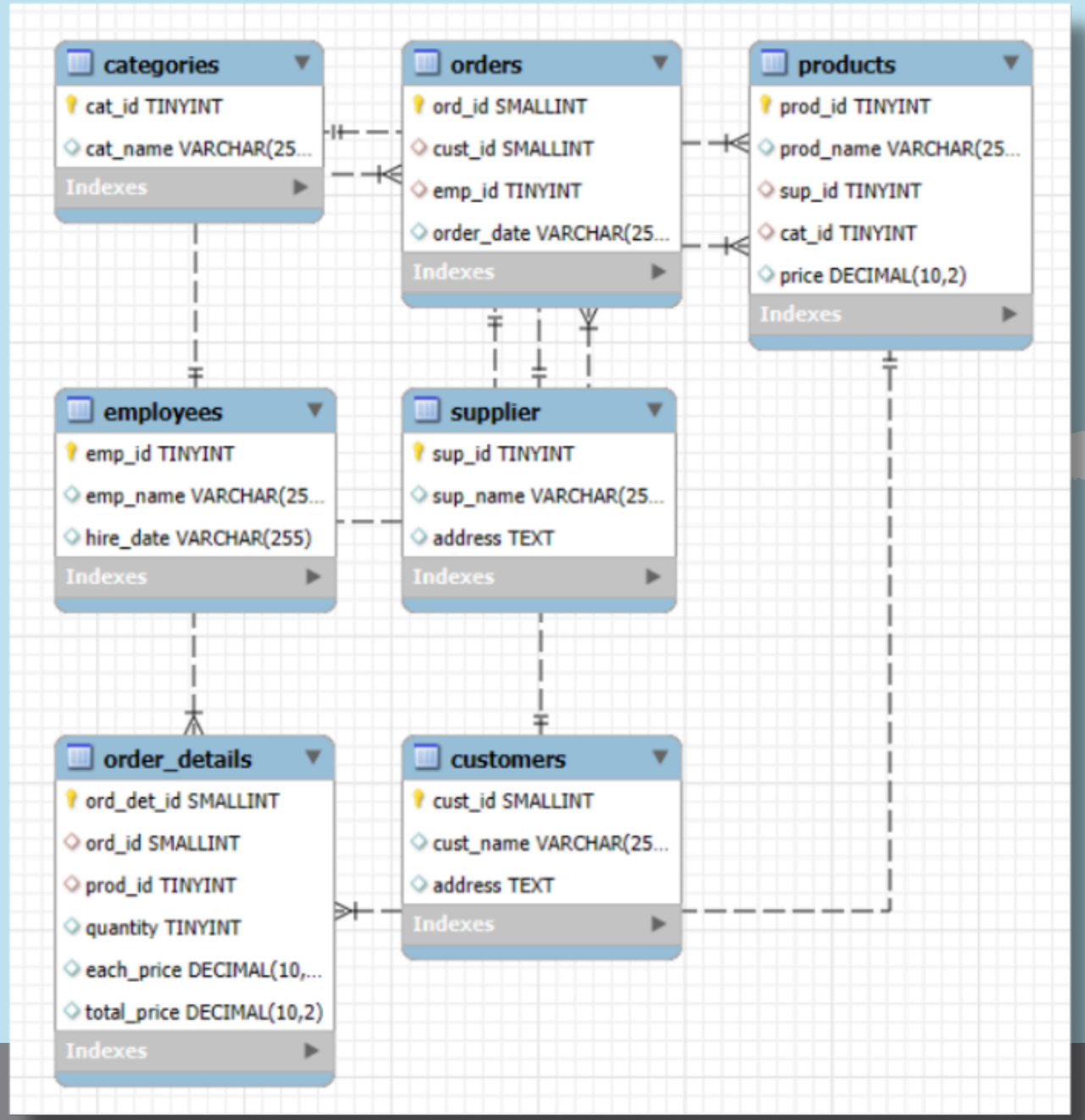
Products Table

Field	Type	Null	Key	Default
prod_id	tinyint	NO	PRI	NULL
prod_name	varchar(255)	YES		NULL
sup_id	tinyint	YES	MUL	NULL
cat_id	tinyint	YES	MUL	NULL
price	decimal(10,2)	YES		NULL

Supplier Table

Field	Type	Null	Key	Default
sup_id	tinyint	NO	PRI	NULL
sup_name	varchar(255)	YES		NULL
address	text	YES		NULL

ENTITY RELATIONSHIP DIAGRAM



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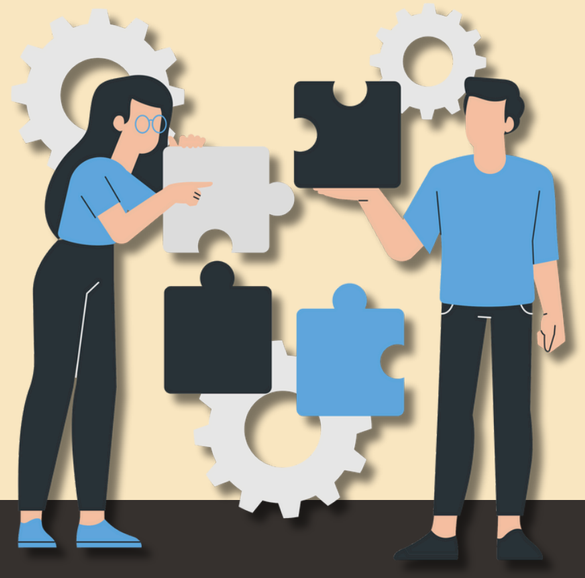
PROBLEM STATEMENT



This project simulates a grocery store database designed to manage products, customers, suppliers, and orders.

It enables tracking of sales, stock levels, and employee or customer activity.

SQL is used to analyze the data and extract meaningful business insights.

The aim is to enhance operational efficiency and support informed decision-making.

CUSTOMER INSIGHTS

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1. How many unique customers have placed orders?

```
SELECT
COUNT(DISTINCT cust_id) AS unique_customers
FROM orders;
```

Output:

	unique_customers
▶	156

2. Which customers have placed the highest number of orders?

```
SELECT c.cust_id, c.cust_name,
COUNT(o.ord_id) AS total_orders
FROM customers c
INNER JOIN orders o
ON c.cust_id=o.cust_id
GROUP BY c.cust_id
ORDER BY total_orders DESC LIMIT 1;
```

Output:

	cust_id	cust_name	total_orders
▶	165	Jyotika	7

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3.What is the total and average purchase value per customer?

```
SELECT o.cust_id, c.cust_name,
SUM(od.total_price) AS total_purchase,
AVG(od.total_price) AS avg_purchase
FROM orders o
INNER JOIN order_details od
ON o.ord_id= od.ord_id
INNER JOIN customers c
ON o.cust_id= c.cust_id
GROUP BY o.cust_id;
```

Output:

cust_id	cust_name	total_purchase	avg_purchase
158	Eshwar Menon	3061.90	765.475000
129	Kiran Pillai	2625.93	656.482500
27	Chetan Gowda	5750.59	821.512857
122	Chetan Reddy	3869.54	1289.846667
168	Kasturi	3865.31	1288.436667
157	Deepa Gowda	1745.11	872.555000
125	Gita Nair	6305.09	1261.018000
167	Karishma	5426.90	493.354545
166	Kapila	11099.51	1109.951000
120	Kiran Iyer	5588.91	698.613750
145	Chetan Rao	5351.18	668.897500
141	Hari Nair	5722.71	817.530000
182	Nikita	5595.89	932.648333
163	Esha	2515.25	1257.625000
94	Gita Menon	6581.93	731.325556

4. Who are the top 5 customers by total purchase amount?

```
SELECT o.cust_id, c.cust_name,
SUM(od.total_price) AS total_purchase
FROM orders o
INNER JOIN order_details od
ON o.ord_id= od.ord_id
INNER JOIN customers c
ON o.cust_id= c.cust_id
GROUP BY o.cust_id
ORDER BY total_purchase DESC
LIMIT 5;
```

Output:

cust_id	cust_name	total_purchase
19	Chetan Naidu	11256.82
166	Kapila	11099.51
67	Eshwar Rao	10819.96
61	Aditi Rao	10230.64
7	Eshwar Iyer	9188.45

PRODUCT PERFORMANCE

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5. How many products exist in each category?

```
SELECT c.cat_id, c.cat_name,
COUNT(p.prod_id) AS total_products
FROM categories c
LEFT JOIN products p
ON c.cat_id= p.cat_id
GROUP BY c.cat_id;
```

Output:

cat_id	cat_name	total_products
1	Grains & Cereals	18
2	Dairy Products	6
3	Beverages	17
4	Personal Care	6
5	Snacks & Confectioneries	3

6. What is the average price of products by category?

```
SELECT c.cat_id, c.cat_name,
AVG(p.price) AS avg_price
FROM categories c
LEFT JOIN products p
ON c.cat_id= p.cat_id
GROUP BY c.cat_id;
```

Output:

cat_id	cat_name	avg_price
1	Grains & Cereals	287.673333
2	Dairy Products	366.943333
3	Beverages	278.892353
4	Personal Care	364.991667
5	Snacks & Confectioneries	363.336667

7. Which products have the highest total sales volume (by quantity)?

```sql
SELECT p.prod_name,
SUM(quantity) AS high_sales
FROM order_details od
LEFT JOIN products p
ON od.prod_id= p.prod_id
GROUP BY prod_name
ORDER BY high_sales DESC
LIMIT 1;
```

Output:

prod_name	high_sales
Bath Soap	60

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8. What is the total revenue generated by each product?

```
SELECT SUM(od.total_price) AS total_revenue,
p.prod_name
FROM order_details od
LEFT JOIN products p
ON od.prod_id= p.prod_id
GROUP BY prod_name;
```

Output:

total_revenue	prod_name
5062.45	Black Pepper
18561.92	Cashews
5819.23	Green Tea
5703.43	Salt
19695.02	Moong Dal
7918.87	Dishwashing Soap
14848.72	Detergent Powder
11283.92	Tomato Ketchup
8406.10	Cumin Seeds
14113.00	Bath Soap
11100.45	Mayonnaise
6104.70	Coffee Powder

9. How do product sales vary by category and supplier?

```sql
SELECT c.cat_name, s.sup_name,
SUM(od.total_price) AS total_sales
FROM order_details od
INNER JOIN products p
ON od.prod_id= p.prod_id
INNER JOIN categories c
ON p.cat_id= c.cat_id
INNER JOIN supplier s
ON p.sup_id= s.sup_id
GROUP BY c.cat_name, s.sup_name
ORDER BY c.cat_name, total_sales
DESC;
```

Output:

cat_name	sup_name	total_sales
Beverages	Aarya	65538.71
Beverages	Suresh	65307.14
Beverages	Aarav Sharma	26948.15
Beverages	Sai	17103.15
Beverages	Karthik	8520.43
Dairy Products	Sai	50740.60
Dairy Products	Aarya	18519.61
Dairy Products	Karthik	11100.45
Grains & Cereals	Aarya	67701.10
Grains & Cereals	Karthik	39473.49
Grains & Cereals	Suresh	26248.89

SALES AND ORDER TRENDS

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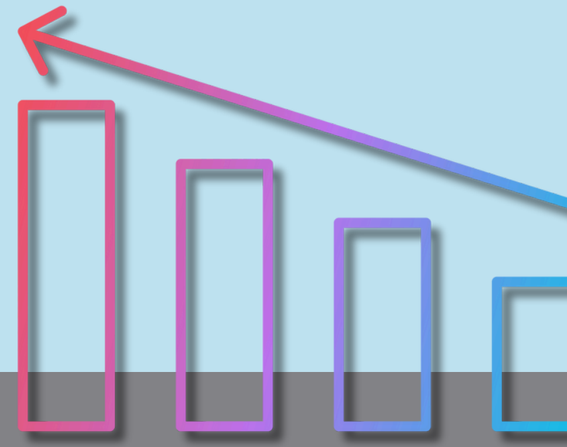
10. How many orders have been placed in total?

```
SELECT COUNT(*) AS total_orders
FROM orders;
```

Output:

total_orders
300



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11. What is the average value per order?

```
SELECT SUM(total_price)/COUNT(DISTINCT ord_id) AS avg_ord_value
FROM order_details;
```

Output:

avg_ord_value
2153.632539

12. On which dates were the most orders placed?

```sql
SELECT order_date, COUNT(ord_id) AS ord_count
FROM orders
GROUP BY order_date
ORDER BY ord_count DESC
LIMIT 1;
```

Output:

order_date	ord_count
9/10/2022	4

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13. What are the monthly trends in order volume and revenue?

```
SELECT
LEFT(o.order_date, 7) AS ord_month,
COUNT(DISTINCT o.ord_id) AS ord_volume,
SUM(od.total_price) AS total_revenue
FROM orders o
INNER JOIN order_details od
ON o.ord_id= od.ord_id
GROUP BY ord_month
ORDER BY ord_month;
```

Output:

ord_month	ord_volume	total_revenue
1/1/202	1	711.73
1/10/20	1	133.51
1/11/20	2	2217.16
1/12/20	1	3489.70
1/14/20	2	3333.21
1/15/20	1	5252.28
1/16/20	3	6340.93
1/18/20	1	1449.57
1/22/20	1	2168.52
1/23/20	2	3957.10
1/24/20	2	7187.71

14. How do order patterns vary across weekdays and weekends?

```sql
SET Sql_safe_updates=0;

ALTER TABLE orders ADD COLUMN date_converted DATE;
UPDATE orders
SET date_converted = STR_TO_DATE(order_date, '%m/%d/%Y');



SELECT
DayName (STR_TO_DATE(order_date, "%m/%d/%y")) AS weekday,
MonthName (STR_TO_DATE(order_date, "%m/%d/%y")) AS month_,
COUNT(ord_id) AS total_orders
FROM orders
GROUP BY weekday, month_
ORDER BY weekday, month_;
```

Output:

weekday	month_	total_orders
Friday	April	2
Friday	August	2
Friday	December	3
Friday	February	4
Friday	January	5
Friday	July	3
Friday	June	2
Friday	March	3
Friday	May	2
Friday	November	3
Friday	October	5

SUPPLIER CONTRIBUTION

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15. How many suppliers are there in the database?

```
SELECT COUNT(*)
FROM Supplier;
```

Output:

COUNT(*)
5

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16. Which supplier provides the most products?

```sql
SELECT s.sup_id, s.sup_name,
COUNT(p.prod_id) AS product_count
FROM supplier s
INNER JOIN products p
ON s.sup_id= p.sup_id
GROUP BY s.sup_id
ORDER BY product_count DESC
LIMIT 1;
```

Output:

sup_id	sup_name	product_count
3	Aarya	18

17. What is the average price of products from each supplier?

```
SELECT
s.sup_id, s.sup_name, AVG(p.price)
FROM products p
INNER JOIN
supplier s
ON s.sup_id = p.sup_id
GROUP BY s.sup_id;
```

Output:

sup_id	sup_name	AVG(p.price)
1	Aarav Sharma	271.366667
2	Sai	342.672000
3	Aarya	319.326667
4	Suresh	281.818000
5	Karthik	288.225556

18. Which suppliers contribute the most to total product sales (by revenue)?

```sql
SELECT s.sup_id, s.sup_name,
SUM(od.total_price) AS total_revenue
FROM supplier s
INNER JOIN products p
ON s.sup_id = p.sup_id
INNER JOIN order_details od
ON p.prod_id= od.prod_id
GROUP BY s.sup_id
ORDER BY total_revenue DESC
LIMIT 1;
```

Output:

sup_id	sup_name	total_revenue
3	Aarya	221137.83

EMPLOYEE PERFORMANCE

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19. How many employees have processed orders?

```
SELECT COUNT(DISTINCT emp_id)
FROM orders;
```

Output:

COUNT(DISTINCT emp_id)
10

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20. Which employees have handled the most orders?

```sql
SELECT e.emp_id, e.emp_name ,
COUNT(o.ord_id) AS ordered_most
FROM orders o
INNER JOIN employees e
ON o.emp_id= e.emp_id
GROUP BY e.emp_id
ORDER BY ordered_most DESC
LIMIT 1;
```

Output:

emp_id	emp_name	ordered_most
8	Diya Sharma 1	38

21. What is the total sales value processed by each employee?

```
SELECT e.emp_id, e.emp_name,
COUNT(od.total_price) AS total_sales
FROM employees e
INNER JOIN orders o
ON e.emp_id = o.emp_id
INNER JOIN order_details od
ON o.ord_id= od.ord_id
GROUP BY e.emp_id
ORDER BY total_sales DESC;
```

Output:

emp_id	emp_name	total_sales
2	Aditya Singh 1	79
3	Pari Kumar 1	78
6	Zara Verma 1	76
8	Diya Sharma 1	68
9	Arjun Kumar 1	59
7	Vihaan Singh 1	53
1	Aarav Kumar 1	49
5	Pari Sharma 1	48
4	Aditya Verma 1	45
10	Arjun Verma 1	45

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22. What is the average order value handled per employee?

```sql
SELECT e.emp_id, e.emp_name,
SUM(od.total_price)/COUNT(DISTINCT o.ord_id) AS avg_value
FROM employees e
INNER JOIN orders o
ON e.emp_id= o.emp_id
INNER JOIN order_details od
ON o.ord_id= od.ord_id
GROUP BY e.emp_id
ORDER BY avg_value DESC;
```

Output:

emp_id	emp_name	avg_value
1	Aarav Kumar 1	2768.572632
6	Zara Verma 1	2650.472593
2	Aditya Singh 1	2330.949706
3	Pari Kumar 1	2227.279667
7	Vihaan Singh 1	2112.081739
9	Arjun Kumar 1	2077.627308
8	Diya Sharma 1	2037.631818
10	Arjun Verma 1	1835.842000
5	Pari Sharma 1	1833.373636
4	Aditya Verma 1	1554.750455

ORDER DETAILS DEEP DIVE

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23. What is the relationship between quantity ordered and total price?

```sql
SELECT quantity,
AVG(od.total_price) AS avg_total_price,
COUNT(*) AS order_count
FROM order_details od
GROUP BY quantity
ORDER BY quantity;
```

Output:

quantity	avg_total_price	order_count
1	319.274516	124
2	595.716667	117
3	898.266377	138
4	1338.607143	105
5	1530.401121	116

24. What is the average quantity ordered per product?

```
SELECT p.prod_id, p.prod_name,
COUNT(od.ord_id) AS total_orders,
AVG(od.quantity) AS avg_quantity_ordered
FROM products p
INNER JOIN order_details od
ON p.prod_id= od.prod_id
GROUP BY p.prod_id
ORDER BY avg_quantity_ordered;
```

Output:

prod_id	prod_name	total_orders	avg_quantity_ordered
5	Soybean Oil	11	1.6364
8	Yogurt	7	2.1429
24	Cardamom	8	2.2500
10	Mixed Vegetable Pickle	7	2.2857
30	Conditioner	10	2.3000
28	Toilet Cleaner	15	2.3333
4	Chickpeas	7	2.4286
15	Coffee Powder	14	2.4286
44	Soya Sauce	14	2.4286
50	Pasta	4	2.5000
2	Wheat Flour	15	2.5333

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25. How does the unit price vary across products and orders?

```sql
SELECT p.prod_id, p.prod_name,
od.each_price AS unit_price,
COUNT(od.ord_id) AS times_ordered
FROM products p
INNER JOIN order_details od
ON p.prod_id= od.prod_id
GROUP BY p.prod_id, od.each_price
ORDER BY p.prod_id, od.each_price;
```

Output:

prod_id	prod_name	unit_price	times_ordered
1	Basmati Rice	358.98	10
2	Wheat Flour	255.50	15
3	Moong Dal	386.18	15
4	Chickpeas	353.50	7
5	Soybean Oil	172.81	11
6	Ghee	487.46	8
7	Paneer	484.27	11
8	Yogurt	111.61	7
9	Mango Pickle	182.50	11
10	Mixed Vegetable Pickle	133.51	7
11	Almonds	315.57	9

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CONCLUSION

This project demonstrates how a relational database can efficiently manage and analyze grocery store operations. It provides structured data storage through linked tables for products, orders, suppliers, customers, and employees. SQL queries help uncover insights on sales, customer behavior, and supplier or employee performance. These insights support better decision-making, improving efficiency and overall store performance.

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CHALLENGES FACED BY ME

- Understanding table relationships and applying correct joins.
- Ensuring data consistency with foreign key constraints.
- Handling aggregation across joined tables.
- Extracting time-based trends from date data (especially if in VARCHAR format).

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THANK YOU FOR JOINING ME