

SUPERMARKET SALES DATA ANALYSIS

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Relational Data Model

Assumptions About Data Entities and Relationships

From the given supermarket sales dataset, the data has 1000 customers. Since the demographic information is not specified and the uniqueness of the customer cannot be obtained with customer type and gender, we are assuming that there are 1000 unique customers and 1000 unique orders.

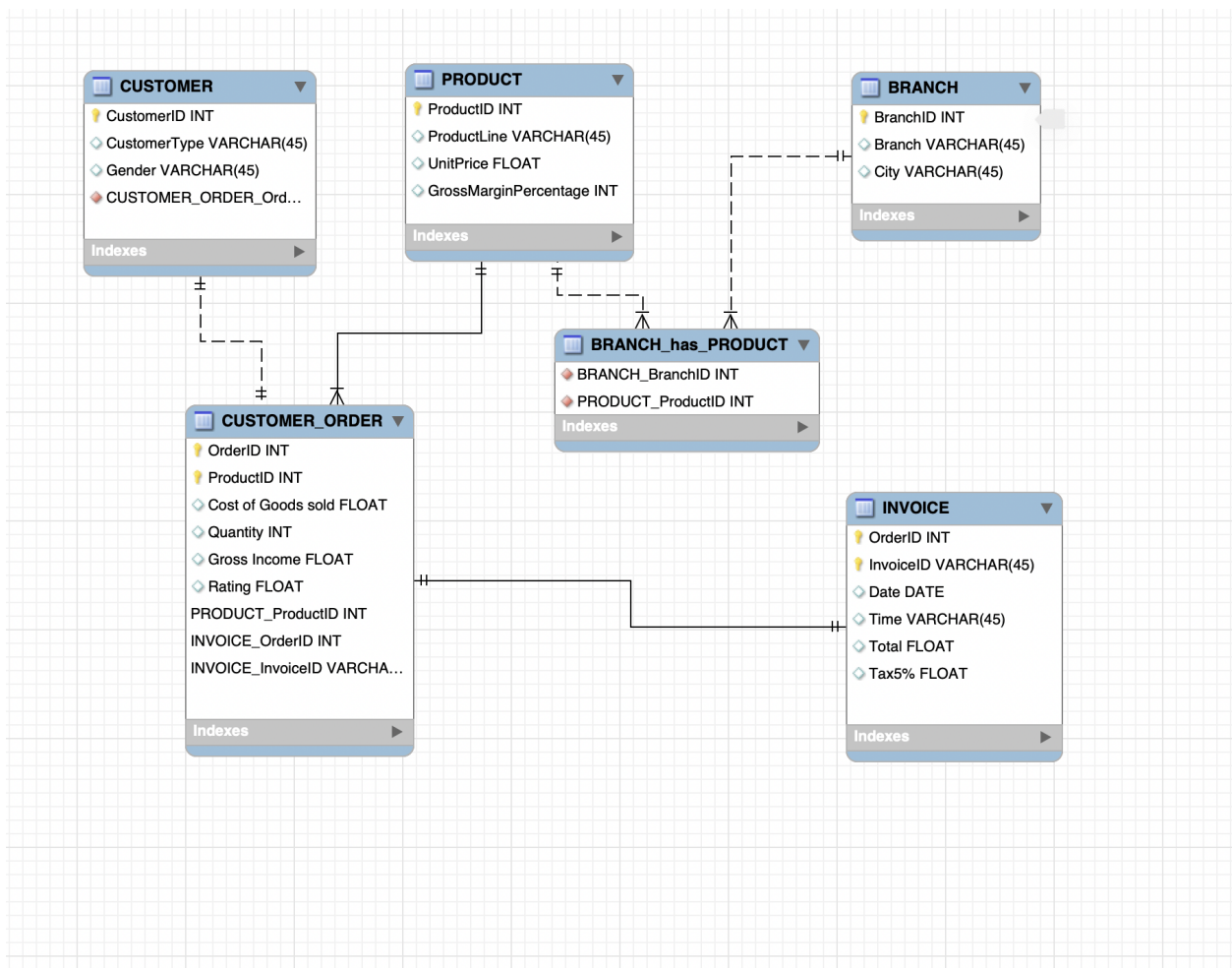
- Every customer has one and only one customer order. Each customer order is associated with one and only one customer. There is a 1-1 Non-Identifying Relationship(primary key of the customer is not a part of the primary key of a Customer order)
- Every customer order has one and only one product. Each product is present in many customer orders. There is a 1-M Identifying Relationship. (primary key of product is a part of the primary key of a customer order)
- Every product is available in many branches. Each branch is associated with many products. There is an M-M Non-Identifying Relationship. (primary key of the branch is not a part of the primary key of products)
- Every customer order has one and only one invoice. Each invoice is associated with one and only one customer order. There is 1-1 Identifying Relationship. (primary key of a customer order is a part of the primary key of invoice).

Data Model is in Third Normalized form(3 NF).

1. All the tables have primary keys with unique and non null values.
2. All the columns have unique clear names with atomic values.
3. All the non-key columns must be functionally dependent on the entire primary key.
 - a. **Customer Table:** All the non key values(Gender, Customer type) are functionally dependent on the customer-id which is the primary key.
 - b. **Customer order Table:** All the non key values (Tax, Cogs, Quantity, Gross Income, Rating) are functionally dependent only the composite primary (Order id, Product id) key
 - c. **Invoice Table:** All the non key values (Date, Time, Total, Payment type) are functionally dependent only on the composite primary (Invoice id, OrderID) key
 - d. **Branch Table:** All the non key values (Branch, City) are functionally dependent only the primary (Branch id) key
 - e. **Product Table:** All the non key values (Product line, unit price, Gross Margin) is functionally dependent only the primary (product id) key

4. There is no transitive dependency. No non-key is functionally dependent on another non-key column in all the tables. Furthermore, there are no calculated columns that are dependent on other nonkey columns.

Entity-Relationship Diagram



Physical MySQL Database

Assumptions

Dimensional Tables(Master Data)

Branch

From the data, we assumed that Customer orders are placed at different branches of the SuperMarket. So created Branch table to describe Branches.

BranchID - Unique Branch ID to identify different branches(*Autogenerated data for insertion of unique records*)

Branch - Branch code (*from the given data*)

City - City where the branch is located (*from the given data*)

Product

We have assumed that customers choose from the available products list based on the corresponding Product Line and its Unit Price and gross margin percentage obtained based on the products available at Supermarket.

Product ID - Unique ProductID to identify different products in Supermarket(*Autogenerated data for insertion of unique records*)

Product Line - Under which category of goods the product falls into(*from the given data*)

UnitPrice - The price of each unit of Product.This is actually stored in the database.It does not change frequently for each order but supermarkets could change at times if there are any circumstances to change that unit price. So, it comes under dimensional tables.(*from the given data*)

Gross Margin Percentage - For this data, gross margin percentage is unchanging for all orders.So, if any new product is introduced by the Supermarket, we could insert new data for Gross Margin Percentage(*from the given data*)

Customer

There is no CustomerID given in the data. We have assumed that for any order to be placed, we should map the order to each different customer and could assign the Total price for each unique customer based on the order he made

Customer ID - Unique CustomerID to identify different customers(*Auto-generated data for insertion of unique records*)

Customer Type - Whether the customer holds any membership with the Supermarket or a normal member. This could be used to determine any discounts or offers for members. *(From the given data)*

Gender - Gender of the Customer *(From the given data)*

Customer-Order

There is no OrderID in the given data, so we have assumed to include unique OrderID for each order made and for the corresponding invoice generated for that particular customer.

OrderID - Unique OrderID to identify different orders made by Customers in different branches of supermarket*(Auto generated data for insertion of unique records)*

ProductID - Unique ProductID pulled from Product table when customer selects a Product in his order*(from the auto generated data in Product table)*

Quantity - Quantity of each product purchased by Customer in any particular order*(from the given data)*

Cost of Goods Sold - Total cost of goods purchased*(from the given data)*

Gross Income - Income generated for the supermarket for each order made by any customer*(from the given data)*

Rating - Rating given by the customer on his satisfaction of that particular order and products in the order*(from the given data)*

Invoice

An Invoice is generated with each customer order which has a Unique InvoiceID. Ideally, an invoice can have multiple orders. However, based on the data given, as the Invoice is unique for all the records, we are assuming each invoice contains only one order.

Invoice ID - Unique Invoice ID to identify different Invoices*(from the given data)*

Order ID - Unique OrderID to identify different orders made by Customers in different branches of the supermarket*(from the auto-generated data in the customer order table)*

Date&Time - The Date & Time at which the order is placed*(from the given data)*

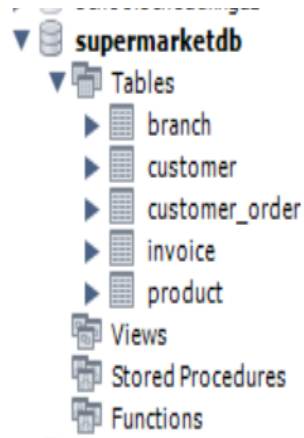
Total - Total bill generated and amount to be paid by the Customer including the tax on his purchase*(from the given data)*

Tax5% - Amount calculated for a total cost of goods purchased by taking constant 5% of the tax for all the goods*(from the given data)*

Payment type - Type of payment used by the customer to place the order(*from the given data*)

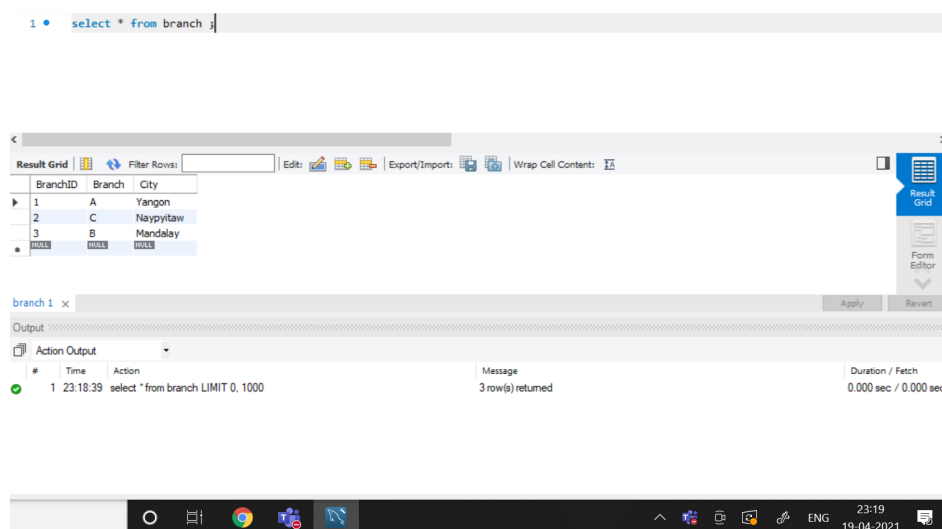
Physical Database Objects

After creating the Entity-Relationship diagram, use forward engineering to create the physical database



Data in the Database:

BRANCH Table



1 • `select * from branch ;`

Result Grid

BranchID	Branch	City
1	A	Yangon
2	C	Naypyitaw
3	B	Mandalay

branch 1 x

Output

#	Time	Action	Message	Duration / Fetch
1	23:18:39	select * from branch LIMIT 0, 1000	3 row(s) returned	0.000 sec / 0.000 sec

CUSTOMER Table

1 • `select * from CUSTOMER;`

CustomerID	CustomerType	Gender
300	Member	Female
301	Normal	Female
302	Normal	Male
303	Member	Male
304	Normal	Male
305	Normal	Male

CUSTOMER 2 x

Output

#	Time	Action	Message	Duration / Fetch
1	23:18:39	select * from branch LIMIT 0, 1000	3 row(s) returned	0.000 sec / 0.000 sec
2	23:20:04	select * from CUSTOMER LIMIT 0, 1000	1000 row(s) returned	0.000 sec / 0.000 sec

CUSTOMER ORDER Table

1 • `select * from `customer_order`;`

OrderID	ProductID	Cost of Goods sold	Quantity	Gross Income	Rating
1	100	522.83	7	26.1415	9.1
2	101	76.4	5	3.82	9.6
3	102	324.31	7	16.2155	7.4
4	103	465.76	8	23.288	8.4
5	104	604.17	7	30.2085	5.3
6	105	597.73	7	29.8865	4.1

customer_order 1 x

Output

#	Time	Action	Message	Duration / Fetch
1	16:36:54	select * from `customer_order` LIMIT 0, 1000	1000 row(s) returned	0.000 sec / 0.000 sec

PRODUCT Table

1 • `select * from PRODUCT;`

Result Grid

ProductID	ProductLine	UnitPrice	GrossMarginPercentage
100	Health and beauty	74.69	5
101	Electronic accessories	15.28	5
102	Home and lifestyle	46.33	5
103	Health and beauty	58.22	5
104	Sports and travel	86.31	5
105	Electronic accessories	85.39	5

PRODUCT 5 x

Output

Action Output

#	Time	Action	Message	Duration / Fetch
1	23:18:39	select * from branch LIMIT 0, 1000	3 row(s) returned	0.000 sec / 0.000 sec
2	23:20:04	select * from CUSTOMER LIMIT 0, 1000	1000 row(s) returned	0.000 sec / 0.000 sec
3	23:21:25	select * from CUSTOMER_ORDER LIMIT 0, 1000	1000 row(s) returned	0.000 sec / 0.000 sec
4	23:21:54	select * from INVOICE LIMIT 0, 1000	1000 row(s) returned	0.000 sec / 0.016 sec
5	23:23:13	select * from PRODUCT LIMIT 0, 1000	993 row(s) returned	0.000 sec / 0.016 sec

23:23
19-04-2021

INVOICE Table

Limit to 1000 rows

1 • `SELECT * FROM supermarketdb.invoice;`

Result Grid

OrderID	InvoiceID	Date	Time	Total	Tax5%	PaymentType
1	750-67-8428	2019-01-05	13:08	26.1415	548.971	Ewallet
2	226-31-3081	2019-03-08	10:29	3.82	80.22	Cash
3	631-41-3108	2019-03-03	13:23	16.2155	340.526	Credit card
4	123-19-1176	2019-01-27	20:33	23.288	489.048	Ewallet
5	373-73-7910	2019-02-08	10:37	30.2085	634.378	Ewallet
6	699-14-3026	2019-03-25	18:30	29.8865	627.617	Ewallet
7	355-53-5943	2019-02-25	14:36	20.652	433.692	Ewallet

Invoice 1 x

Output

Action Output

#	Time	Action	Message	Duration / Fetch
1	18:59:30	SELECT * FROM supermarketdb.invoice LIMIT 0, 1000	1000 row(s) returned	0.000 sec / 0.000 sec

19:00
08-05-2021

DATA IN THE DATABASE

Table Name	Primary Key	Foreign Key	# of rows in the table
Branch	Branch ID	Product ID	3
Product	ProductID	Branch ID	993
Customer	CustomerID	Order ID	1000
Invoice	InvoiceID	Order ID	1000
Customer Order	OrderID,ProductID	Invoice ID	1000

Reasons for revising data :

From Phase 1, We have just made a small correction which includes an identifying relationship between order id and invoice table.

SQL QUERIES

Question 1:

Some retailers believe that there is more money to be made in selling fashion accessories to men than sports and travel to women. Is this true?

Translate:

Select Product Line, Gender, the sum of Cost of Goods Sold as Total cost of Goods Sold, the sum of Gross Income as Money Made \$ from the Product table joined with the Customer Order table on ProductID in the Product table matching ProductID in Customer Order table joined with Customer table on OrderID in the Customer Order table matching CustomerID in the customer table where gender of the customer equal female and Product Line equal 'Sports and Travel' or Customer Gender of customer equal Male and Product Line equal Fashion Accessories grouped by Product Line and Gender.

Cleanup:

Select Product.Product Line, Customer.Gender, sum(Cost of Goods Sold) as Total cost of Goods Sold, sum(Gross Income) as Money Made \$ from Product join Customer Order on Product.Product ID = Customer Order.Product ID join Customer on Customer Order.Order ID=Customer.Customer ID where (customer.gender= 'Female' and Product Line='Sports and Travel') or (Customer.gender ='Male' and Product Line='Fashion Accessories') group by Product.Product Line and Customer.Gender

Screenshot of SQL Query and Results

The screenshot displays a SQL query editor and its results. The query is as follows:

```
1 # QUESTION 1
2 # Some retailers believe that there is more money to be made in selling
3 # fashion accessories to men than sports and travel to women.Is this true?
4 select p.ProductLine, c.Gender , sum('Cost of Goods sold') as 'Total cost of goods sold',sum('Gross Income') as 'Money made ($)'
5 from product p
6 join customer_order co on p.ProductID = co.ProductID
7 join customer c on (c.CustomerID = (co.OrderID ))
8 where (c.Gender = 'Female' and p.ProductLine = 'Sports and travel')
9 or (c.Gender = 'Male' and p.ProductLine = 'Fashion accessories')
10 group by p.ProductLine, c.Gender ;
11
```

The results are shown in a table with the following data:

ProductLine	Gender	Total cost of goods sold	Money made (\$)
Sports and travel	Female	27214.020027160645	1360.7010015845299
Fashion accessories	Male	22731.89996623993	1136.5950004458427

The bottom of the screenshot shows the 'Action Output' section with the following message:

```
1 18:06:35 select p.ProductLine, c.Gender , sum('Cost of Goods sold') as 'Total cost of goo... 2 row(s) returned
```

The duration of the query execution is 0.015 sec / 0.000 sec.

Notes/Comments:

Retailers' belief is **wrong**. There is more gross income generated by selling 'Sports and Travel' related products to Female customers which is \$1360.70 than selling Fashion accessories to male customers which is \$1136.59. Also the conclusion can be further supported by verifying Total cost of goods sold for both female and male customers who purchased 'Sports and Travel' and 'fashion accessories' respectively. Number of rows returned=2

Question 2: Some retailers believe that revenue in food and beverages can be increased amongst women by focusing on E-wallets, while others believe EWallets are more popular with men buying electronic accessories. Who is right?

Translate:

Select Product Line, Customer Gender, the count of Payment Type as 'People using E wallet', the sum of Gross Income as Revenue, from Customer_order table joined with the Product table on Product ID in the Customer Order table matching Product ID in Product table joined with Invoice table on OrderID in the Customer Order table matching Order ID in the invoice table joined with Customer table on Order ID in Customer Order table matching with Customer ID in Customer table where Customer gender equal Female, Product Line equal 'Food and Beverages' and union the result with the result of Customer gender equal Male, Product Line equal 'Electronic Accessories' and Payment Type equal EWallet grouped by Payment type and Product Line

Cleanup:

Select Product.ProductLine, Customer.Gender, count(Invoice.PaymentType) sum(Customer Order.Gross Income) as Revenue, as 'People using E wallet' from Customer_order join Product on Customer Order.Product ID=Product.Product ID join Invoice on Customer Order.OrderID=Invoice.Order ID join Customer on Customer Order.Order ID=Customer.Customer ID where (Customer.Gender= 'Female' and Product.Product Line='Food and Beverages') union (Customer.Gender='Male' with Product.Product Line='Electronic Accessories') group by Invoice.PaymentType and Product.Product Line.

Screenshot of SQL Query and Results

```

4 • select p.ProductLine,c.Gender,i.PaymentType,sum(co.`Gross Income`) as Revenue,count(i.PaymentType)
5 as 'People using E wallet' from customer_order co join product p on p.ProductID = co.ProductID
6 join invoice i on i.OrderID = co.OrderID join customer c on c.CustomerID = co.OrderID where
7 c.Gender='Female' and p.ProductLine='food and beverages'
8 group by p.ProductLine, i.PaymentType
9 Union select p.ProductLine,c.Gender,i.PaymentType,sum(co.`Gross Income`) as Revenue,
10 count(i.PaymentType) as 'People using E wallet' from customer_order co join product p on p.ProductID = co.ProductID
11 join invoice i on i.OrderID = co.OrderID
12 join customer c on c.CustomerID = co.OrderID where
13 c.Gender='Male' and p.ProductLine='Electronic accessories'group by p.ProductLine,i.PaymentType;

```

ProductLine	Gender	PaymentType	Revenue	People using E wallet
Food and beverages	Female	Credit card	524.2734980583191	31
Food and beverages	Female	Cash	610.7679948806763	33
Food and beverages	Female	Ewallet	444.52599716186523	26
Electronic accessories	Male	Ewallet	541.173500418663	33
Electronic accessories	Male	Cash	453.1079971790314	33
Electronic accessories	Male	Credit card	302.64750015735626	20

Result 22 x Read Only

Output

Action Output

#	Time	Action	Message	Duration / Fetch
26	21:48:14	select p.ProductLine,c.Gender,i.PaymentType,sum(co.`Gross Income`) as Rev...	6 row(s) returned	0.016 sec / 0.000 sec

Notes/Comments:

Retailers who believe “e-wallets are more popular with men buying electronic accessories” are **right**. Total number of payments by male customers in purchasing electronic accessories which was a total of 33 payments that were made and generated a revenue of \$ 541.17 is higher compared to the total number of payments by male customers using the other mode of payments. The total number of payments by female customers in purchasing products related to Food and beverages which were only 26 with a generated revenue of \$ 444.52 which is lesser compared to the other modes of payments. Number of rows returned=2.

Question 3: Some retailers believe payment method is a bigger indicator of health and beauty purchases while other retailers believe gender is a bigger factor. Who is right?

Translate:

Select concatenation of “Purchase made in”, “ , Product Line,” “,using”, “ , and Payment Type as Description,the count of payment type as Number of Payments, the sum of total as ‘Amount spent by customer’ from customer_order table joined with Product table on Product ID in Customer Order table matching Product ID in Product table joined with Invoice table on Order ID in Customer Order table matching Order ID in Invoice table joined with Customer table on Order ID in Customer Order table

matching Customer ID in Customer table where Product Line is Health and Beauty grouped by Payment Type Union Select concatenation of "Purchase made in," " , Product Line," " , "using," " , and Payment Type as Description, the count of payment type as Number of Payments, the sum of total as 'Amount spent by customer' from customer_order table joined with Product table on Product ID in Customer Order table matching Product ID in Product table joined with Invoice table on Order ID in Customer Order table matching Order ID in Invoice table joined with Customer table on Order ID in Customer Order table matching Customer ID in Customer table where Product Line is Health and Beauty grouped by Payment Type

Cleanup:

Select Customer.Customer Type, avg(Cost of Goods Sold) as Average amount made, avg(Total) as Average amount spent from Customer_Order join Invoice on Customer Order.Order ID = Invoice.Order ID join Customer on Customer.Customer ID=Customer Order.Order ID group by Customer.Customer Type

Screenshot of SQL Query and Results

The screenshot displays a SQL query in the Query Editor and its results in the Results Grid. The query is a UNION SELECT statement designed to analyze payment methods for health and beauty products. It concatenates 'Purchase made in', the product line, 'using', and the payment type into a single description. The first part of the query counts the number of payments and sums the total amount spent by customer for each payment type. The second part of the query repeats the same logic but grouped by customer gender.

SQL Query:

```

1 # Question 3
2 ##Some retailers believe payment method is a bigger indicator of health and beauty purchases while other
3 ##retailers believe gender is a bigger factor. Who is right?
4 select CONCAT('Purchase made in', ' ', p.ProductLine, ' ', 'using', ' ', i.PaymentType) as Description,
5 count(i.PaymentType) as Count, sum(i.Total) as 'Amount spent by customer' from customer_order co
6 join product p on p.ProductID = co.ProductID join invoice i on i.OrderID = co.OrderID join customer c
7 on c.CustomerID = (co.OrderID) where p.ProductLine in ('health and beauty') group by i.PaymentType
8 UNION select CONCAT('Purchase made in', ' ', p.ProductLine, ' ', 'using', ' ', c.Gender) as Description,
9 count(i.PaymentType) as Count, sum(i.Total) from customer_order co
10 join product p on p.ProductID = co.ProductID join invoice i on i.OrderID = co.OrderID
11 join customer c on c.CustomerID = (co.OrderID) where p.ProductLine in ('health and beauty') group by c.Gender;

```

Results Grid:

Description	Count	Amount spent by customer
Purchases made in Health and beauty using Ewallet	53	16035.159017562866
Purchases made in Health and beauty using Credit card	50	15969.47092628479
Purchases made in Health and beauty using Cash	49	17189.108976364136
Purchases made in Health and beauty using Female	64	18560.986345291138
Purchases made in Health and beauty using Male	88	30632.752574920654

The Results Grid shows 5 rows of data. The first three rows represent different payment methods (Ewallet, Credit card, Cash) and the last two rows represent different customer genders (Female, Male). The 'Count' column shows the number of payments for each category, and the 'Amount spent by customer' column shows the total amount spent.

Notes/Comments:

Retailers who believe **Gender is a bigger factor are right**. Total number of payments and Amount spent by customers using different payments methods is not much impacted by the Payment type as Count is 53,50,49 and Amount spent is

\$16035.16,\$15969.47,\$17189.10 for Payment types Ewallet, Credit Card and Cash respectively. However, on the other hand, there is a significant impact of gender on Number of payments made and amount spent by Customers where purchases made by male customers are almost 70% more than purchases made by female customers. Number of rows returned=2.

Question 4:

Some retailers believe that their members are spending more per purchase while members believe they are spending less per purchase. Who is right?

Translate:

Select Customer Type, the average Cost of Goods Sold as Average amount made, the average of Gross Income as average amount made \$ from Customer order table joined with the Invoice table on Order ID in the Customer Order table matching Order ID in Invoice table joined with Customer table on OrderID in the Customer Order table matching CustomerID in the customer table grouped by Customer Type

Cleanup:

Select Customer.Customer Type, avg(Cost of Goods Sold) as Average amount made, avg(Total) as Average amount spent from Customer_Order join Invoice on Customer Order.Order ID = Invoice.Order ID join Customer on Customer.Customer ID=Customer Order.Order ID group by Customer.Customer Type

Screenshot of SQL Query and Results

The screenshot shows a SQL query editor with the following query:

```

1  # QUESTION 4
2  ## Some retailers believe that their members are spending more
3  ## per purchase while members believe they are spending less per purchase. Who is right?
4  • select c.CustomerType ,avg(co.`Cost of Goods sold`) as `Average amount made from selling goods`,
5  avg(i.Total) as `Average amount paid by the customer` from customer_order co
6  join invoice i on i.OrderID = co.OrderID
7  join customer c on c.CustomerID = (co.OrderID ) where
8  c.CustomerType in ('Member','Normal') group by c.CustomerType ;
9
10
11

```

The results are displayed in a grid:

CustomerType	Average amount made from selling goods	Average amount paid by the customer
Member	312.18219584809566	327.79130550772845
Normal	302.97414758066856	318.1228560044436

The bottom of the screenshot shows the output window with the message: "select c.CustomerType ,avg(co.`Cost of Goods sold`) as `Average amount mad... 2 row(s) returned" and a duration of 0.016 sec / 0.000 sec.

Notes/Comments:

Retailers' belief that members spend more per purchase(which is the average purchase of members for all the orders) is **right**. Members spend on average \$327.79 whereas Non-members spend an average \$302.97. This might be because members would have some discounts on purchasing in bulk which in turn is more purchase value for order but price per unit decreases on the member side. Number of rows returned=2

Question 5:

Some retailers believe that their male members are bringing in more overall revenue per purchase while others believe female non-members are bringing in more revenue per purchase of fashion accessories. Who is right?

Translate:

Select Product Line, Customer Gender, Customer Type, the average Gross Income as Revenue per purchase from Product table joined with the Customer_Order table on Product ID in the Product table matching Product ID in Customer Order table joined with Customer table on OrderID in the Customer Order table matching CustomerID in the customer table where Product Line is Fashion Accessories and Gender of Customer is Male and Customer Type is Member or Gender of Customer is Female and Customer Type is Normal grouped by Customer Gender and Customer Type

Cleanup:

Select Product.Product Line, Customer.Gender, Customer.Customer Type, avg(Gross Income) as Revenue per Purchase from Product join Customer Order on Customer Order.Product ID = Product.Product ID join Customer on Customer Order.Order ID=Customer.Customer ID where Product.Product Line='Fashion Accessories' and ((Customer.Gender='Male' and Customer.Customer Type='Member') or (Customer.Gender='Female' and Customer.Customer Type='Normal')) 'group by Customer.Gender, Customer.Customer Type

Screenshot of SQL Query and Results

```
1 # QUESTION 5
2 # Some retailers believe that their male members are bringing in more overall revenue per
3 # purchase while others believe female non-members are
4 # bringing in more revenue per purchase of fashion accessories. Who is right?
5 • select p.ProductLine, c.Gender, c.CustomerType, avg(co.'Gross Income') as 'Revenue per purchase' from product p
6 join customer_order co on p.ProductID = co.ProductID join customer c on (c.CustomerID = (co.OrderID))
7 where p.ProductLine = 'Fashion accessories' and
8 ((c.Gender = 'Male' and c.CustomerType = 'Member') or (c.Gender = 'Female' and c.CustomerType = 'Normal' ))
9 group by c.Gender, c.CustomerType ;
10
```

ProductLine	Gender	CustomerType	Revenue per purchase
Fashion accessories	Female	Normal	14.883132638979932
Fashion accessories	Male	Member	13.676807709229298

Result 14 x

Output

#	Time	Action	Message	Duration / Fetch
29	17:21:10	select CONCAT('Purchases made in:', ' ', p.ProductLine, ', using:', ' ', j.Payment...	5 row(s) returned	0.000 sec / 0.000 sec
30	17:31:59	select p.ProductLine, c.Gender, c.CustomerType, avg(co.'Gross Income') as '...	2 row(s) returned	0.015 sec / 0.000 sec

Notes/Comments:

Retailers who believe that female non-members are bringing in more revenue per purchase of fashion accessories are **right**. Female Non members who purchase fashion accessories bring a revenue per purchase of \$14.88 on average whereas Male Members bring in revenue per purchase of \$13.67 on average. Number of rows= 2

Data Review for MongoDB

Assumptions/Notes About Data Collections

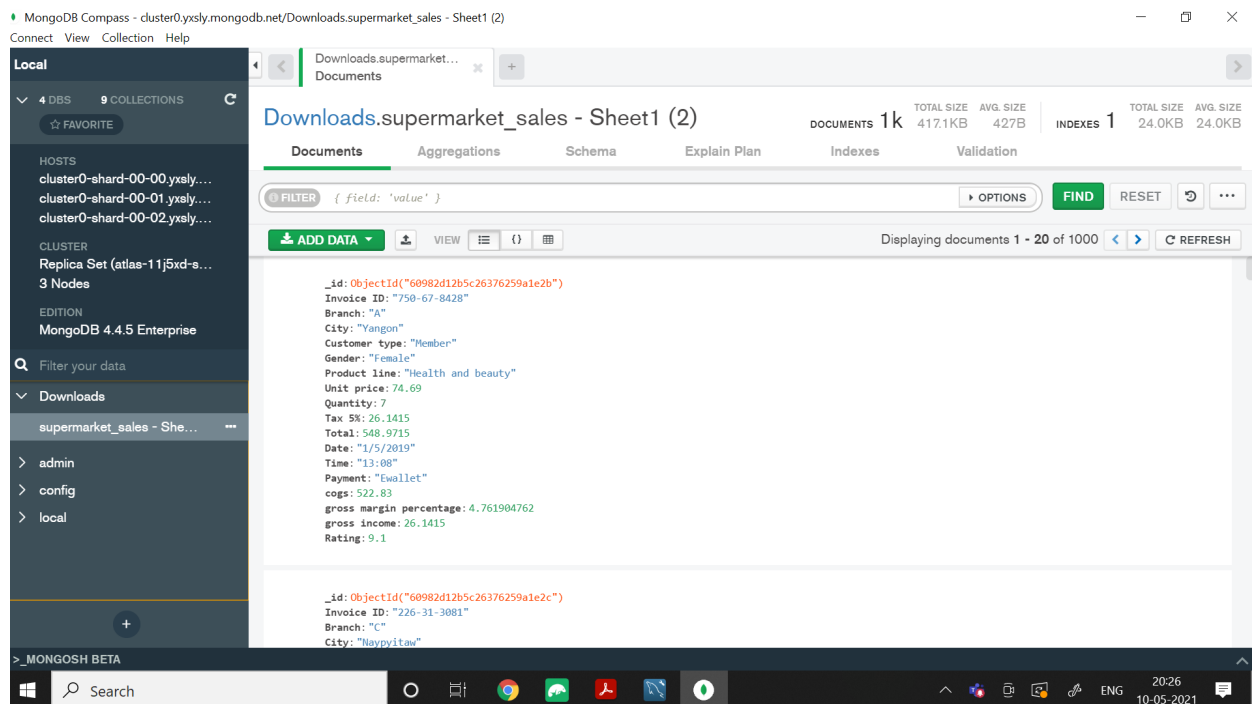
A dataset consisting of a supermarket sales of 1000 customers is given. Since the customer uniqueness cannot be obtained from customer type and gender and the demographic information is not specified, we are assuming that there are unique customers i.e 1000 unique orders and 1000 unique customers.

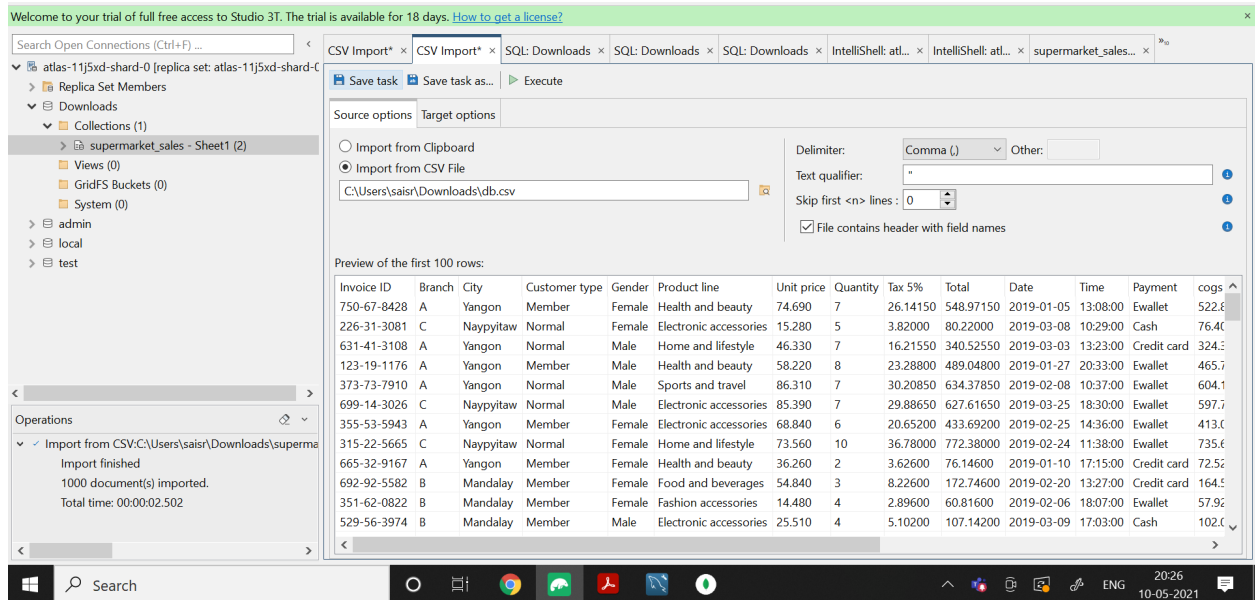
Attributes and Relationships in Collection

- Every customer has one and only one customer order. Each customer order is associated with one and only one customer.
- Every customer order has one and only one product. Each product is present in many customer orders.
- Every product is available in many branches. Each branch is associated with many products.
- Every customer order has one and only one invoice. Each invoice is associated with one and only one customer order.

Physical Data in Mongo Database :

We have downloaded the **raw dataset** into the Mongo Database and generated all our mongo queries using **Studio 3T**.





MONGO QUERIES

Question 1:

Some retailers believe that there is more money to be made in selling fashion accessories to men than sports and travel to women. Is this true?

Translate:

Using Supermarket_Sales collection, utilize aggregate framework to group documents by Gender and Product Line and get the sum of 'cost of goods sold' for each gender and each Product Line from purchases made by female customers in the "Sports and Travel" product line and purchases made by male customers in the "Fashion accessories" product line.

```

1 db = db.getSiblingDB("Downloads");
2 db.getCollection("supermarket_sales - Sheet1 (2)").aggregate(
3   [
4     { "$match" : {
5       "$or" : [
6         { "$and" : [ { "Gender" : { "$in" : ["Female"] } },
7           { "Product line" : { "$in" : ["Sports and travel"] } } ] },
8         { "$and" : [ { "Gender" : { "$in" : ["Male"] } },
9           { "Product line" : { "$in" : ["Fashion accessories"] } } ] } ] },
10    { "$group" : { "_id" : { "Gender" : "$Gender", "Product line" : "$Product line" },
11      "SUM(cogs)" : { "$sum" : "$cogs" } } },
12    { "$project" : { "Product line" : "$_id.Product line", "Gender" : "$_id.Gender",
13      "SUM(cogs)" : "$SUM(cogs)",
14      "_id" : NumberInt(0) } }, { "allowDiskUse" : true }
15  ]
16 );

```

Raw Shell Output: Aggregate Query (line 3)

Documents 1 to 2

Output > Product line

_id	Product line	Gender	SUM(cogs)
0	Sports and travel	Female	27214.02
0	Fashion accessories	Male	22731.9

1 document selected

Count Documents: 00:00:00.051

Screenshot of MongoDB Query and Results

Notes/Comments

Retailers' belief is **wrong**. Cost of goods sold for female customers purchasing in by 'Sports and Travel' Product Line \$27214.02 is more compared to Cost of goods sold for male customers purchasing in Fashion accessories Product Line \$22731.9. Number of documents =2

Question 3:

Some retailers believe payment method is a bigger indicator of health and beauty purchases while other retailers believe gender is a bigger factor. Who is right?

Translate:

Using Supermarket_Sales collection,utilize aggregate framework to group documents by Payment Type and Gender and get the sum of Total paid for each gender and each Payment Type in Product Line "Health and Beauty" and count the number of documents for each Payment Type

Screenshot of MongoDB Query and Results

```
1 // Requires official MongoShell 3.6+
2 db = db.getSiblingDB("Downloads");
3 db.getCollection("supermarket_sales - Sheet1 (2)").aggregate(
4   [ { "$match" : { "Product line" : { "$in" : [ "Health and beauty" ] } } }, {
5     "$group" : { "_id" : { "Gender" : "$Gender", "Payment" : "$Payment", "Product line" : "$Product line" },
6       "COUNT(Payment)" : { "$sum" : NumberInt(1) },
7       "SUM(Total)" : { "$sum" : "$Total" }
8     }, { "$project" : { "Product line" : "$_id.Product line",
9       "Gender" : "$_id.Gender", "Payment" : "$_id.Payment", "COUNT(Payment)" : "$COUNT(Payment)",
10      "SUM(Total)" : "$SUM(Total)", "_id" : NumberInt(0) } } ], {
11     "allowDiskUse" : true });
```

Raw Shell Output | Aggregate Query (line 3) x

50 Documents 1 to 6

Output > Product line

_id	Product line	Gender	Payment	COUNT(Payment)	SUM(Total)
	Health and beauty	Female	Ewallet	23	5975.6025
	Health and beauty	Female	Credit card	19	5600.637
	Health and beauty	Male	Cash	27	10204.362
	Health and beauty	Female	Cash	22	6984.747
	Health and beauty	Male	Credit card	31	10368.834

1 document selected | Count Documents | 00:00:00.049

Raw Shell Output

Aggregate Query (line 3) ×

←

→

50

Documents 1 to 6

Pin Result

Query Code

Output > Product line

_id	Product line	Gender	Payment	COUNT(Payment)	SUM(Total)
	Health and beauty	Female	Ewallet	23	5975.6025
	Health and beauty	Female	Credit card	19	5600.637
	Health and beauty	Male	Cash	27	10204.362
	Health and beauty	Female	Cash	22	6984.747
	Health and beauty	Male	Credit card	31	10368.834
	Health and beauty	Male	Ewallet	30	10059.5565

Notes/Comments:

Retailers who believe **Gender is a bigger factor are right**. Total number of payments and Amount spent by customers using different payments methods is not much impacted by the Payment type as Count is 53,50,49 and Amount spent is \$16035.16,\$15969.47,\$17189.10 for Payment types Ewallet, Credit Card and Cash respectively. However, on the other hand, there is a significant impact of gender on Number of payments made and amount spent by Customers where purchases made by male customers are almost 70% more than purchases made by female customers. Number of documents=6

Question 5:

Some retailers believe that their male members are bringing in more overall revenue per purchase while others believe female non-members are bringing in more revenue per purchase of fashion accessories. Who is right?

Translate:

Using Supermarket_Sales collection,utilize aggregate framework to group documents by Gender and Customer Type and get the average of 'Gross Income' for each gender and each Customer Type from purchases made in "Fashion accessories" product line and by male members and female non-members(normal customer type)

Screenshot of MongoDB Query and Results

The screenshot displays the MongoDB Shell interface. The top pane shows an aggregate query that filters for 'Fashion accessories' and groups data by 'Gender' and 'Customer type'. The bottom pane shows the results in table view, with columns for '_id', 'Product line', 'Gender', 'SUM(gross income)', 'COUNT(Gender)', and 'Customer type'.

```
1 // Requires official MongoDB 3.6+
2 db = db.getSiblingDB("Downloads");
3 db.getCollection("supermarket_sales - Sheet1 (2)").aggregate(
4   [ { "$match" : { "$or" : [ { "$and" : [ { "Gender" : { "$in" : ["Male"] } } ],
5     { "Customer type" : { "$in" : [ "Member" ] } } ] } }, {
6     "$in" : ["Fashion accessories"] } } ], {
7     "$and" : [ { "Gender" : { "$in" : ["Female"] } }, {
8       "Customer type" : { "$in" : [ "Normal" ] } } ] }, {
9     { "Product line" : { "$in" : ["Fashion accessories" ] } } ] } } ], {
10    "$group" : { "_id" : { "Gender" : "$Gender", "Customer type" : "$Customer type",
11      "Product line" : "$Product line" }, "SUM(gross income)" : { "$sum" : "$gross income"
12    }, "COUNT(Gender)" : { "$sum" : NumberInt(1) } } }, { "$project" : { "Product line" : "$_id.Product line", "Gender" : "$_id.Gender",
13    "COUNT(Gender)" : "$COUNT(Gender)", "Customer type" : "$_id.Customer type", "_id" : NumberInt(0) } } ],
14   [ { "allowDiskUse" : true } ] );
15
```

_id	Product line	Gender	SUM(gross income)	COUNT(Gender)	Customer type
	Fashion accessori...	Male	533.3955	39	Member
	Fashion accessori...	Female	729.2735	49	Normal

1 document selected | Count Documents | 00:00:00.046

Notes/Comments:

Retailers who believe that female non-members are bringing in more revenue per purchase of fashion accessories are **right**. Female Non members who purchase fashion accessories bring a revenue of \$729.27 for 49 purchases which is \$14.88 on average whereas Male Members bring in revenue of \$533.39 for 39 purchases per purchase of \$13.67 on average. Number of documents=2