Group Project – Retail Store Visualization (Group: ITMG2A- Group 6)

Contents

Group Project – Retail Store Visualization (Group: ITMG2A - Group 6) 1
Members: 1
Responsibility Log 1
Actions Taken Since Last Feedback: 2
Design a Data Model and ERD for a Retail Store 3
Business Logic Assumptions: 3
Database Definitions: 3
Database and Data-Entry Table Definitions, Field attributes and Constraints 3
Database Table Relationships: 4
Table Relationships and Cardinality 4
Database Table Referential Integrity Control: 5
Analysis Data Model 6
Diagram of Analytic data Model showing merge and calculated Fields. 6
Visualizations 7

Members:

Name	Student ID
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Responsibility Log

Task ID	Task Description	Assigned To
1	Revise ERD	Kun
2	Fix table and relation designs in Access	Pingping
3	Fix Excel data file for Customers, Products, and Categories	Michael
4	Add sample Customers, Products, and Categories data in Excel	Fern
5	Re-Import dimension data samples into Access	Katie
6	Populate Orders, Order_Details, and Sales tables with sample data	Pingping
7	Fix Power Query sources and transform for importing Access data	Kun
8	Create Merged Views in Power Query	Fern
9	Cerate Calculated columns in Power Query.	Katie
10	Create Pivot Data from the Excel data model	Michael
11	Create Dashboards	Kun
12	Create and Configure Slicers and Timelines	Pinging
13	Test and Report Narrations	Fern

14	Test and Report Diagrams	Katie
15	Test and Report Proof-Check	Michael

Actions Taken Since Last Feedback:

Aspects	Action Types	Actions Done
Data Entry Excel File	Fix	Corrected attribute names to sync with database fields.
	New	Added data samples for Customer, Product and Category.
Database Access File	Fix	Detailed attributes and constraints on report.
	New	Added data samples for Orders and Order_details.
Data Model Excel File	Fix	Rebuilt data-linkage and data models by using Power-Query
	New	Built merged fields in data model. Built calculated fields in data model. Built Analytic Pivots, one for each visual Built Visual Dashboard Built Slicers and Timelines

Design a Data Model and ERD for a Retail Store

Business Logic Assumptions:

1. Once product information is entered, the price is fixed.
2. Anytime an order is created, it is not necessary to assign a sale. Generally, a sale should only happen when a customer wants to pay (later than the order creation).
3. Any order will be included in only one sale, and splitting invoices is not possible.

Database Design:

Please note that there was no adjustment to database design as we have all the required fields for final visualization purposes.

Database Definitions:

Database and Data-Entry Table Definitions, Field attributes and Constraints

Table: Customer

Field ID	Field Desc	Mandatory	Data Type in Data-Entry Excel	Data Type in Access
CustID	Primary key of the table, Unique identifier for each customer	Yes	Number, Integer	AutoNumber
CustFName	First name of the customer	Yes	General (Text)	Short Text (255)
CustLName	Last name of the customer	No	General (Text)	Short Text (255)
CustEmail	Email address of the customer	No	General (Text)	Short Text (255)
CustPhone	Phone number of the customer	No	Number, Integer	Short Text (20)
Address	Street address of the customer	Yes	General (Text)	Short Text (255)
City	City where the customer is located	Yes	General (Text)	Short Text (255)
Province	Province or state where the customer is located	Yes	General (Text)	Short Text (255)
Postal	Postal or zip code of the customer's address	Yes	General (Text)	Short Text (255)
Country	Country where the customer is located	Yes	General (Text)	Short Text (255)
DOB	Date of birth of the customer	No	Date Time	Date/Time
Gender	Gender of the customer	No	General (Text)	Short Text (255)
CustSince	Date when the customer became a customer of the retail store	Yes	Date Time	Date/Time

Table: Categories

Field ID	Field Desc	Mandatory	Data Type in Data-Entry Excel	Data Type in Access
CatID	Primary key of the table, Unique identifier for each category	Yes	Number, Integer	AutoNumber
CatName	Catergory Name	Yes	General (Text)	Short Text (255)
CatDesc	Catergory Description	No	General (Text)	Short Text (255)
CatImgURL	Catergory Image URL	No	General (Text)	Short Text (255)

Table: Products

Field ID	Field Desc	Mandatory	Data Type in Data-Entry Excel	Data Type in Access
ProdID	Primary key of the table, Unique identifier for each Product	Yes	Number, Integer	AutoNumber
ProdName	Name of the product	Yes	General (Text)	Short Text (255)
ProdDesc	Description of the product	No	General (Text)	Short Text (255)
ProdPrice	Price of the product	Yes	Number	Currency
ProdStkAmt	Quantity of the product in stock	Yes	Number	Decimal (18)
CatID	Foreign key referencing the categories table	Yes	Number, Integer	Decimal (18)
Cost	Cost of producing or purchasing the product	Yes	Number	Currency
Supplier	Name of the supplier that provides the product	Yes	General (Text)	Short Text (255)
ProdImgURL	URL of an image representing the products	No	General (Text)	Short Text (255)

Table: Orders

Field ID	Field Desc	Mandatory	Data Type in Data-Entry Excel	Data Type in Access
OrdID	Primary key of the table, Unique identifier for each order	Yes	Number, Integer	AutoNumber
DateNTime	Date and time of the order	Yes	Date Time	Date/Time
Total	Total price of the order	Yes	Number	Currency
CustID	Foreign key that references the Customer table to associate the c	Yes	Number, Integer	Long Integer
SaleID	Foreign key that references the Sales table to associate the order	No	Number, Integer	Long Integer

Table: Order_Details

Field ID	Field Desc	Mandatory	Data Type in Data-Entry Excel	Data Type in Access
OrderDTID	Primary key of the table, Unique identifier for each order detail r	Yes	Number, Integer	AutoNumber
OrdID	Foreign key referencing the order table	Yes	Number, Integer	Long Integer
ProdID	Foreign key referencing the product table	Yes	Number, Integer	Long Integer
ProdAmt	Quantity of the product ordered for that particular order detail re	Yes	Number	Decimal (18)

Table: Sales

Field ID	Field Desc	Mandatory	Data Type in Data-Entry Excel	Data Type in Access
SaleID	Unique identifier for each sale	Yes	Number, Integer	AutoNumber
TransDate	Date and time when the sale was made	Yes	Date Time	Date/Time
Total	Total amount of the sale in the currency used in the system	Yes	Number	Currency
OrdStat	Status of the order (e.g. Pending, Shipped, Delivered)	Yes	General (Text)	Short Text
PmtMethod	Method used to pay for the order (e.g. Credit Card, PayPal)	No	General (Text)	Short Text
ShpMethod	Method used to ship the order (e.g. Standard, Express)	No	General (Text)	Short Text
ShpCarrier	Carrier used to ship the order (e.g. FedEx, DHL)	No	General (Text)	Short Text
TrackNo	Tracking number of the shipment for the order	No	General (Text)	Short Text
DeliveryDate	Estimated date of delivery for the order	No	Date Time	Date/Time
ShpAddress	Shipping address for the order	No	General (Text)	Short Text
ShpPostal	Postal code of the shipping address	No	General (Text)	Short Text
ShpCity	City of the shipping address	No	General (Text)	Short Text
ShpProvince	Province or state of the shipping address	No	General (Text)	Short Text
ShpCountry	Country of the shipping address	No	General (Text)	Short Text
BillAddress	Billing address for the order	No	General (Text)	Short Text
BillPostal	Postal code of the billing address	No	General (Text)	Short Text
BillCity	City of the billing address	No	General (Text)	Short Text
BillProvince	Province or state of the billing address	No	General (Text)	Short Text
BillCountry	Country of the billing address	No	General (Text)	Short Text

Database Table Relationships:

Storage and database-management system: Microsoft Access

Diagram

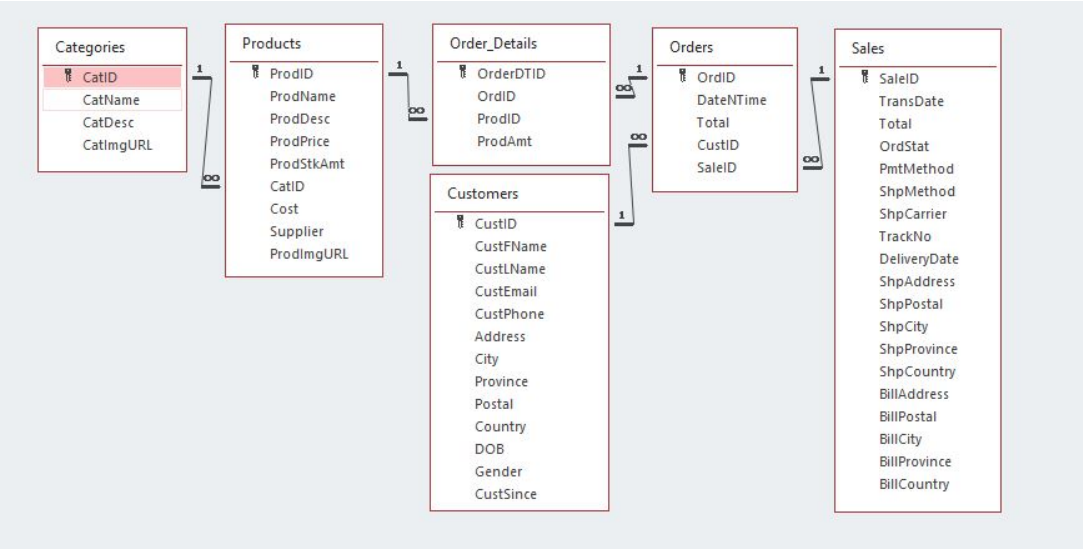


Table Relationships and Cardinality

Table/Key	Ref Table/Key	Cardinality	Purpose
Order.OrdID	Order_Details.OrdID	One-to-Many	Header-Detail
Products.ProdID	Order_Details.ProdID	One-to-Many	Dimension-Fact
Categories.CatID	Products.CatID	One-to-Many	Hierarchy-Dimension
Customers.CustID	Orders.CustID	One-to-Many	Dimension-Fact
Order.SaleID	Sales.SaleID	One-to-Many	Business Logic

Database Table Referential Integrity Control:

System: Microsoft Access

Except for the relation Sales.SalesID – Orders.SalesID, all referral relations are set with the below configuration, with the “Left Inner Join” controlling approach.

For the relation Sales.SalesID – Orders.SalesID, this is operation flow relation and there are stages during which there are no corresponding Sales table records for some Orders records. Therefore, “Left Outer Join” controlling approach is used.

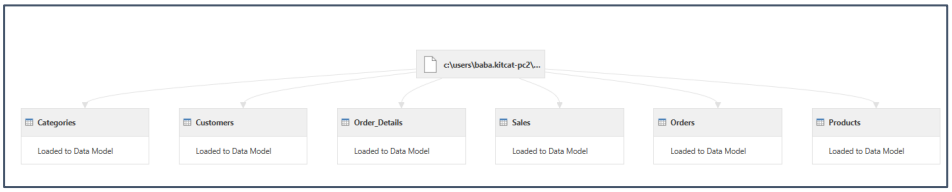
Analysis Data Model

Analytic System: Microsoft Excel, Power-Query and Power-Pivot

Data Source: Microsoft Access

It used two steps to establish the data-linkage from data source:

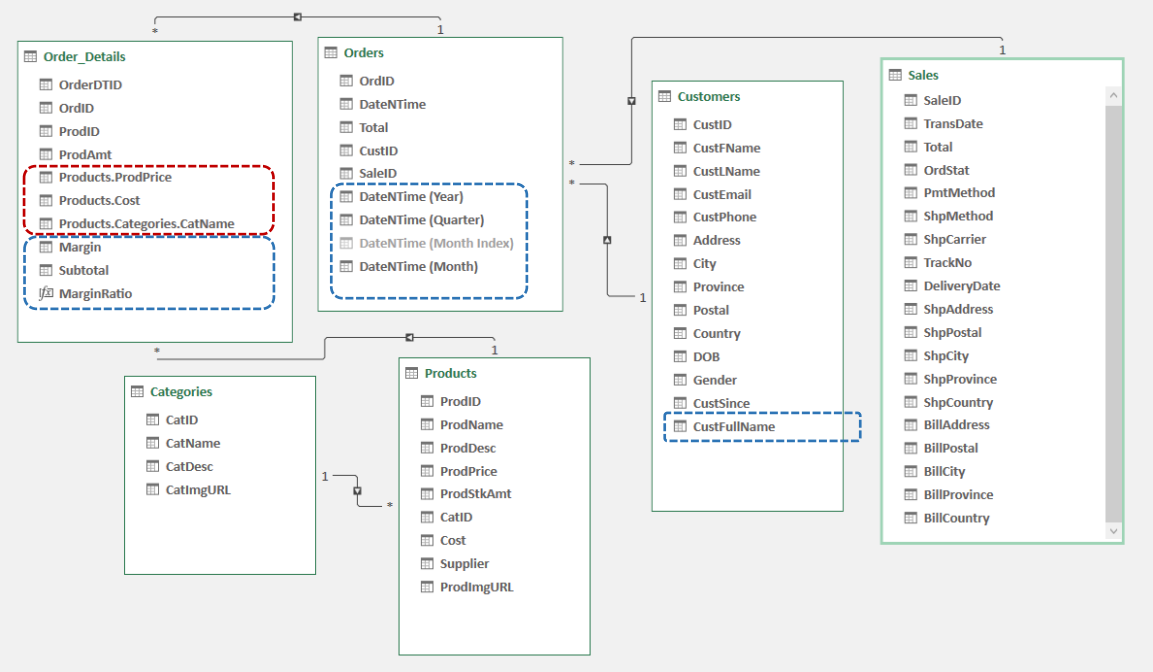
1. **Transform**: To establish data source, basic data model table structures, and attain sample data, used Power-Query to locate and populate tables in Access database into excels data model tables.



2. **Merge**: To merge columns from reference table into the main table, results to a single-table view for later used to build Pivot-Table, Analytic Charts, Slicers and Timeline filters with 2-directional effectiveness.

3. **Calculated Fields:** Add calculated fields aggregations and data hierarchy during analysis.

Diagram of Analytic data Model showing merge and calculated Fields.



Red: Power-Query Merging
Blue: Calculated Fields
*(**MarginRatio is Measure ****DateNTime -Year/Quarter/Month were auto-generated)*

Visualizations

The following Pivot tables were created for the corresponding purpose of analysis.

Pivot Name	User Model Tables	Analysis Objective
PMarginBySale_Pivot	Order Order_Details Sales	Analyze the sales margin of or each Sales.
AvgRevByOrd_Pivot	Order Order_Details	Analyze the averaged revenue amounts over periods of time.
TotalRevByCat_Pivot	Categories Order Order_Details	Analyze the sales amounts across different products or categories.
TotalSaleByCat_Pivot	Categories Order Order_Details	Analyze the profit amounts across different products or categories.
MapData_Pivot	Order Details Customers Provinces	Analyze the profit amounts across the customers and their attributes e.g., provinces
TreeData_Pivot	Revenues by Customers Name	Analyze the revenue amounts across the customers and their attributes e.g., full name

The following visuals were created to visualize the analytic results of the pivots. All visuals are placed in the “Dashboard” sheet. with the following slicers and timelines were made.

- Slicers on Categories (CatName of Categories)
- Timeline on Order (DateNTime of Orders)

Visual Name	Type	Base on Pivot	Slicer Effective (On Pivot)	Timeline Effective (On Pivot)
Total Sales by Category	Column Chart	TotalSaleByCat_Pivot	Yes	-
Sales Trend	Line Chart	AvgRevByOrd_Pivot	-	Yes
Sales Distribution by Province	Map	Copied data from MapData_Pivot [E3:F10]	-	-
Total Revenue by Customer	Treemap	Copied data from TreeData_Pivot [E13:F39]	-	-