Data Warehouse Project

Supermarket project

Introduction my Self

- Name: Youssef Azam Mahfouz Mohamed
- Education:
- Studying at the Faculty of Computers and Artificial Intelligence, Beni Suef University
- Specializing in Data Engineering
- Project:
- Title: Building a Data Warehouse for a Supermarket
- Objective: To design and implement a comprehensive data warehouse that supports supermarket operations and provides actionable business insights.

Agenda

- Introduction
- Project Goals
- Entity-Relationship Diagram (ERD)
- Schema
- Database Creation in MSSQL
- Gathering Business Information
- Data Modeling
- Data Warehouse
- ETL Process in SSIS
- Reporting in Power BI
- Project Timeline
- Conclusion

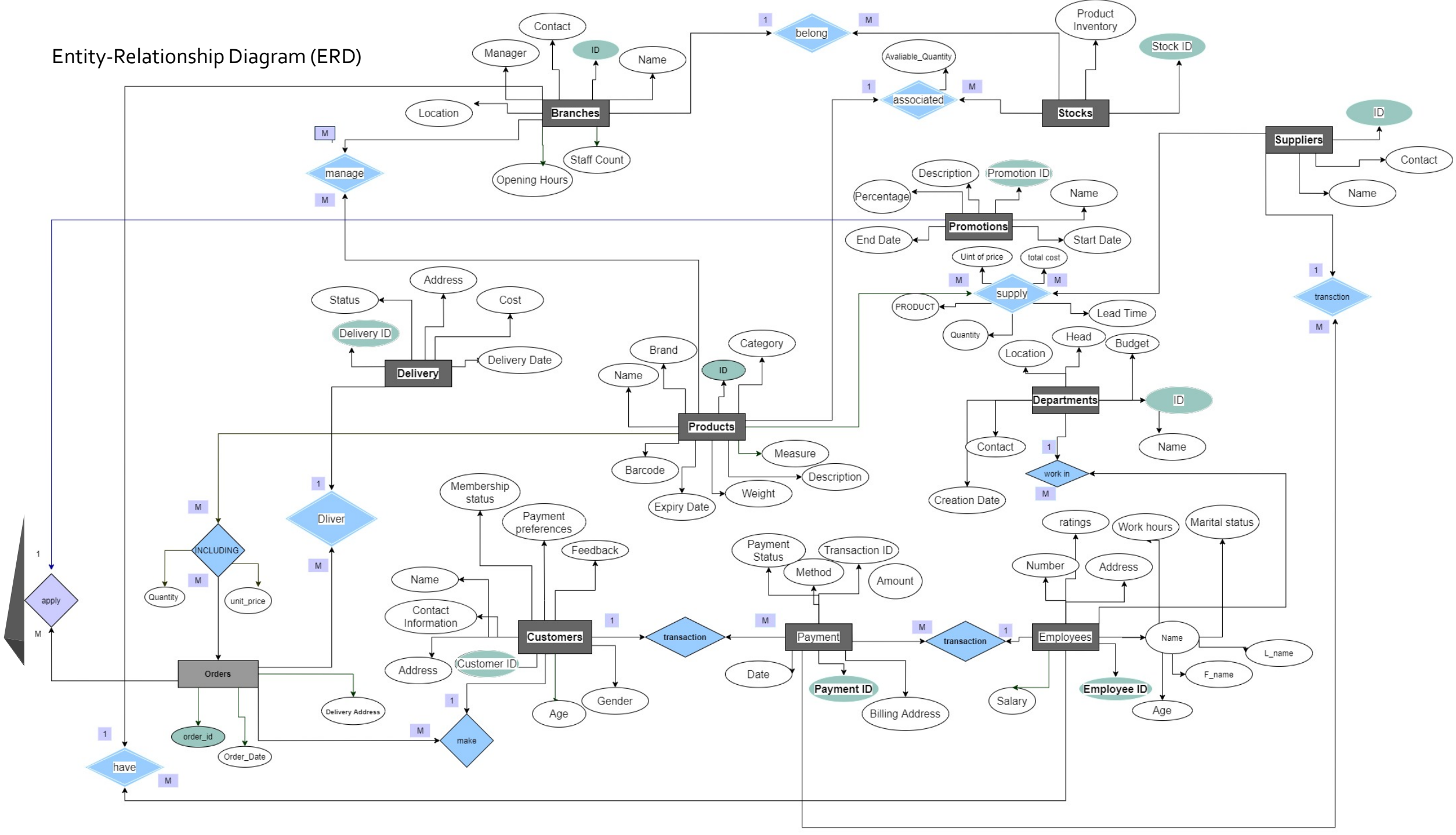
Introduction

- **Gola of project** : In the modern retail landscape, efficient and accurate data management is crucial for the smooth operation and success of any supermarket. The Supermarket Management System Database project aims to develop a comprehensive database solution that streamlines various aspects of supermarket operations, from inventory management and sales tracking to customer relationship management and business analytics.
- This project will encompass the entire lifecycle of database development, including the design, implementation, and deployment phases. The end goal is to create a robust and scalable database in Microsoft SQL Server (MSSQL) that supports the supermarket's business needs and provides actionable insights through advanced reporting and data analytics tools such as Power BI.

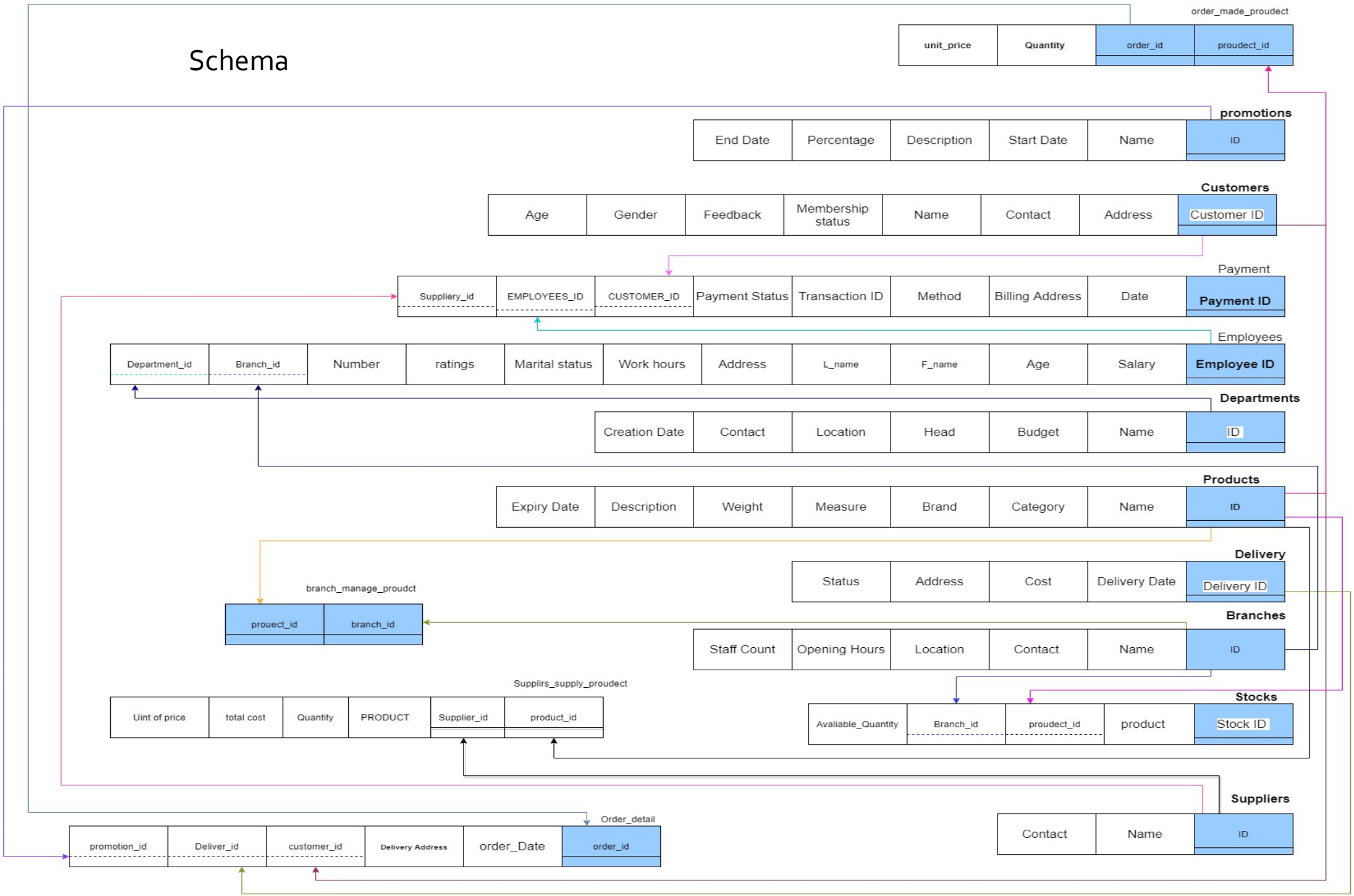
Project Goals

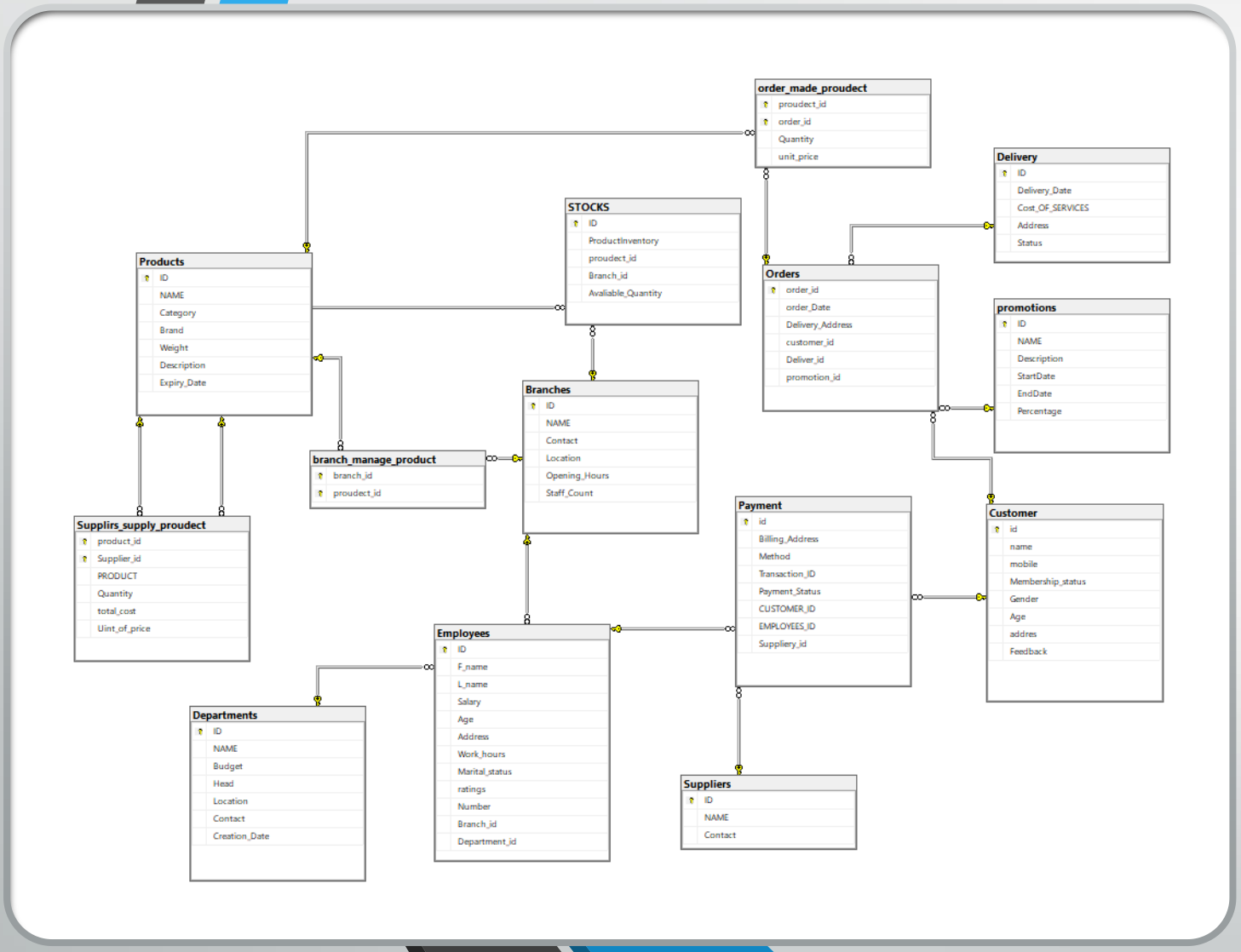
1. Create ERD: Design a detailed Entity-Relationship Diagram (ERD) for supermarket operations.
2. Convert ERD to Schema: Translate the ERD into a formal database schema with all necessary tables, keys, and constraints.
3. Create Database in MSSQL: Implement the schema in Microsoft SQL Server, setting up the database structure.
4. Gather Business Information: Identify key business questions to guide decision-making.
5. Create Data Model: Develop a data model optimized for performance and scalability.
6. Create Data Warehouse: Design and implement a data warehouse for comprehensive reporting and analysis.
7. ETL in SSIS: Use SQL Server Integration Services (SSIS) to develop an ETL process to populate the data warehouse.
8. Create Reports in Power BI: Develop interactive reports in Power BI to visualize data and provide business intelligence.

Entity-Relationship Diagram (ERD)



Schema


order_made_proudect
unit_price
Quantity
order_id
proudect_id
promotions
End Date
Percentage
Description
Start Date
Name
ID
Customers
Age
Gender
Feedback
Membership status
Name
Contact
Address
Customer ID
Payment
Suppliery_id
EMPLOYEES_ID
CUSTOMER_ID
Payment Status
Transaction ID
Method
Billing Address
Date
Payment ID
Employees
Department_id
Branch_id
Number
ratings
Marital status
Work hours
Address
L_name
F_name
Age
Salary
Employee ID
Departments
Creation Date
Contact
Location
Head
Budget
Name
ID
Products
Expiry Date
Description
Weight
Measure
Brand
Category
Name
ID
Delivery
Status
Address
Cost
Delivery Date
Delivery ID
branch_manage_proudct
prouect_id
branch_id
Branches
Staff Count
Opening Hours
Location
Contact
Name
ID
Supplirs_supply_proudect
Uint of price
total cost
Quantity
PRODUCT
Supplier_id
product_id
Stocks
Avaliable_Quantity
Branch_id
proudect_id
product
Stock ID
Suppliers
Contact
Name
ID
Order_detail
promotion_id
Deliver_id
customer_id
Delivery Address
order_Date
order_id

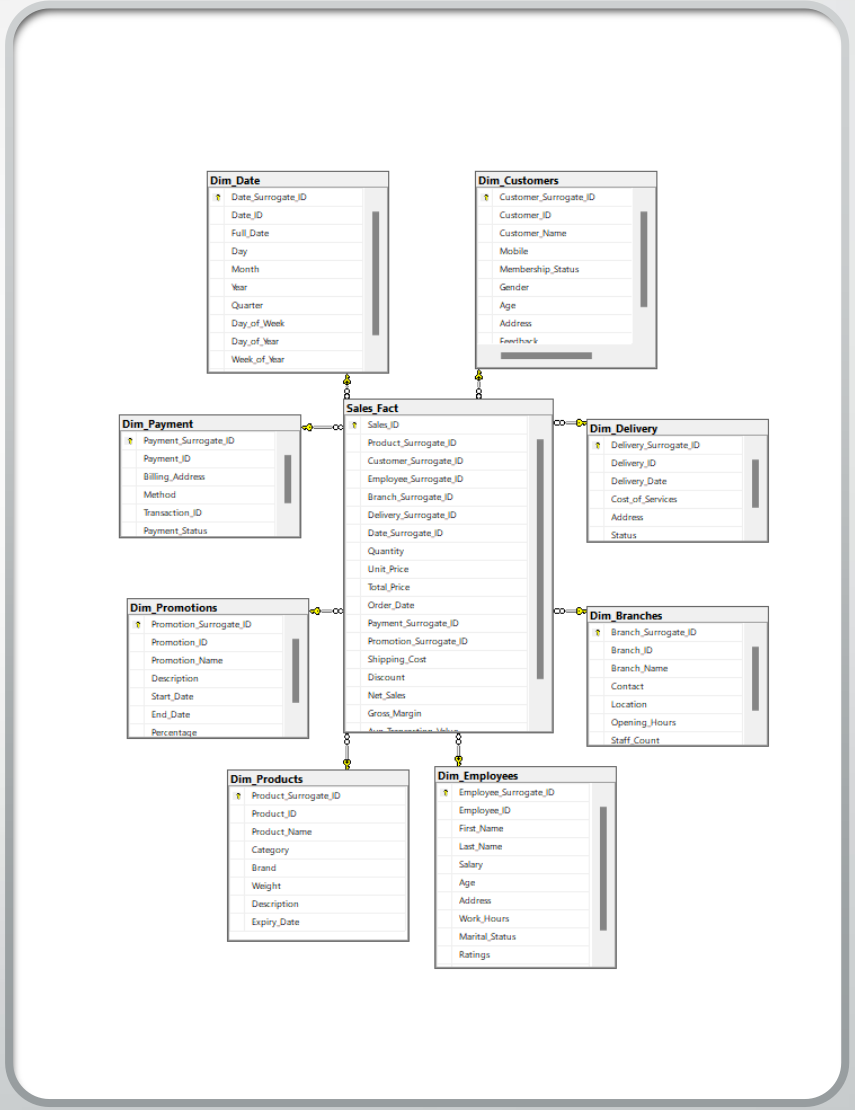


Database Creation in MSSQL

Business Information Questions ?

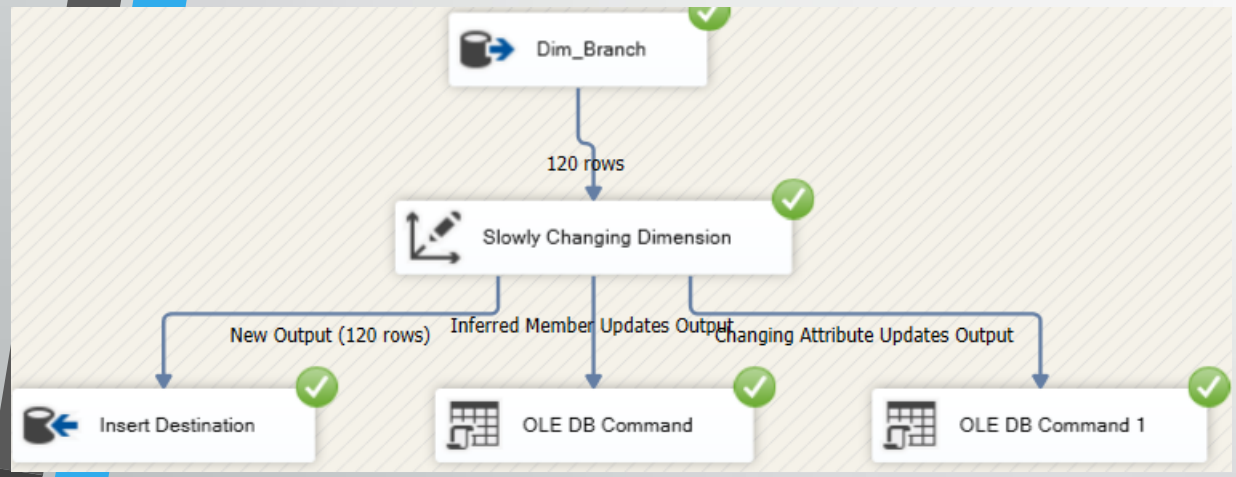
1. What are the total sales revenue and quantity sold for each product category?
2. How do sales vary over time, and can we identify any seasonal trends or patterns?
3. Which branches are the top performers in terms of sales revenue and profit margin?
4. What is the sales performance of employees in each branch and department, and who are the top 10 sales representatives and their managers?
5. What are the current inventory levels of each product in each branch, and how does inventory turnover vary across different product categories and branches?
6. Which promotions result in the highest increase in sales revenue, and can we quantify the ROI for each promotion campaign?

Data Warehouse Design

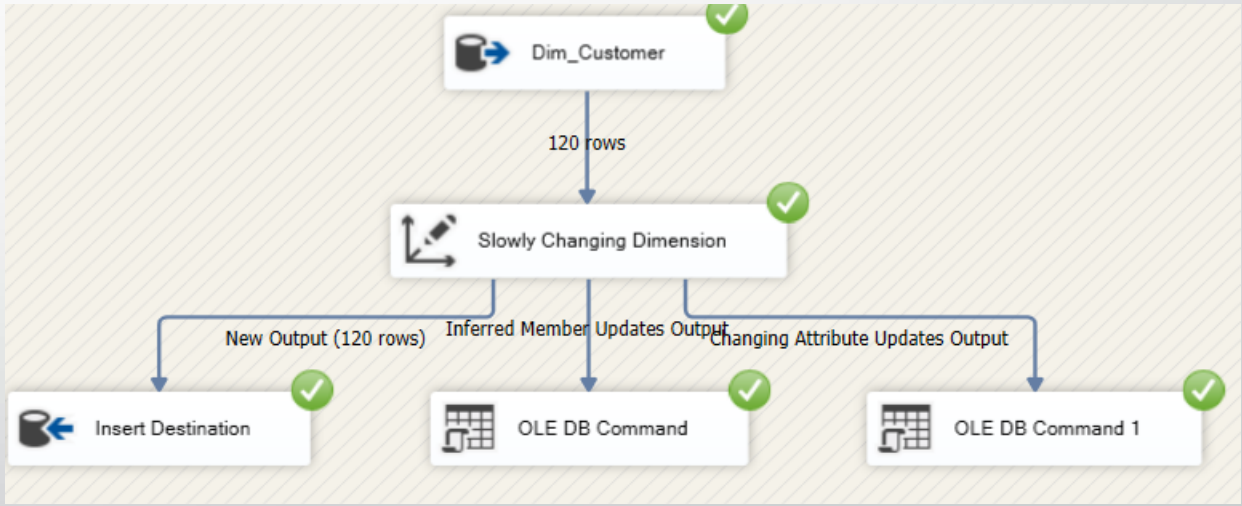


ETL Process in SSIS

Dim Branches

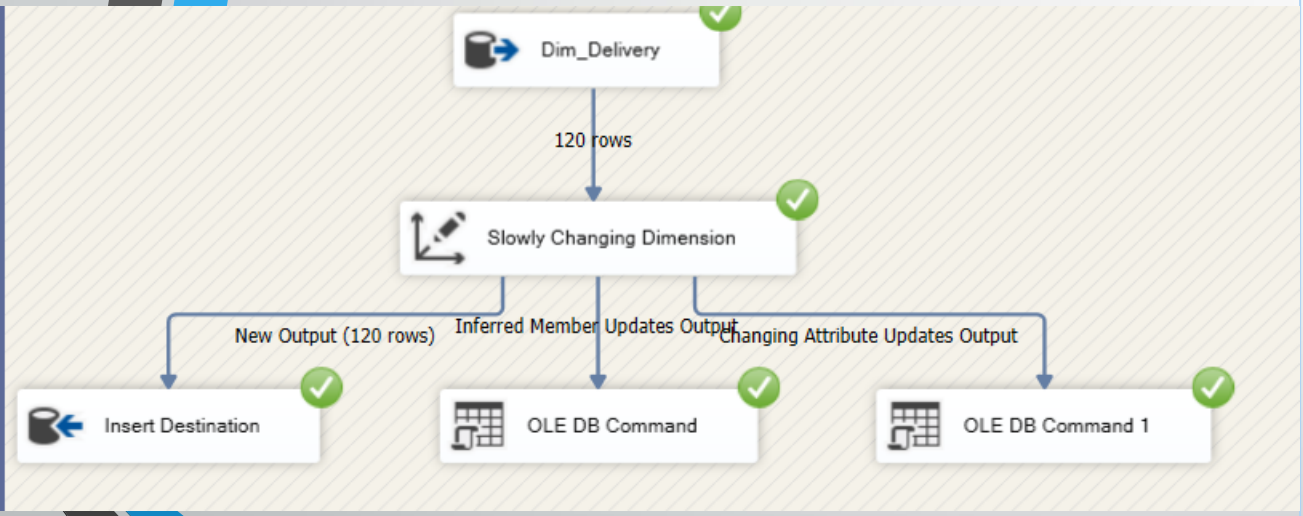


Dim_Customer

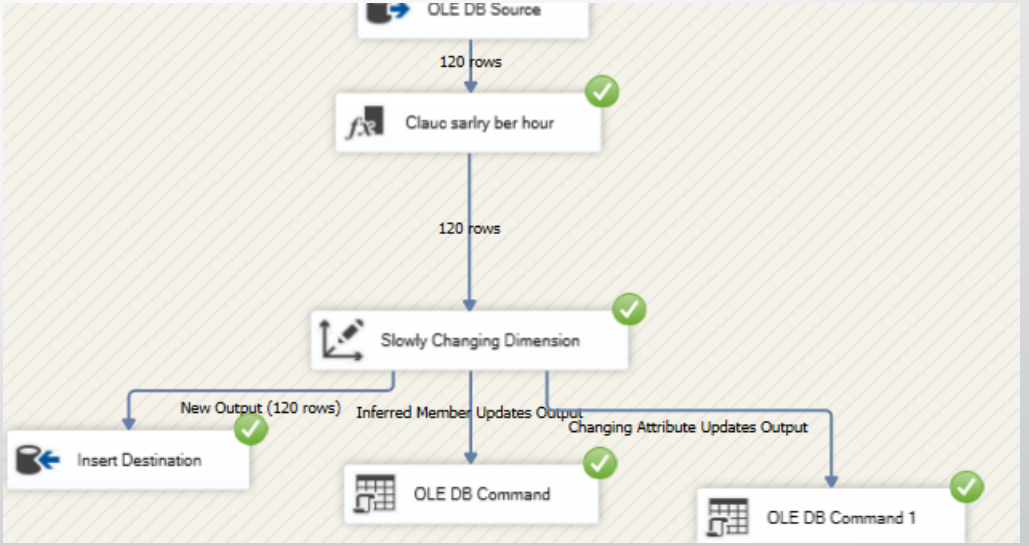


ETL Process in SSIS

Dim_Delivery

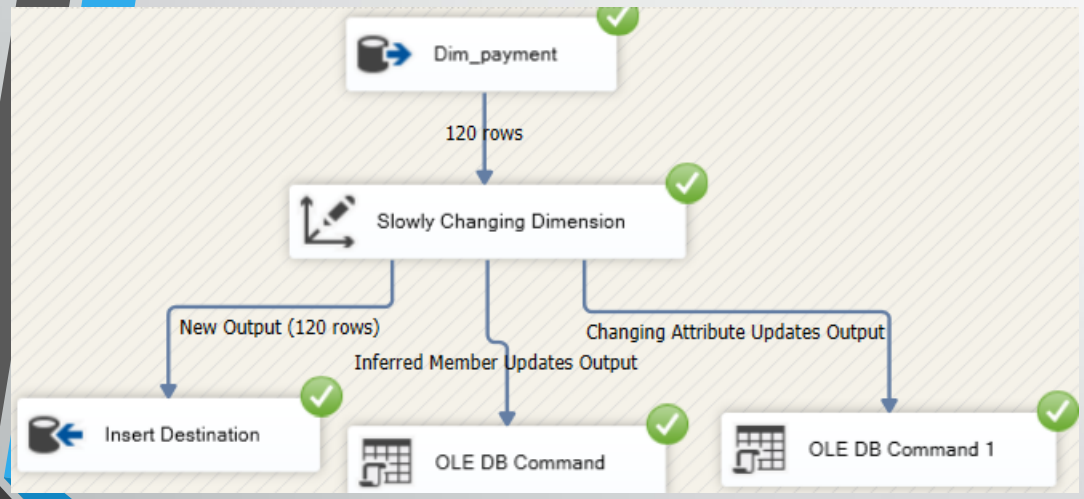


Dim_Employee

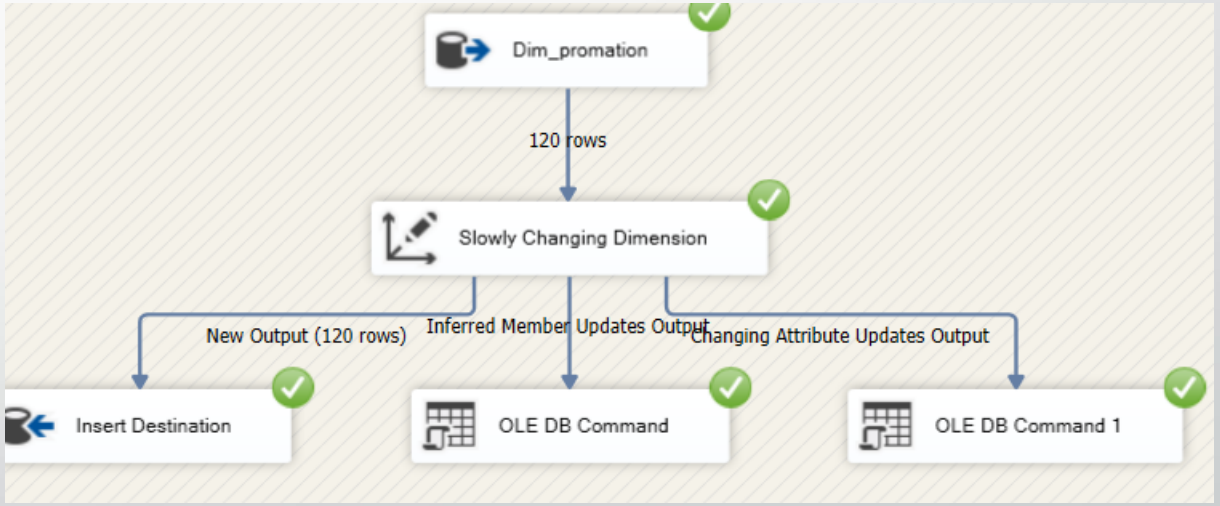


ETL Process in SSIS

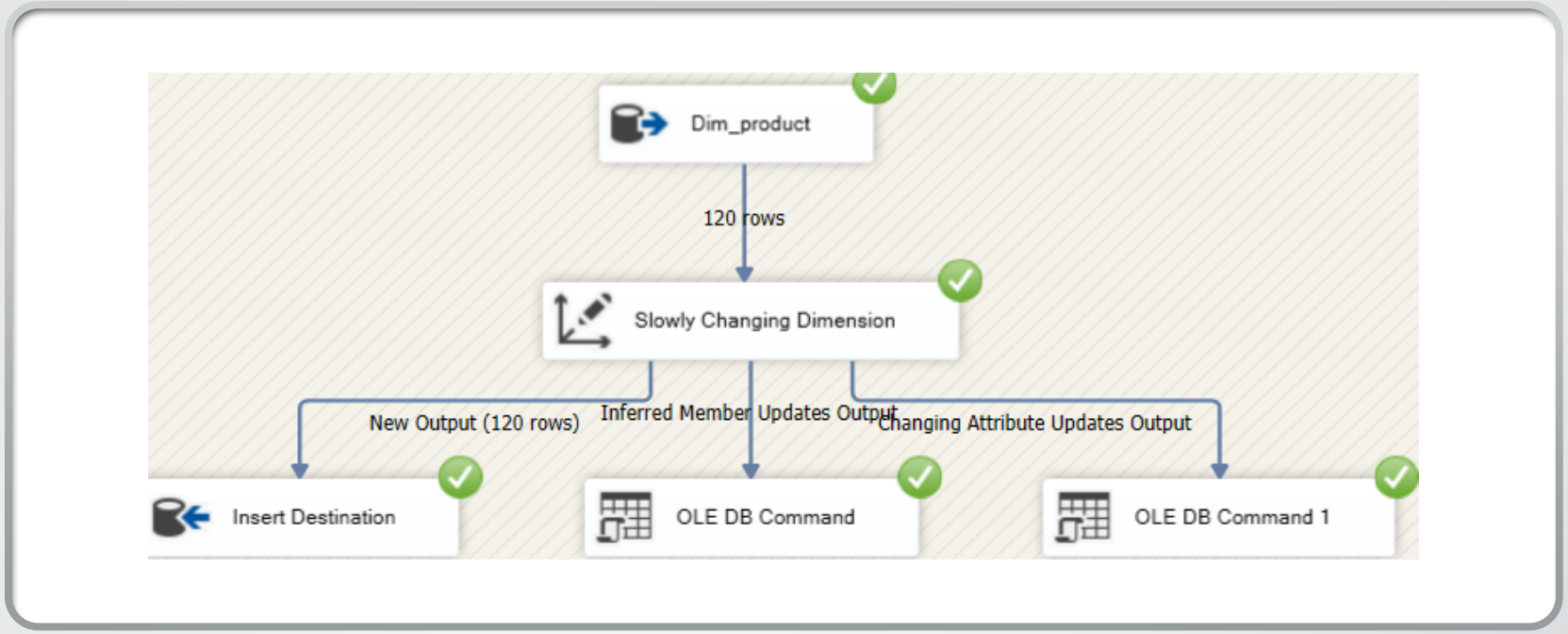
Dim_payment



Dim_promation

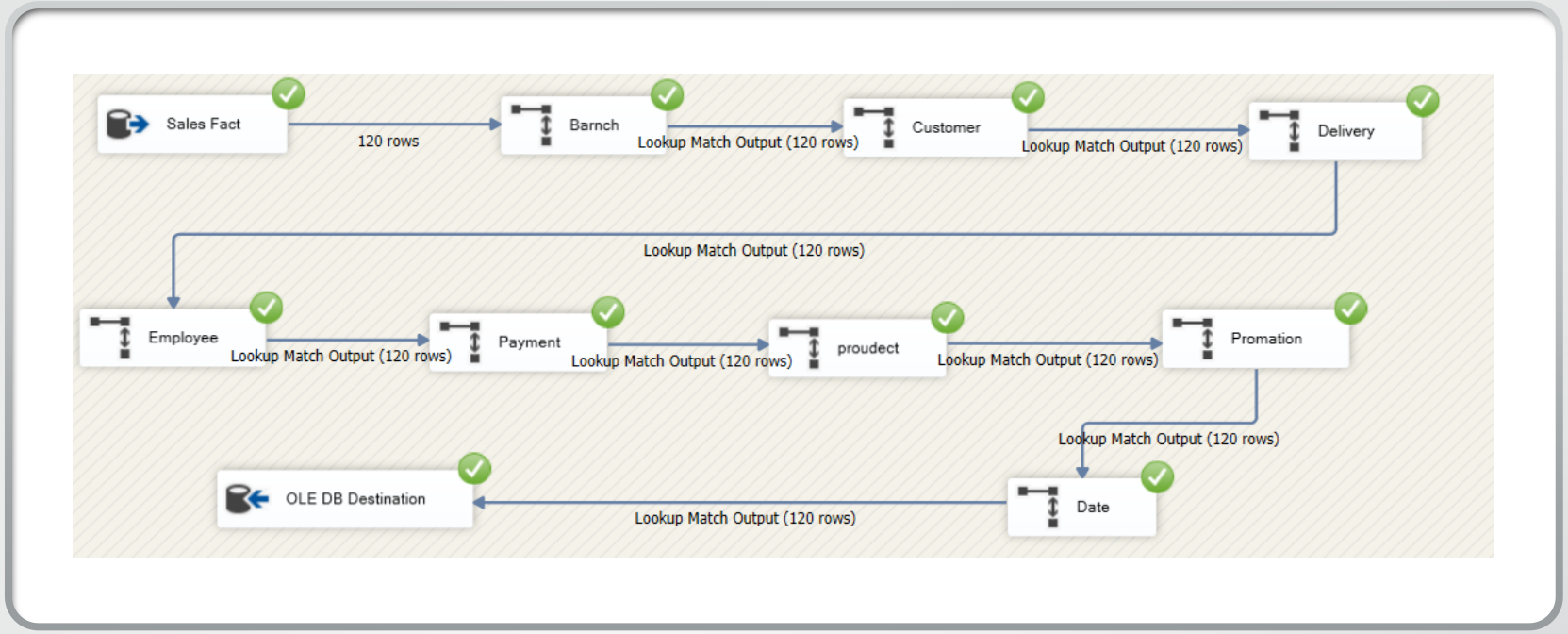


Dim_product



ETL Process in SSIS

Sales Fact



ETL Process in SSIS

Date in FACT

Sales_ID	Product_Surrogate_ID	Customer_Surrogate_ID	Employee_Surrogate_ID	Branch_Surrogate_ID	Delivery_Surrogate_ID	Date_Surrogate_ID	Quantity	Unit_Price	Total_Price
140	20	20	20	11	20	8929	10	29.00	290.00
141	21	21	21	2	21	8930	1	10.00	10.00
142	22	22	22	3	22	8931	2	11.00	22.00
143	23	23	23	4	23	8932	3	12.00	36.00
144	24	24	24	5	24	8933	4	13.00	52.00
145	25	25	25	6	25	8934	5	14.00	70.00
146	26	26	26	7	26	8935	6	15.00	90.00
147	27	27	27	8	27	8936	7	16.00	112.00
148	28	28	28	9	28	8937	8	17.00	136.00
149	29	29	29	10	29	8938	9	18.00	162.00
150	30	30	30	11	30	8939	10	19.00	190.00

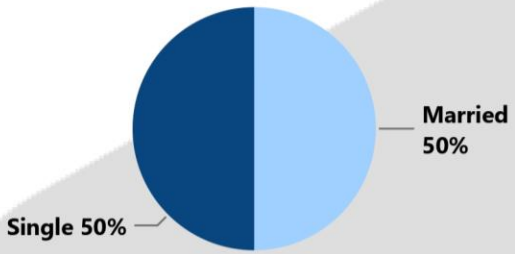
Order_Date	Payment_Surrogate_ID	Promotion_Surrogate_ID	Shipping_Cost	Discount	Net_Sales	Gross_Margin	Avg_Transaction_Value	Avg_Quantity_Per_Transaction
2024-06-10	20	20	69.00	24.00	220.40	151.40	2.00	5.00
2024-06-11	21	21	70.00	25.00	7.50	-62.50	0.00	5.00
2024-06-12	22	22	71.00	26.00	16.28	-54.72	0.00	5.00
2024-06-13	23	23	72.00	27.00	26.28	-45.72	0.00	5.00
2024-06-14	24	24	73.00	28.00	37.44	-35.56	0.00	5.00
2024-06-15	25	25	74.00	29.00	49.70	-24.30	0.00	5.00
2024-06-16	26	26	75.00	30.00	63.00	-12.00	0.00	5.00
2024-06-17	27	27	76.00	31.00	77.28	1.28	0.00	5.00
2024-06-18	28	28	77.00	32.00	92.48	15.48	1.00	5.00
2024-06-19	29	29	78.00	33.00	108.54	30.54	1.00	5.00
2024-06-20	30	30	79.00	34.00	125.40	46.40	1.00	5.00

Sales General information

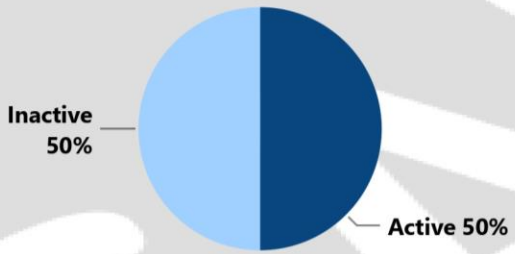
LinkedIn: Eng Youssef Azam

Average Age for employees	Avg Rating for employees	Avg cost services Delivery	Count of Customer	Count of Branches
42.17	★★★★☆ 3.5	72.2	120	10

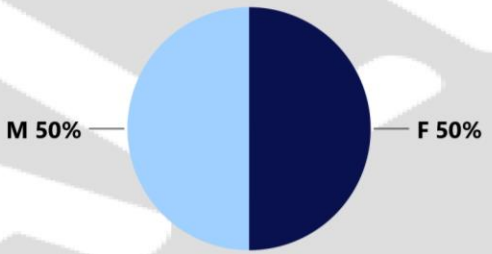
Marital_Status for Employees



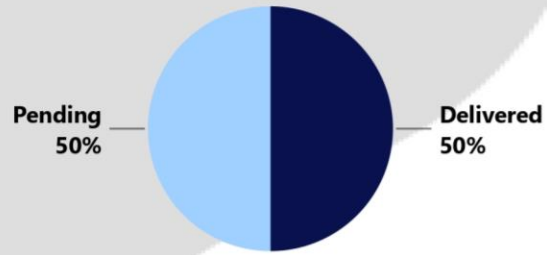
Membership Status for Customers



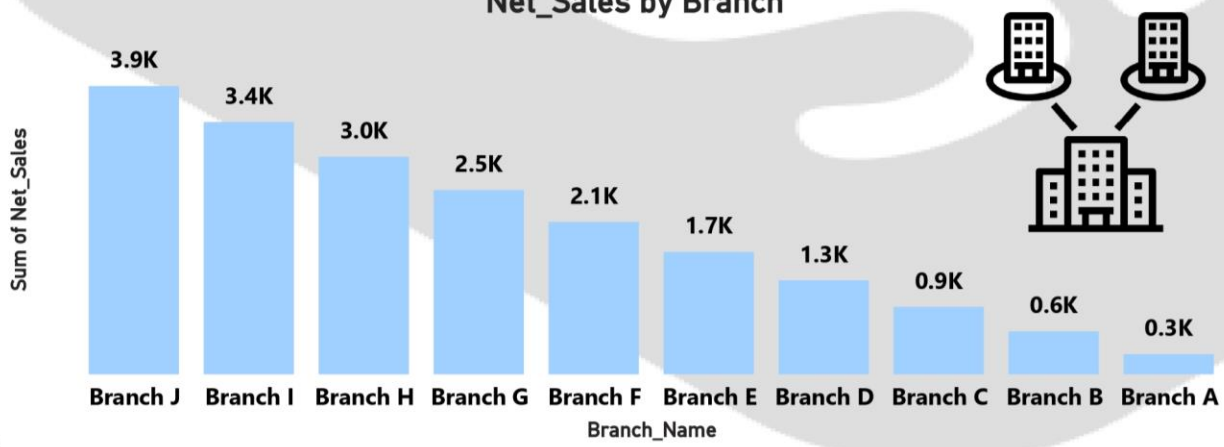
Gender



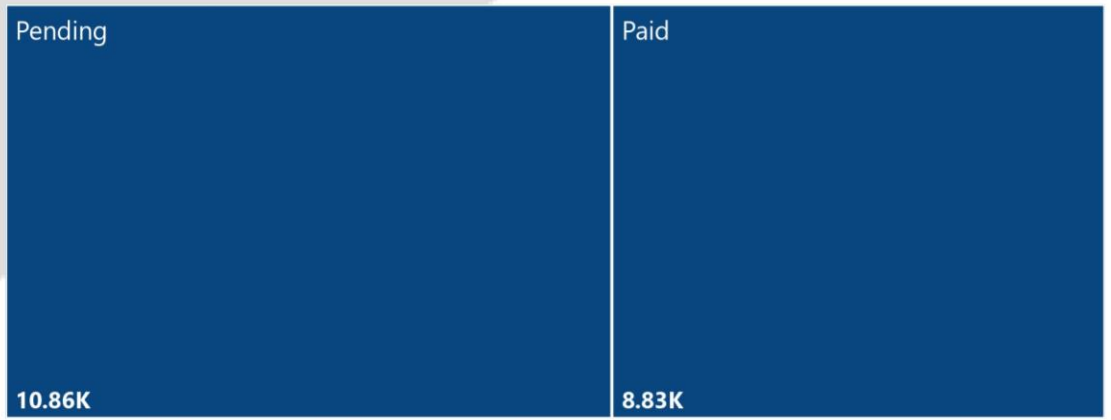
Status of Delivery



Net_Sales by Branch



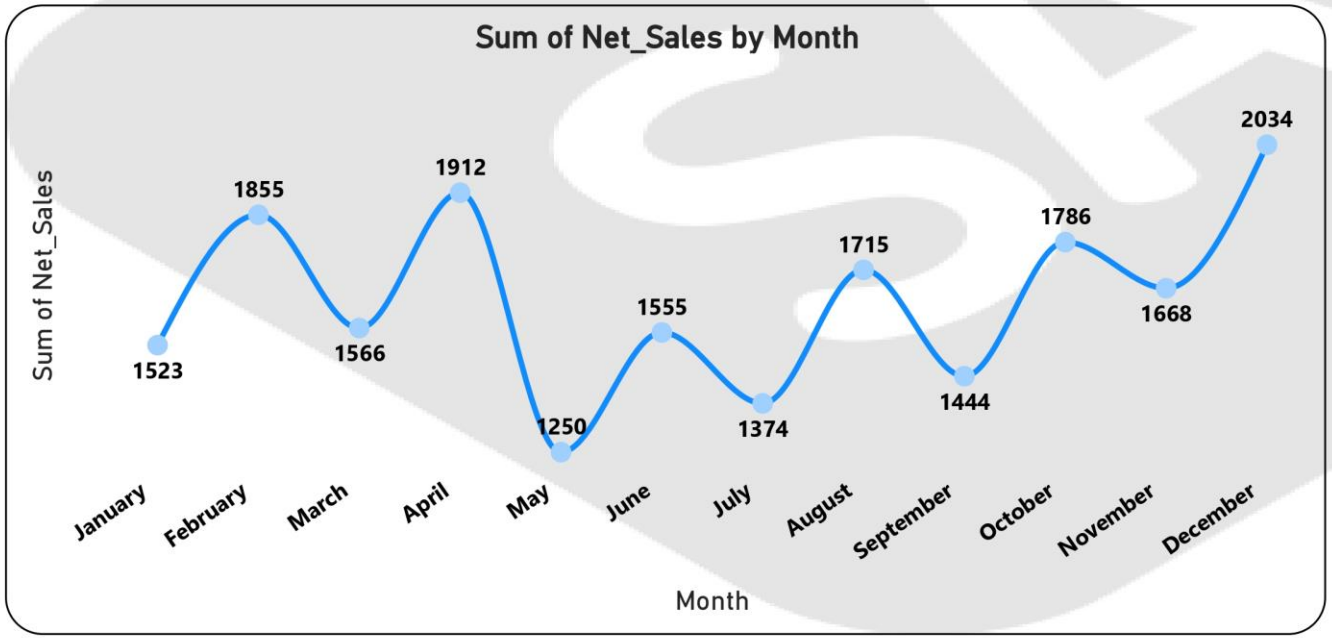
Sum of Net_Sales by Payment_Status

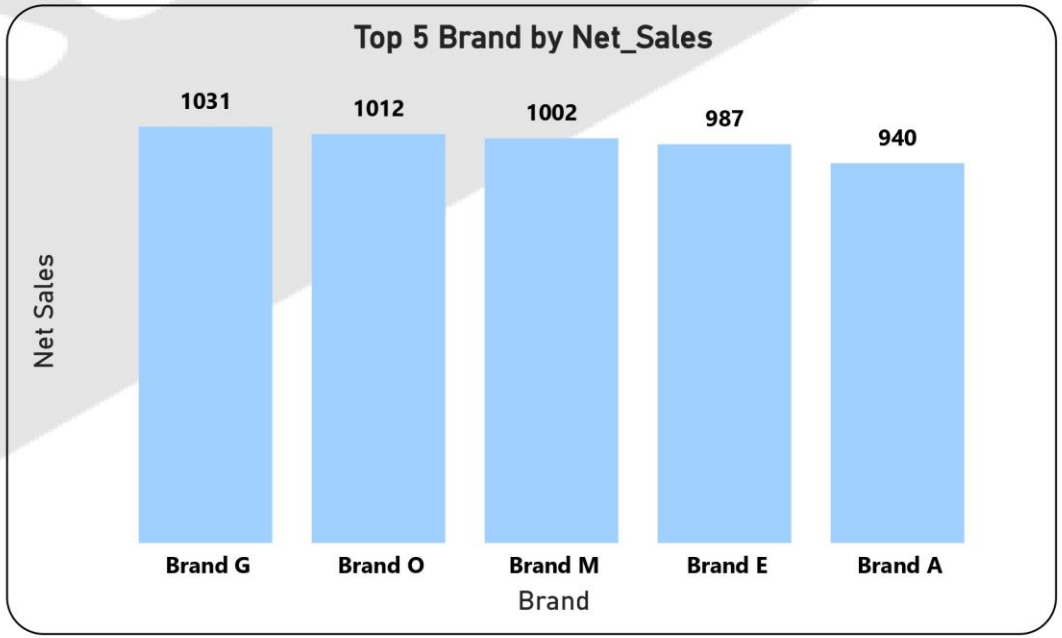


KPI

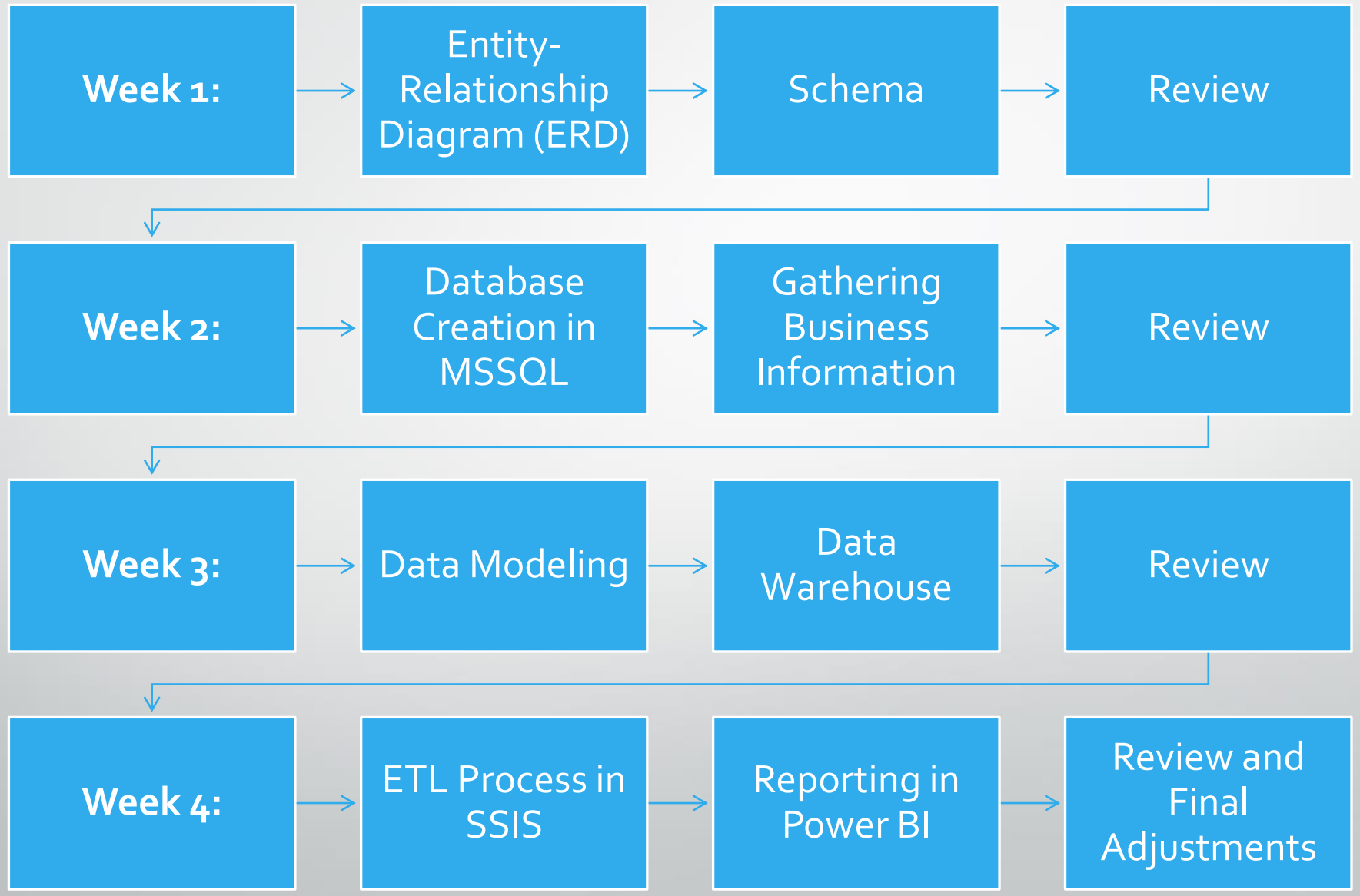
Net_Sales	Average of Gross_Margin	Average of Discount	Avg_Transaction_Value	Avg_Quantity_Per_Transaction
19.7K	2.4K	27.2	0.55	5

Quantity	Sum of Total_Price	Average of Unit_Price	Count of Orders	Average of Work_Hours
1320	28K	20	240	45





Project Timeline



Conclusion

- The Supermarket Management System Database project is a comprehensive initiative that will significantly enhance the operational efficiency and decision-making capabilities of a supermarket. Through meticulous design, robust implementation, and advanced reporting, this project aims to deliver a powerful tool for managing and analyzing supermarket data. The successful completion of this project will not only streamline daily operations but also provide valuable insights that drive business growth.