

INTRODUCTION

Data modeling is the process of creating a conceptual representation of data to be used in a database or information system. It involves defining the data elements, relationships, and constraints necessary for the system. In essence, it's about organizing data into a structured format that is easily understandable and accessible.

Traditional data models, such as hierarchical and network models, were complex and often inefficient for business intelligence and reporting. They struggled to handle large volumes of data and the need for rapid, ad-hoc analysis. Dimensional modeling emerged as a powerful solution to these challenges.

Based on the provided invoice, the following information is crucial for sales analysis:

Customer Information

- Customer Name
- Customer Address
- Contact Number

Vehicle Information

- Make
- Model
- Year
- VIN
- Registration Number
- Mileage

Service Information

- Job Performed
- Hours
- Rate
- Amount
- Parts Used
- Part Name
- Quantity
- Unit Price
- Amount

Financial Information

- Invoice Number
- Invoice Date
- Due Date
- Subtotal
- Sales Tax Rate
- Sales Tax Amount
- Total Labor
- Total Parts
- Total

Types of Analysis

With this data, Latino Garage Winnipeg North can perform various sales analyses to gain valuable insights into their business operations.

Sales Analysis

Sales by Customer:

- Track and analyze total sales for each customer.
- Identify top customers by revenue.
- Understand purchasing patterns and frequencies.

Sales by Vehicle Brand/Model/Year:

- Analyze sales based on vehicle make, model, and year.
- Determine which vehicles bring in the most revenue.
- Identify trends in vehicle services and parts replacement.

Sales by Services:

- Break down sales by different types of services performed.
- Evaluate which services are most popular and profitable.
- Identify seasonal trends in service demand.

Sales by Parts:

- Analyze sales of various parts used in services.
- Track inventory and usage of parts.
- Identify high-demand and high-margin parts.

Sales by Shop Locations:

- Compare sales performance across different shop locations.
- Identify which locations are performing best.
- Determine if certain locations have higher demand for specific services or parts.

Performance Analysis

Revenue Growth:

- Track monthly, quarterly, and yearly revenue growth.
- Identify periods of high and low sales.

Customer Retention and Acquisition:

- Analyze repeat vs. new customers.
- Evaluate the effectiveness of marketing and customer loyalty programs.

Profit Margins:

- Calculate profit margins for different services and parts.
- Identify areas to improve profitability.

Expense Tracking:

- Monitor costs associated with labor and parts.
- Optimize resource allocation to reduce costs.

Customer Feedback and Satisfaction:

- Collect and analyze customer feedback.
- Improve services based on customer satisfaction data.
- Analyze customer repeat business and identify opportunities for loyalty programs.

By conducting these analyses, Latino Garage Winnipeg North can make data-driven decisions to optimize operations, increase revenue, and enhance customer satisfaction.

Core Components of a Dimensional Model

A typical dimensional model consists of:

- **Fact Table:** Stores numerical measurements and foreign keys referencing dimension tables.
- **Dimension Tables:** Contain descriptive attributes about the dimensions and provide context to the facts.

Fact tables:

Auto shop data warehouse;

- SalesID: Unique identifier for each sale.
- CustomerID: References Customer table.
- VehicleID: References Vehicle table.
- ServiceID: References Service table.
- PartID: References Part table.
- LocationID: References Location table.
- DateID: References Date table.
- ServiceHours: Number of hours spent on the service.
- ServiceCharge: Charge for the service.
- PartsCharge: Charge for the parts used.
- Subtotal: Subtotal amount (ServiceCharge + PartsCharge).
- SalesTaxRate: Sales tax rate applied.
- SalesTaxAmount: Amount of sales tax collected.
- TotalAmount: Total amount including sales tax.

```
70 • CREATE TABLE FactSales (  
71     SalesID INT PRIMARY KEY,  
72     CustomerID INT,  
73     VehicleID INT,  
74     ServiceID INT,  
75     PartID INT,  
76     LocationID INT,  
77     DateID INT,  
78     ServiceHours DECIMAL(10, 2),  
79     ServiceCharge DECIMAL(10, 2),  
80     PartsCharge DECIMAL(10, 2),  
81     Subtotal DECIMAL(10, 2),  
82     SalesTaxRate DECIMAL(5, 2),  
83     SalesTaxAmount DECIMAL(10, 2),  
84     TotalAmount DECIMAL(10, 2),  
  
85     FOREIGN KEY (CustomerID) REFERENCES Customer(CustomerID),  
86     FOREIGN KEY (VehicleID) REFERENCES Vehicle(VehicleID),  
87     FOREIGN KEY (ServiceID) REFERENCES Service(ServiceID),  
88     FOREIGN KEY (PartID) REFERENCES Part(PartID),  
89     FOREIGN KEY (LocationID) REFERENCES Location(LocationID),  
90     FOREIGN KEY (DateID) REFERENCES Date(DateID)  
91 );  
92  
93 • SELECT *  
94 FROM FactSales;
```

Result Grid

	SalesID	CustomerID	VehicleID	ServiceID	PartID	LocationID	DateID	ServiceHours	ServiceCharge	PartsCharge	Subtotal	SalesTaxRate	SalesTaxAmount	TotalAmount
*	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL

Dimension tables:

Customer Table:

- CustomerID: Unique identifier for each customer.
- CustomerName: Name of the customer.
- CustomerAddress: Address of the customer.
- CustomerPhone: Contact number of the customer.

```

4  CREATE TABLE Customer(
5      CustomerID INT PRIMARY KEY,
6      CustomerName VARCHAR(255),
7      CustomerAddress VARCHAR(255),
8      CustomerPhone VARCHAR(50)
9  );
10 SELECT*
11 FROM Customer;

```

Result Grid

Filter Rows:

Edit:

Export/Import:

Wrap Cell Content:

	CustomerID	CustomerName	CustomerAddress	CustomerPhone
*	NULL	NULL	NULL	NULL

Vehicle Table:

- VehicleID: Unique identifier for each vehicle.
- Make: Make of the vehicle.
- Model: Model of the vehicle.
- Year: Year of the vehicle.
- Color: Color of the vehicle.
- VIN: Vehicle Identification Number, unique for each vehicle.
- RegistrationNo: Registration number of the vehicle.
- Mileage: Mileage of the vehicle.

```

13 • CREATE TABLE Vehicle (
14     VehicleID INT PRIMARY KEY,
15     Make VARCHAR(255),
16     Model VARCHAR(255),
17     Year INT,
18     Color VARCHAR(50),
19     VIN VARCHAR(50),
20     RegistrationNo VARCHAR(50),
21     Mileage INT
22 );
23
24 • SELECT *
25 FROM Vehicle;

```

Result Grid

	VehicleID	Make	Model	Year	Color	VIN	RegistrationNo	Mileage
*	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL

Service Table:

- ServiceID: Unique identifier for each service.
- ServiceType: Type of service performed.
- ServiceDesc: Description of the service.
- ServiceRate: Rate per hour for the service.

```

--
27 • CREATE TABLE Service (
28     ServiceID INT PRIMARY KEY,
29     ServiceType VARCHAR(255),
30     ServiceDesc VARCHAR(255),
31     ServiceRate DECIMAL(10, 2)
32 );
33 • SELECT *
34 FROM Service;

```

Result Grid

	ServiceID	ServiceType	ServiceDesc	ServiceRate
*	NULL	NULL	NULL	NULL

Part Table:

- PartID: Unique identifier for each part.
- PartNumber: Unique part number.
- PartName: Name of the part.
- UnitPrice: Price per unit of the part.

- Quantity: The number of units of the part used in a particular sale or service.
- Amount: The total cost of the part used in a particular sale or service, calculated as $\text{Quantity} * \text{UnitPrice}$.

```

36 • CREATE TABLE Part (
37     PartID INT PRIMARY KEY,
38     PartNumber VARCHAR(50),
39     PartName VARCHAR(255),
40     UnitPrice DECIMAL(10, 2),
41     Quantity INT,
42     Amount DECIMAL(10, 2)
43 );
44
45 • SELECT *
46 FROM Part;

```

Result Grid

	PartID	PartNumber	PartName	UnitPrice	Quantity	Amount
*	NULL	NULL	NULL	NULL	NULL	NULL

Location Table:

- LocationID: Unique identifier for each location.
- LocationName: Name of the location.
- LocationAddress: Address of the location.

```

48 • CREATE TABLE Location (
49     LocationID INT PRIMARY KEY,
50     LocationName VARCHAR(255),
51     LocationAddress VARCHAR(255)
52 );
53
54 • SELECT *
55 FROM Location;

```

Result Grid

	LocationID	LocationName	LocationAddress
*	NULL	NULL	NULL

Date Table:

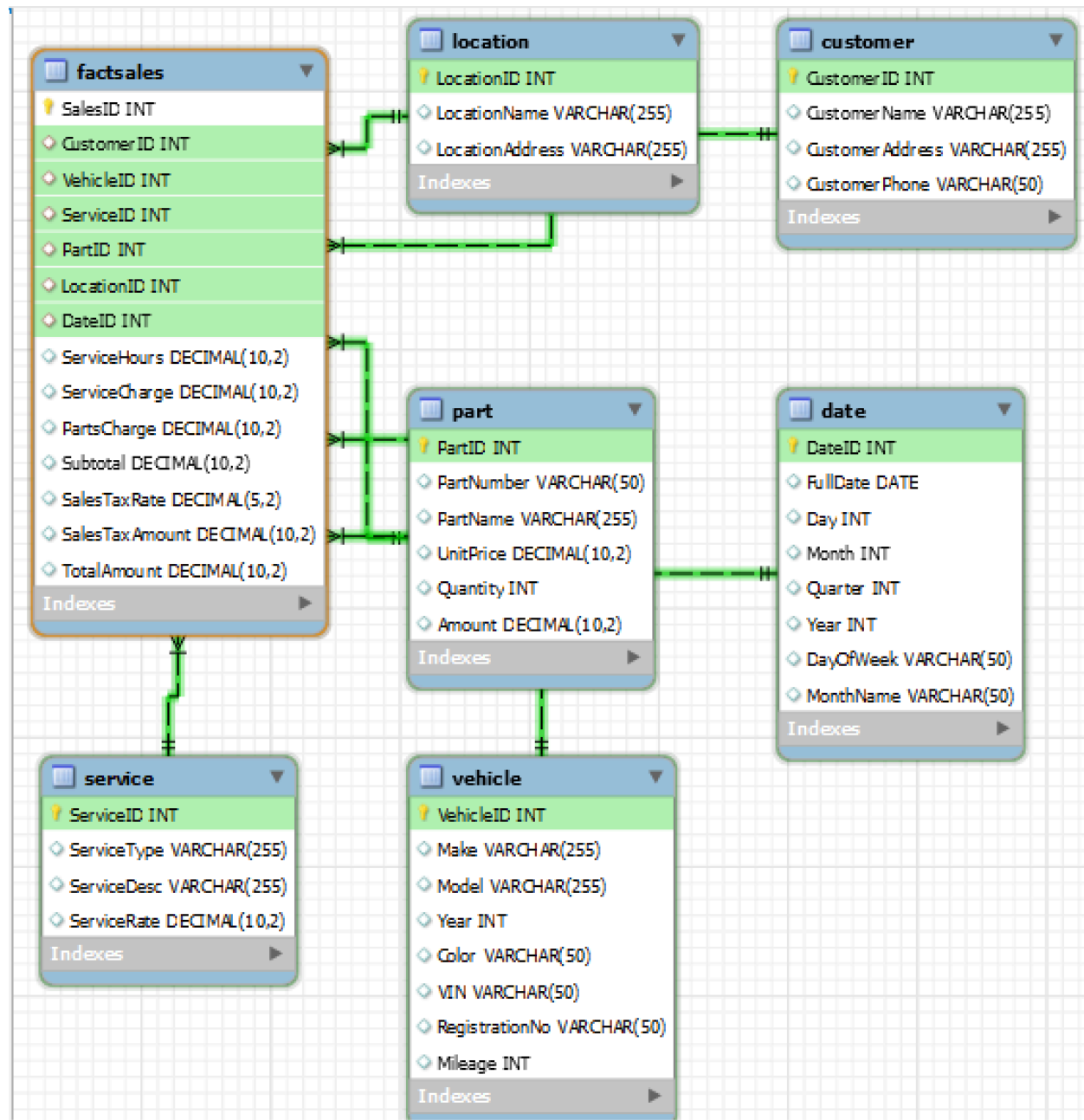
- DateID: Unique identifier for each date entry.
- FullDate: Full date (YYYY-MM-DD).
- Day: Day of the month.

- Month: Month of the year.
- Quarter: Quarter of the year.
- Year: Year.
- DayOfWeek: Name of the day of the week.
- MonthName: Name of the month.

```
57 CREATE TABLE `Date` (  
58     DateID INT PRIMARY KEY,  
59     FullDate DATE,  
60     Day INT,  
61     Month INT,  
62     Quarter INT,  
63     Year INT,  
64     DayOfWeek VARCHAR(50),  
65     MonthName VARCHAR(50)  
66 );  
67 SELECT *  
68 FROM `Date`;
```

[illegible]

ER Diagram and Data Model Documentation for Auto Shop Sales Analysis



Logical Explanations

- **Customer Table:** Captures all relevant customer details necessary for identifying and contacting the customer.
- **Vehicle Table:** Stores detailed information about the vehicles serviced, enabling analysis based on make, model, year, etc.
- **Service Table:** Keeps records of different service types and their rates, allowing for analysis of service frequency and revenue.
- **Part Table:** Contains details about parts used in services, facilitating tracking of parts usage and costs.
- **Location Table:** Holds information about different service locations, supporting location-based analysis.
- **Date Table:** Provides a comprehensive time dimension for detailed time-based analysis of sales and services.
- **Sales Table:** Acts as the fact table, aggregating quantitative data from all dimension tables and allowing for multi-faceted analysis.

Below is the link to the sql file

[database export Single Part A Script](#)