REPORT ON LATINA GARAGE DATA MODEL

Introduction

This report focuses on designing a dimensional model for analyzing sales data for Latina Garage Shop. The model will help in extracting meaningful insights to optimize operations, improve customer satisfaction and increase profitability. The report details the entire process from reviewing a sample invoice to developing an Entity-Relationship (ER) diagram.

Business Requirements

The objective is to create a dimensional data model to analyze the sales performance of Latina Garage centers located across Western Canada. The model must provide flexible analysis of sales of both services and parts by customer, vehicle brands/model/year and shop location.

Sample Invoice Analysis

Key information identified:

- Customer Information : Customer name, Address and Phone number
- Vehicle Details : Make, Model, Year, Color VIN, Registration number
- Service Information : Job description, Rate and Hours
- Parts Information : Part name, Part number, Unit price and Quantity
- Location Information : Shop location name and Address
- Date Information : Transaction date and Due date
- Financial Details : Service charges, Part charges, Sales tax and Total sales

Analysis Needed For Business

To effectively manage and optimize the car repair shop's operations, the business will need to conduct various types of analysis. These analyses will provide a comprehensive understanding of different aspects of the business, enabling data-driven decision-making. The key types of analysis required are:

- **Customer Analysis**

  The objective is to identify top-spending customers and analyze their purchasing patterns. This will help in tailoring marketing strategies, design loyalty programs, and improve customer retention.

- **Vehicle Brand/Model/Year Analysis**

  With an objective of determining the most common vehicle brands, models, and years serviced. Assists in stocking relevant parts, creating targeted service packages, and understanding market trends.

- **Sales by Services**

  This analysis is carried out in order to identify the most frequently performed services and their revenue contribution. It will enable better resource allocation, development of competitive pricing strategies, and promotion of high-margin services.

- **Sales by Parts**

  Analyzes the usage and sales of parts, including identifying the most frequently replaced parts. This leads to optimization in inventory management, reduces stockouts, and minimizes holding costs.

- **Sales by Shop Locations**

  Evaluate the performance of different shop locations in terms of sales and service frequency and support strategic decisions regarding location expansion, resource allocation, and targeted marketing efforts.

- **Sales by Date**

  Analyzing sales trends over time, such as daily, weekly, monthly, and seasonal variations. Helps in identifying peak periods, planning promotions, and managing workforce allocation effectively.

- **Financial Analysis**

  This analysis aims at assessing overall financial performance, including revenue, costs, and profitability. Thereby providing insights into profit margins, cost control, and financial health, enabling informed budgeting and investment decisions.

By conducting these analyses, the business will gain valuable insights that can drive informed decision-making, strategic planning, and operational improvements. This comprehensive approach ensures that all aspects of the business are optimized for efficiency and profitability.

Data Model Design

Facts

- **Service Charges**: Total labor cost.
- **Parts Charges**: Total cost of parts used.
- **Sales Tax**: Tax amount on the invoice.
- **Total Sales**: Overall total amount of the invoice.
- **Quantity**: Number of parts used.

Dimensions

- **Customer**: Attributes related to the customer.
- **Vehicle**: Attributes related to the vehicle.

- **Service**: Attributes related to the services provided.
- **Parts**: Attributes related to the parts used.
- **Location**: Attributes related to the shop location.
- **Date**: Attributes related to the transaction date.

Table And Column Description

Dimension Customer

Purpose: To store detailed information about customers.

- **CustomerID**: Unique identifier for each customer, this is the primary key.
- **CustomerName**: The name of the customer, it helps in identifying and differentiating customers.
- **Address**: The physical address of the customer, useful for geographic analysis and contact purposes.
- **Phone**: The phone number of the customer, important for communication and potential follow-ups.

This table allows for analysis of sales data by different customers, providing insights into customer behavior, repeat business, and customer demographics.

Dimension Vehicle

Purpose: To store detailed information about vehicles.

- **VehicleID**: Unique identifier for each vehicle, this is the primary key.
- **Make**: The manufacturer of the vehicle, useful for brand-specific analysis.
- **Model**: The specific model of the vehicle, helps in understanding which models are frequently serviced.
- **Year**: The year the vehicle was manufactured, important for age-related analysis and trends.
- **Color**: The color of the vehicle, although it is less critical, it can be useful for detailed segmentation.
- **VIN**: Vehicle Identification Number, unique to each vehicle and useful for precise tracking.
- **RegistrationNumber**: The registration number of the vehicle. Useful for legal and administrative purposes.
- **Mileage**: The mileage of the vehicle, important for understanding wear and tear and service frequency.

This table provides a comprehensive view of the vehicles serviced, enabling analysis by make, model, and other vehicle-specific attributes.

Dimension Service

Purpose: To store detailed information about services provided.

- **ServiceID**: Unique identifier for each service, this is the primary key.
- **JobDescription**: Description of the service job, helps in understanding the nature of services provided.
- **Rate**: The rate charged for the service, important for revenue analysis.
- **Hours**: Number of hours spent on the service, useful for labor cost analysis.

This table captures details about the services provided, enabling analysis of service types, labor hours, and associated costs.

Dimension Parts

Purpose: To store detailed information about parts used.

- **PartID**: Unique identifier for each part, this is the primary key.
- **PartName**: The name of the part, helps in identifying the part.
- **PartNumber**: The part number, useful for precise identification and inventory management.
- **UnitPrice**: The price per unit of the part, important for cost analysis.

This table provides detailed information about the parts used in repairs, enabling analysis of part usage, costs, and inventory management.

Dimension Location

Purpose: To store detailed information about shop locations.

- **LocationID**: Unique identifier for each location, this is the primary key.
- **LocationName**: The name of the shop location, it is useful for identifying different branches.
- **Address**: The address of the shop location, important for geographic analysis and logistics.

This table helps in analyzing sales performance across different repair centers, providing insights into location-based performance.

Dimension Date

Purpose: To store detailed information about dates.

- **DateID**: Unique identifier for each date, this is the primary key.
- **Date**: The actual transaction date, this is critical for time-based analysis.
- **DueDate**: The due date of the invoice, useful for payment tracking and analysis.
- **Year**: The year of the transaction, it enables annual analysis.
- **Quarter**: The quarter of the year (1 to 4), useful for seasonal analysis.
- **Month**: The month of the transaction, important for monthly trend analysis.

This table allows for detailed time-based analysis, helping to identify trends, seasonality, and other temporal patterns in the sales data.

Fact Invoice

Purpose: To store quantitative data related to sales transactions.

- **InvoiceID**: Unique identifier for each invoice, this is the primary key.
- **CustomerID**: Foreign key referencing Dimension_Customer(CustomerID), links the invoice to the customer.
- **VehicleID**: Foreign key referencing Dimension_Vehicle(VehicleID), links the invoice to the vehicle.
- **ServiceID**: Foreign key referencing Dimension_Service(ServiceID), links the invoice to the service.
- **PartsID**: Foreign key referencing Dimension_Parts(PartID), links the invoice to the parts.
- **LocationID**: Foreign key referencing Dimension_Location(LocationID), links the invoice to the location.
- **DateID**: Foreign key referencing Dimension_Date(DateID), links the invoice to the date.
- **Total_Labour**: Total labor charges on the invoice, reflects the revenue from services.
- **Total_Parts**: Total parts charges on the invoice, reflects the revenue from parts.
- **Sales_Tax**: Sales tax amount on the invoice, important for financial analysis.
- **Total_Sales**: Overall total amount of the invoice, represents the total revenue.
- **Quantity**: Number of parts used, useful for inventory and usage analysis.

The FactInvoice table consolidates all relevant quantitative data from the sales transactions, providing a comprehensive view for analysis. By linking to the dimension tables, it supports detailed, multi-dimensional analysis of sales performance.

Design Decisions

When designing the dimensional data model based on the sales receipt, the following logical decisions were made to ensure the model fulfills the business requirements for analyzing sales performance:

- **Fact Table Design**

The Fact Invoice table is designed to store quantitative data related to sales transactions, including foreign keys to dimension tables for detailed analysis. This design allows for comprehensive sales performance analysis by various dimensions such as customer, vehicle, service, parts, location, and date.

- **Dimension Table Design**

Each dimension table is designed to store qualitative data relevant to the analysis of sales performance. These tables support the fact table by providing detailed attributes for slicing and dicing the sales data.

- **Customer Dimension**

The customer information is crucial for analyzing sales performance by customer demographics and behavior. Storing this information in a dedicated dimension table allows for easy access and detailed analysis of customer-related data.

- **Vehicle Dimension**

Vehicle details are important for analyzing sales performance by vehicle brand, model, and year. This table helps in understanding which types of vehicles are more frequently serviced and the associated revenue.

- **Service Dimension**

Detailed service information is essential for analyzing the types of services provided and their profitability. This table allows for detailed analysis of service-related sales.

- **Parts Dimension**

Parts sales are a significant component of the total sales. This table allows for tracking parts usage and analyzing sales performance by different parts.

- **Location Dimension**

Location data is important for analyzing sales performance by different repair centers. This table enables location-based analysis, helping to identify high-performing locations and areas for improvement.

- **Date Dimension**

Time-based analysis is crucial for understanding sales trends and seasonality. This table provides the necessary attributes for detailed time-based analysis, enabling comparisons over different periods.

- **FactInvoice Table**

The FactInvoice table consolidates all quantitative data from sales transactions, linking them to relevant dimensions. This design allows for comprehensive analysis across multiple dimensions, providing insights into overall sales performance.

By structuring the tables in this manner, the model achieves the flexibility and comprehensiveness required for detailed sales analysis. The separation of facts and dimensions ensures that the model is scalable, easy to query, and capable of supporting a wide range of analytical needs.