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|  | Car Industry Data Warehousing Project  Data Design Document    Version 1.0 |



National University of Computer and Emerging Sciences (NUCES-FAST), Lahore

**Group ID**

DW\_F19\_Group03

**Project Team**

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Revision History

|  |  |  |  |
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| **Date** | **Version** | **Description** | **Author** |
| October 1, 2018 | 1.0 | Revision of the whole document, identified discrepancy in the E.R. diagram. | |
| October 3, 2018 | 1.0 | Finalized E.R. Diagram and review of the Target system along with the dimensional system. | |
| October 9, 2018 | 1.0 | Finalized document and review carried out. |  |

Job Log

|  |  |  |  |
| --- | --- | --- | --- |
| Job Performed | Performed By | Job Description | Time Taken |
| E.R. diagrams. | Bilal  Samad  Abu Sufyan  Mubarak | Involved transfer of E.R. diagrams from paper into Erwin, identify and fill holes. | 2 days |
| Introduction, scope,  requirements and Integrated Target database Design and Data dictionaries | Bilal | Combine all the E.R.models into one target system | 3 Days |
| Data Mart 1 (Logical, Physical, Data Dictionary) | Bilal, Abu Sufyan | Designing logical, physical and creating data dictionary for the mart. | 1 day |
| Data Mart 2 (Logical, Physical, Data Dictionary) | Samad, Bilal | Designing logical, physical and creating data dictionary for the mart. | 4 days |
| Data Mart 3 (Logical, Physical, Data Dictionary) | Mubarak, Bilal | Designing logical, physical and creating data dictionary for the mart. | 1 day |
| Data Mart 1, 3 SQL SCRIPTS AND TABLES | Bilal | SQL Data model and scripts for data insertions. | 1 day |
| Data Mart 2 SQL SCRIPTS AND TABLES | Samad | SQL Data model and scripts for data insertions. | 2 days |
| Document Integration | Bilal | Getting Data from all teammates and merging it | 4 days |
| Document Editing | Bilal, Mubarak | Document Editing and Setting Font Size etc Headers, Footers | 1 Day |

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**Data Design Document**

# 

# Introduction

## Purpose

The purpose of writing this document is to give a detailed view of the project (Car Industry Data Warehouse). How are the things defined in the project and their association with each other. Also, the document gives a deep insight into the design of the project, having focus on its implementation. The audience for this document can be users using the data warehouse and all those developers, building the data warehouses on the same lines. We hope, this would give them, useful information and steps, to carry out things. This document provides all the tiny details of data warehousing creation such as normalized design of the data warehouse, dimensional design of the data warehouse.

This document is not only helpful for the users of the data warehouse because it provides necessary implementation and design information but it is equally helpful for the Software designers for further maintenance of the software.

## Scope

The design of the Ushape data warehouse will allow users (executives) of Car Industry Data Warehouse to more easily and efficiently monitor the business activities like Sales, Services, and Parts Supply. Our product aims to improve the user's business efficiency through a well defined and easy-to-navigate data warehouse.

This document covers much of the design ideas and main implementation features of the Car Industry data warehouse. Section 1.0 provides an introduction of the project, Section 2.0 provides a Project Overview while In Section 3.0 a high level Plan for the project including Target ER model design and the Target Dimensional Data Marts Designs.

There are basically three major OLTP systems involved in the product development and they are:

1. Car Sales Module
2. Car Service Center
3. Car Parts Suppliers

So all the car sales,parts and services invoices will be done by getting the information from these modules and the Resulting Data Warehouse will include the corresponding three Data marts of the data Warehouse.

This document is aimed to provide necessary information for the users and the developers to guide them for future use or maintenance respectively. This document is aimed to provide the executives a Q&A reference. We have tried to make it clear and understandable containing all needed information. Some very minor information may be not discussed in the document, otherwise it should be considered as a complete design specification document for Ushape data warehouse.

**Definitions, Acronyms and Abbreviations:**

**Car Industry** Car Sales,Parts and Services Corporation

**Q&A** An abbreviation for "Question and Answer."

**SRS** Software Requirements Specification

**GUI** (Graphical User Interface) - a visually based application that serves to provide an interactive medium between the user and the application.

**E-R** Entity-Relationship

**CSM** Car Sales Module

**CSC** Car Service Centre

**CPS** Car Parts Supplier

**ETL** Extraction, Transformation and Loading (of data for Data warehouse)

**DW** Abbreviation of Data Warehouse

**SRS** Software Requirements Specification

**SDS** Software Design Specifications

**GUI** (Graphical User Interface) - a visually based application that serves to provide an Interactive medium between the user and the application.

**OLTP** Online Transaction Processing Systems (Operational Systems)

**BI**  business Intelligence

## References

*Data Warehousing Fundamentals,* Paulraj Ponniah

Building the Data Warehouse, W. H. Inmon

# Project Overview

## 2.1. Project Description

This project deals with Car Industry Corporation features a directory of Pakistan’s best car services provider, in this corporation a customer can view the most featured cars on specified time. it features different modules like sales, services(repairing), parts suppliers. it also covers cars features, categories, manufacturers, description, service details providing a detailed view regarding service i.e mechanic, parts ordered.

## 2.2. Goals

The goals of the project are categorized as following:

• Build a data warehouse Build a small data warehouse for Car Industry Corporations that integrates the given three systems **Car Sales Module**, **Car Service Center**, **Car Parts Suppliers** systems being used by the corporation and helps them in analyzing the business.

• The system must provide data in such a form, which is readily available for the analysis purpose.

• The system must be optimized for complex queries.

• Getting a clear picture of requirements and that will ultimately lead to a better data warehouse design.

## . Scope

The scope of the target system mainly covers following business processes.

* Which car is on demand the most?
* How many customers bought a particular car?
* Which car features are most preferred by customers?
* Which manufacture cars mostly came for service?
* Which mechanic resolved cars issues the most?
* Which is the most demanding car part?
* Which car model part is most demanding?
* Who are most valuable car parts suppliers?

## . High Level User Requirements

The required system is a data warehouse system, which is used for business

Analysis purposes. The major analysis needs of the customer are as following:

* Which car is on demand the most?
* How many customers bought a particular car?
* Which car features are most preferred by customers?
* Which manufacture cars mostly came for service?
* Which mechanic resolved cars issues the most?
* Which is the most demanding car part?
* Which car model part is most demanding?
* Who are most valuable car parts suppliers?

## 

**2.3. Source Design**

## 

2.3.1 Car Sales Module

***Data Model:***

**Customers:**

|  |  |  |  |
| --- | --- | --- | --- |
| **Table name** | Customer | **Database name** | Car Sale Module |
| **Description** | This will provide information regarding customers. | | |
| **Attributes** | Customer \_id, email, phone | | |
| **Primary keys** | Customer \_id | | |
| **Foreign keys** | - | | |

|  |  |  |  |
| --- | --- | --- | --- |
| **Attribute Name** | **Description** | **Data type** | **Domain Constraint** |
| Customer \_id | It is the unique customer ssn or id | DECIMAL(10) | PK |
| Email | It will tell the email of the customer | CHAR(30) | - |
| Phone | It will tell the contact number of the customer | CHAR(18) | - |

# Customer Preferences:

|  |  |  |  |
| --- | --- | --- | --- |
| **Table name** | Customer Preferences | **Database name** | Car Sale Module |
| **Description** | This will provide information regarding customers preferences. | | |
| **Attributes** | Customer\_preference\_id, car\_feature\_id, customer\_id, customer\_preference\_details | | |
| **Primary keys** | Customer \_preference\_id | | |
| **Foreign keys** | Customer\_id, car\_feature\_id | | |

|  |  |  |  |
| --- | --- | --- | --- |
| **Attribute Name** | **Description** | **Data type** | **Domain Constraint** |
| Customer pref id | It will uniquely store the value of customer pref | DECIMAL(10) | PK |
| Car Feature id | provides the value regarding car feature | DECIMAL(10) | FK |
| Customer id | It will store the value of customer key | DECIMAL(10) | FK |
| Customer pref details | provides the information regarding customer pref | CHAR(18) | - |

**Car Features:**

|  |  |  |  |
| --- | --- | --- | --- |
| **Table name** | Car Features | **Database name** | Car Sale Module |
| **Description** | This will provide information regarding car features. | | |
| **Attributes** | Customer\_feature\_id, car\_feature\_desc | | |
| **Primary keys** | Customer\_feature\_id | | |
| **Foreign keys** | - | | |

|  |  |  |  |
| --- | --- | --- | --- |
| **Attribute Name** | **Description** | **Data type** | **Domain Constraint** |
| Customer Feature id | It will uniquely store the value of customer feature key | DECIMAL(10) | PK |
| Car Feature Desc | provides the information regarding car feature | CHAR(18) | - |

**Features on Car for Sale:**

|  |  |  |  |
| --- | --- | --- | --- |
| **Table name** | Features on cars for sale | **Database name** | Car Sale Module |
| **Description** | This will provide information regarding features on cars which are on the sale.. | | |
| **Attributes** | Car\_for\_sale\_id, car\_Feature\_id | | |
| **Primary keys** | Car\_for\_sale\_id, car\_Feature\_id | | |
| **Foreign keys** | - | | |

|  |  |  |  |
| --- | --- | --- | --- |
| **Attribute Name** | **Description** | **Data type** | **Domain Constraint** |
| Car for sale id | It will compositely store the value of car for sale key | DECIMAL(10) | PK |
| Car feature id | It will compositely store the value of car feature key | DECIMAL(10) | PK |

**Cars Sold**

|  |  |  |  |
| --- | --- | --- | --- |
| **Table name** | Cars Sold | **Database name** | Car Sale Module |
| **Description** | This will provide information regarding cars which are sold.. | | |
| **Attributes** | Car\_sold\_id, car\_for\_sale\_id, customer\_id, agreed\_price, date\_sold, other\_details | | |
| **Primary keys** | Car\_sold\_id | | |
| **Foreign keys** | car\_for\_sale\_id, customer\_id | | |

|  |  |  |  |
| --- | --- | --- | --- |
| **Attribute Name** | **Description** | **Data type** | **Domain Constraint** |
| Car sold id | It will uniquely store the value of car sold key | DECIMAL(10) | PK |
| Cars for sale id | provides the value regarding car for sale key | DECIMAL(10) | FK |
| Customer id | provides the value regarding customer key | DECIMAL(10) | FK |
| Agreed price | provides the value regarding price | DECIMAL(10) | - |
| Date sold | provides the date information regarding sale | DATE TIME | - |
| Other details | provides the information regarding other details | CHAR(18) | - |

**Cars for Sale**

|  |  |  |  |
| --- | --- | --- | --- |
| **Table name** | Cars for Sale | **Database name** | Car Sale Module |
| **Description** | This will provide information regarding cars which are for sale.. | | |
| **Attributes** | car\_for\_sale\_id, manufacturer\_shortname, model\_code, vehicle\_category\_code, asking\_price, current\_mileage, date\_acquired, registeration\_year, other\_car\_details | | |
| **Primary keys** | Car\_for\_sale\_id | | |
| **Foreign keys** | manufacturer\_shortname, model\_code, vehicle\_category\_code, registration\_year | | |

|  |  |  |  |
| --- | --- | --- | --- |
| **Attribute Name** | **Description** | **Data type** | **Domain Constraint** |
| Cars for sale id | It will uniquely store the addresses. | DECIMAL(10) | PK |
| Manufacturer shortname | provides the information regarding Permanent address. | CHAR(18) | FK |
| Model code | provides the information regarding Secondary Address. | DEICMAL(10) | FK |
| Vehicle category code | provides the information regarding town name | DECIMAL(10) | FK |
| Asking price | provides the information regarding city name | DECIMAL(10) | - |
| Current mileage | provides the information regarding state name | FLOAT | - |
| Date acquired | provides the information regarding region name | DATE TIME | - |
| Registeration year | provides the information regarding zip code | DATE (YAER) | FK |
| Other car details |  | CHAR(18) | - |

**Cars Models**

|  |  |  |  |
| --- | --- | --- | --- |
| **Table name** | Cars Models | **Database name** | Car Sale Module |
| **Description** | This will provide information regarding car models. | | |
| **Attributes** | model\_code, manufacturer\_code, model\_name | | |
| **Primary keys** | Model\_code | | |
| **Foreign keys** | - | | |

|  |  |  |  |
| --- | --- | --- | --- |
| **Attribute Name** | **Description** | **Data type** | **Domain Constraint** |
| Model code | It will uniquely store the addresses. | DECIMAL(10) | PK |
| Manufacturer code | provides the information regarding Permanent address. | DECIMAL(10) | - |
| Model name | provides the information regarding Secondary Address. | CHAR(18) | - |

**Car Manufacturers**

|  |  |  |  |
| --- | --- | --- | --- |
| **Table name** | Cars Manufacturer | **Database name** | Car Sale Module |
| **Description** | This will provide information regarding manufacturers of the car | | |
| **Attributes** | manufacturer\_shortname, manufacturer\_fullname, manufacturer\_otherdetails | | |
| **Primary keys** | Manufacturer\_shortname | | |
| **Foreign keys** | - | | |

|  |  |  |  |
| --- | --- | --- | --- |
| **Attribute Name** | **Description** | **Data type** | **Domain Constraint** |
| Manufacturer shortname | It will uniquely store the addresses. | CHAR(18) | PK |
| Full name | provides the information regarding Permanent address. | CHAR(50) | - |
| Other details | provides the information regarding Secondary Address. | CHAR(50) | - |

**Vehicle Categories**

|  |  |  |  |
| --- | --- | --- | --- |
| **Table name** | Vehicle Categories | **Database name** | Car Sale Module |
| **Description** | This will provide information regarding Vehicle categories. | | |
| **Attributes** | vehicle\_category\_code, vehicle\_category\_desc | | |
| **Primary keys** | Vehicle\_category\_code | | |
| **Foreign keys** | - | | |

|  |  |  |  |
| --- | --- | --- | --- |
| **Attribute Name** | **Description** | **Data type** | **Domain Constraint** |
| Vehicle Category code | It will uniquely store the addresses. | DECIMAL(10) | PK |
| Vehicle Category Desc | provides the information regarding Permanent address. | CHAR(50) | - |

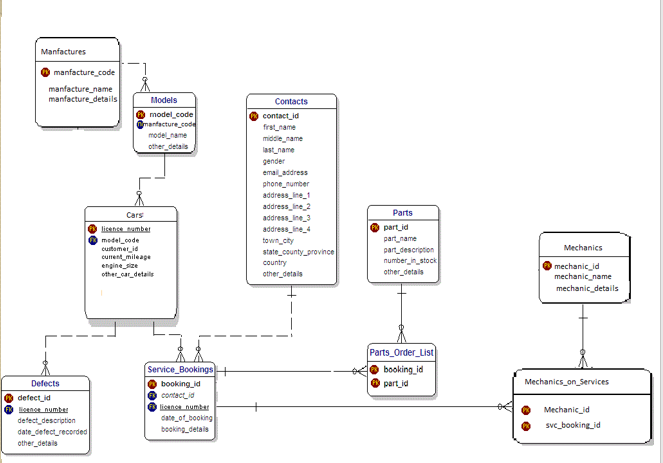
**Address Dim:**

|  |  |  |  |
| --- | --- | --- | --- |
| **Table name** | Addresses | **Database name** | Sales Information System |
| **Description** | This will provide information regarding addresses. | | |
| **Attributes** | adderess\_id, Permanent address, Secondary address, town, City, State, Country, Zip, Customer id | | |
| **Primary keys** | adderess\_id | | |
| **Foreign keys** | - | | |

|  |  |  |  |
| --- | --- | --- | --- |
| **Attribute Name** | **Description** | **Data type** | **Domain Constraint** |
| adderess\_id | It will uniquely store the addresses. | DECIMAL(10) | PK |
| Permanent Address | provides the information regarding Permanent address. | CHAR(50) | - |
| Secondary Address | provides the information regarding Secondary Address. | CHAR(50) | - |
| Town | provides the information regarding town name | CHAR(18) | - |
| City | provides the information regarding city name | CHAR(18) | - |
| State | provides the information regarding state name | CHAR(18) | - |
| Region | provides the information regarding region name | CHAR(18) | - |
| Zip | provides the information regarding zip code | DECIMAL(6) | - |
| Customer id |  | CHAR(18) | FK |

2.3.2 Order Tracking System

***Data Model:***



***Contacts***

|  |  |  |  |
| --- | --- | --- | --- |
| **Table name** | Contacts | **Database name** | Car Service Center Module |
| **Description** | This will provide information regarding Contacts of Customer for Car Service Center. | | |
| **Attributes** | Contact\_id, first\_name, middle\_name, last\_name, gender, email\_address, phone\_number, address\_line1, address\_line2, address\_line3, address\_line4, town\_city, state\_country\_province, country, other\_details | | |
| **Primary keys** | Contact\_id | | |
| **Foreign keys** | - | | |

|  |  |  |  |
| --- | --- | --- | --- |
| **Attribute Name** | **Description** | **Data type** | **Domain Constraint** |
| Contact\_id | It will uniquely store the Contacts. | DECIMAL(10) | PK |
| First Name | provides the information regarding First Name.. | CHAR(50) | - |
| Middle Name | provides the information regarding Middle Name. | CHAR(50) | - |
| Last Name | provides the information regarding Last name | CHAR(18) | - |
| Gender | provides the information regarding Gender | CHAR(5) | - |
| Email | provides the information regarding email | CHAR(30) | - |
| Phone Number | provides the information regarding Customer Phone Number | CHAR(25) | - |
| Address Line 1 | provides the information regarding Address Line 1 | Char(100) | - |
| Address Line 2 | Provides the information regarding Address Line 2 | CHAR(100) | - |
| Address Line 3 | Provides the information regarding Address Line 2 | CHAR(100) | - |
| Address Line 4 | Provides the information regarding Address Line 3 | CHAR(100) | - |
| Town\_city | Provides information regarding town city | CHAR(100) | - |
| State Country Province | Provides information regarding State | CHAR(20) | - |
| Other Details | Provides information regarding customer other details | CHAR(100) | - |

***Service Bookings***

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Table name** | Service bookings | **Database name** | Car Service Center Module | |
| **Description** | This will provide information regarding Service Booking for Car Service Center. | | | |
| **Attributes** | Booking\_id, contact\_id, licence\_number,date\_of\_booking, booking\_deatils | | | |
| **Primary keys** | Booking\_id | | | |
| **Foreign keys** | Licence\_number, Contact\_id, license\_number | | | |
| **Attribute Name** | | **Description** | **Data type** | **Domain Constraint** |
| Booking\_id | | It will uniquely store the Contacts. | DECIMAL(10) | PK |
| Contact\_id | | provides the information Contact | DECIMAL(10) | FK |
| Licence\_number | | provides the information regarding License Number | CHAR(50) | FK |
| Date\_of\_booking | | provides the information regarding Booking Date | Date | - |
| Booking\_details | | provides the information regarding Booking Details | CHAR(500) | - |

**Cars**:

|  |  |  |  |
| --- | --- | --- | --- |
| **Table name** | Cars | **Database name** | Car Service Center Module |
| **Description** | This will provide information regarding cars for service. | | |
| **Attributes** | License\_number, model\_code, customer\_id, current\_mileage, engine\_size, other\_car\_details | | |
| **Primary keys** | License\_number | | |
| **Foreign keys** | Model\_code | | |

|  |  |  |  |
| --- | --- | --- | --- |
| **Attribute Name** | **Description** | **Data type** | **Domain Constraint** |
| License\_number | It is the unique License Number assigned for car. | DECIMAL(10) | PK |
| Model\_code | It will tell the Model code for car | CHAR(40) | - |
| Customer\_id | It will tell the customer id to uniqly identify customer | DECIMAL(10) | - |
| Current\_Mileage | It will tell the current Mileage of car | DECIMAL(10) | - |
| Engine\_size | It will tell the Engine Size of Car | DECIAML(10) | - |
| Other\_car\_details | It will tell the otoher car details. | CHAR(500) | - |

**Defects**:

|  |  |  |  |
| --- | --- | --- | --- |
| **Table name** | Defects | **Database name** | Car Sales Service Module |
| **Description** | This will provide information regarding Car Defects. | | |
| **Attributes** | Defect\_id, license\_number, defect\_description, date\_defect\_recorded, other\_detials | | |
| **Primary keys** | Defects\_id | | |
| **Foreign keys** | License\_number | | |

|  |  |  |  |
| --- | --- | --- | --- |
| **Attribute Name** | **Description** | **Data type** | **Domain Constraint** |
| Defect\_id | Defect id of each product | DECIMAL(10) | PK |
| License\_number | Licence number for each defected car | DECIMAL(10) | - |
| Defect\_description | Details about defect | CHAR(100) | - |
| Date\_defect\_recorder | Date first defect occurred | DATE | - |
| Other\_Details | Other details regarding defect | CHAR(200) | - |

**Manufacturers**:

|  |  |  |  |
| --- | --- | --- | --- |
| **Table name** | Manufacturers | **Database name** | Car Sales Service Center Module |
| **Description** | This will provide information regarding car manufacturers for specific car | | |
| **Attributes** | Manufacturer code, manufacturer\_name, manufacturer\_details | | |
| **Primary keys** | Manufacturer\_code | | |
| **Foreign keys** | - | | |

|  |  |  |  |
| --- | --- | --- | --- |
| **Attribute Name** | **Description** | **Data type** | **Domain Constraint** |
| Manufacturer\_code | It will tell the unique manufacturer code for each manufactuerer | DECIMAL(10) | PK |
| Manufacturer\_Name | It will uniqely tells the name of each Manufactuer. | CHAR(100) | FK |
| Manufacturer\_details | It will tell the manufacturer details for each manufacturer | CHAR(300) | FK |

**Models**:

|  |  |  |  |
| --- | --- | --- | --- |
| **Table name** | Models | **Database name** | Car Service Center Module |
| **Description** | This will provide information regarding ordered items. | | |
| **Attributes** | Model\_code, manufacturer\_code, model\_name, other\_details | | |
| **Primary keys** | Model\_code | | |
| **Foreign keys** | Manufacturer\_code | | |

|  |  |  |  |
| --- | --- | --- | --- |
| **Attribute Name** | **Description** | **Data type** | **Domain Constraint** |
| Model\_code | Tells the unique Model code for each car | DECIMAL(10) | PK |
| Manufacturer\_code | It will give manufacturer code referring to manufacturer for each model | DECIMAL(10) | FK |
| Model\_name | Tells the model name | CHAR(50) | - |
| Order\_details | It will tell the other details for the model | CHAR(200) | - |

**Parts**:

|  |  |  |  |
| --- | --- | --- | --- |
| **Table name** | Parts | **Database name** | Sales Service Center Module |
| **Description** | This will tell Parts details in Sales Service Center Module | | |
| **Attributes** | Part\_id, part\_name, part\_description, number\_in\_stock | | |
| **Primary keys** | Part\_id | | |
| **Foreign keys** | - | | |

|  |  |  |  |
| --- | --- | --- | --- |
| **Attribute Name** | **Description** | **Data type** | **Domain Constraint** |
| Part\_id | It will uniquely identify each part | DECIMAL(10) | PK |
| Part\_name | Provides part name for each part | CHAR(100) | - |
| Part\_Description | Provides Part Description for each part | CHAR(200) | - |
| Number\_in\_stock | Provides stock details i.e availablitiy for each part | DECIMAL(3) | - |
| Other\_deatils | Provides other details regarding each part | CHAR(200) | - |

**Mechanics On Service**:

|  |  |  |  |
| --- | --- | --- | --- |
| **Table name** | Mechanics On Service | **Database name** | Sale Service Center Module |
| **Description** | This will provide details of on service mechanics for Sales Service Center Module | | |
| **Attributes** | Mechanic\_id, svc\_booking\_id | | |
| **Primary keys** | Mechanic\_id | | |
| **Foreign keys** | Svc\_booking\_id, Mechanic\_id | | |

|  |  |  |  |
| --- | --- | --- | --- |
| **Attribute name** | **Description** | **Data type** | **Domain Constraint** |
| Mechanic\_id | Provides unique identifier for mechanic may be mechanic ssn or nic | CHAR(18) | PK, FK |
| Svc\_booking\_id | Provides the service booking id for each mechanic i.e on which car he is working | DECIMAL(10) | FK, PK |

**Mechanic**:

|  |  |  |  |
| --- | --- | --- | --- |
| **Table name** | Mechanic | **Database name** | Sales Service Center Module |
| **Description** | This will provide details of mechanics | | |
| **Attributes** | Mechanic\_id, mechanic\_name, mechanic\_details | | |
| **Primary keys** | Mechanic\_id | | |
| **Foreign keys** | - | | |

|  |  |  |  |
| --- | --- | --- | --- |
| **Attribute name** | **Description** | **Data type** | **Domain Constraint** |
| Mechanic\_id | Unique identifier for each mechanic SSN/NIC | DECIMAL(10) | PK |
| Mechanic Name | Provides mechanic name | CHAR(20) | - |
| Mechanic\_Adress | Provides Adress of Mechanic | CHAR(50) | - |
| Mechanic\_PhoneNo | Provides Phone no for each mechanic | DECIMAL(20) | - |

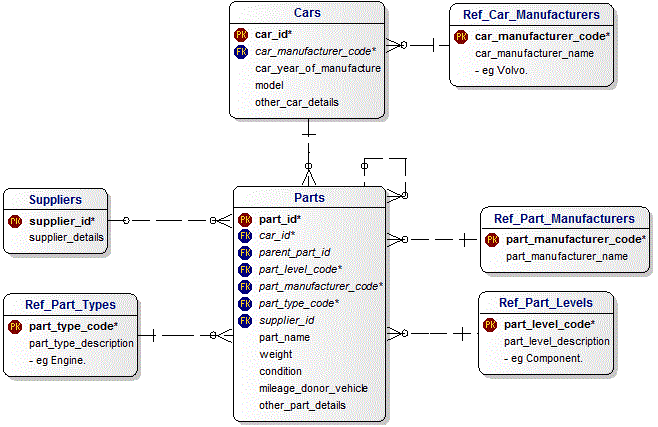
**Parts Order List**:

|  |  |  |  |
| --- | --- | --- | --- |
| **Table name** | Parts Order List | **Database name** | Sale Service Center Module |
| **Description** | This will provide information regarding Parts order for Sale Service Center | | |
| **Attributes** | Booking\_id, part\_id | | |
| **Primary keys** | Booking\_id,part\_id | | |
| **Foreign keys** | Booking\_id,part\_id | | |

|  |  |  |  |
| --- | --- | --- | --- |
| **Attribute Name** | **Description** | **Data type** | **Domain Constraint** |
| Booking\_id | Provides booking id for each car requiring parts | DECIMAL(10) | PK,FK |
| Part\_id | Provides Part id for each | DATE | FK |

2.3.3 Car Sales Module

***Data Model:***



***Data Dictionary:***

1. **Suppliers:**

|  |  |  |  |
| --- | --- | --- | --- |
| **Table name** | Supplier | **Database name** | Cars Parts Suppliers |
| **Description** | This will provide information regarding supplier of cars parts | | |
| **Attributes** | Supplier\_id, supplier\_details | | |
| **Primary keys** | Supplier\_id | | |
| **Foreign keys** | - | | |

|  |  |  |  |
| --- | --- | --- | --- |
| Supplier\_id | It is the unique supplier SSN or CNIC | DECIMAL(10) | PK |
| Supplier\_details | It will tell more about supplier | CHAR(30) | - |

# Ref\_Part\_Types:

|  |  |  |  |
| --- | --- | --- | --- |
| **Table name** | Ref\_part\_types | **Database name** | Cars parts supplier |
| **Description** | This will provide information regarding parts of cars | | |
| **Attributes** | Part\_type\_code, part\_type\_description e.g Engine | | |
| **Primary keys** | Part\_type\_code | | |
| **Foreign keys** | - | | |

|  |  |  |  |
| --- | --- | --- | --- |
| **Attribute Name** | **Description** | **Data type** | **Domain Constraint** |
| Part\_type\_code | It will uniquely store the part type | DECIMAL(10) | PK |
| Part\_type\_description | provides the information regarding part type. | CHAR(18) | - |

1. **Cars:**

|  |  |  |  |
| --- | --- | --- | --- |
| **Table name** | Cars | **Database name** | Cars parts module |
| **Description** | This will provide information regarding cars. | | |
| **Attributes** | Cars\_id, car\_manufacturer\_code, car\_year\_of\_mafnufacture, model, other\_car\_details | | |
| **Primary keys** | Car\_id | | |
| **Foreign keys** | Car\_manufactureer\_code | | |

|  |  |  |  |
| --- | --- | --- | --- |
| **Attribute Name** | **Description** | **Data type** | **Domain Constraint** |
| Car\_id | It will uniquely store cars | DECIMAL(10) | PK |
| Car\_manufacturer\_Code | Provides information of car manufacturer | DECIMAL(10) | FK |
| Car\_year\_of\_manufacture | Provides informantion of year of manufacture | CHAR(4) | - |
| Model | Information of model | CHAR(18) | - |
| Other\_car\_details | Other specific details of car | CHAR(180) | - |

1. **Parts:**

# 

|  |  |  |  |
| --- | --- | --- | --- |
| **Table name** | Parts | **Database name** | Cars Parts Module |
| **Description** | This will provide information regarding Parts use for that car.. | | |
| **Attributes** | Part\_id, car\_id, parent\_part\_id, part\_level\_code, part\_manufacturere\_code, part\_type\_code, supplier\_id, part\_name, weight, condition, mileage\_donor\_vehicle, othwer\_parts\_details | | |
| **Primary keys** | Part\_id | | |
| **Foreign keys** | Car\_id, parent\_part\_id, parent\_level\_code, part\_manufacturer\_code, part\_type\_code, supplier\_id | | |

|  |  |  |  |
| --- | --- | --- | --- |
| **Attribute Name** | **Description** | **Data type** | **Domain Constraint** |
| Part\_id | Uniquely identifies part of car | DECIMAL(10) | PK |
| Car\_id | Id of car | DECIMAL(10) | FK |
| Parent\_part\_id | id of parent of part | DECIMAL(10) | FK |
| Part\_level\_code | Id of part level of reference | DECIMAL(10) | FK |
| Part\_manufacturer\_code | Information of part manufacturer | DECIMAL(10) | FK |
| Part\_type\_code | Information of part type | DECIMAL(10) | FK |
| Supplier\_id | Id of supplier | DECIMAL(10) | FK |
| Part\_name | Name of part | CHAR(50) | - |
| Weight | Weight of part | CHAR(50) | - |
| Condition | Current condition of part | CHAR(50) | - |
| Mileage)donor\_vehicle | Mileage of donor vehicle | CHAR(50) | - |
| Other part details | Other all details | CHAR(50) | - |

1. **Reference Car Manufacturers**

|  |  |  |  |
| --- | --- | --- | --- |
| **Table name** | Ref\_car\_manufacturers | **Database name** | Cars parts module |
| **Description** | This will provide information regarding car parts manufacturers | | |
| **Attributes** | Car\_manufacturer\_code, car\_manufacturer\_name | | |
| **Primary keys** | Car\_manufacture\_code | | |
| **Foreign keys** | - | | |

|  |  |  |  |
| --- | --- | --- | --- |
| **Attribute Name** | **Description** | **Data type** | **Domain Constraint** |
| Car manufacturer code | It will uniquely store the car manufacturer | DECIMAL(10) | PK |
| Car manucturere name | provides the information regarding car manufacturer name e.g volvo | CHAR(20) | - |

1. **Ref\_Part\_Manufacturers:**

|  |  |  |  |
| --- | --- | --- | --- |
| **Table name** | Ref\_part\_manufcturers | **Database name** | Cars parts module |
| **Description** | This will provide information regarding cars parts manufacturer | | |
| **Attributes** | Part\_manufacturer\_code. Part\_manufucturer\_name | | |
| **Primary keys** | Part\_manufcturere\_code | | |
| **Foreign keys** | - | | |

|  |  |  |  |
| --- | --- | --- | --- |
| **Attribute Name** | **Description** | **Data type** | **Domain Constraint** |
| Part\_manufturer\_code | It will uniquely store the car part manufacturer | DECIMAL(10) | PK |
| Part\_manufcturer\_name | provides the information regarding car part manufacturer. | CHAR(50) | - |

1. **Ref\_part\_levels:**

|  |  |  |  |
| --- | --- | --- | --- |
| **Table name** | Ref\_Part\_Levels | **Database name** | Cars parts module |
| **Description** | This will provide information regarding part levels | | |
| **Attributes** | Part\_level\_code, part\_level\_description | | |
| **Primary keys** | Part\_level\_code | | |
| **Foreign keys** | - | | |

|  |  |  |  |
| --- | --- | --- | --- |
| **Attribute Name** | **Description** | **Data type** | **Domain Constraint** |
| Part\_level\_code | It will uniquely store the part level | DECIMAL(10) | PK |
| Part\_level\_description | provides the information regarding part level | CHAR(40) | - |

**Data Marts Design**

Data Mart 1 – Sales Information System

### **Logical Model**

#### Customer Dimension

|  |  |  |
| --- | --- | --- |
| **Attribute Name** | **Description** | **Sample Values** |
| Customer\_id  Cell\_mobile\_phone  Email\_Address  Other\_details | It keeps the value of a particular customer which will be unique  It keeps the customer’s phone number  It keeps the customer’s email address  It keeps the customer’s other remaining details | C1  03096898062  Sufyan.javed99@gmail.com  DOB |

#### Customer Preference Dimension:

|  |  |  |
| --- | --- | --- |
| **Attribute Name** | **Description** | **Sample Values** |
| Customer\_pref\_id  Customer pref details | It keeps the value of a particular customer which will be unique  It keeps the customer’s preferences other remaining details | P1  DOB |

#### Car Feature Dimension:

|  |  |  |
| --- | --- | --- |
| **Attribute Name** | **Description** | **Sample Values** |
| Car\_feature\_id  Car Feature Desc | It keeps the value of a particular customer which will be unique  It keeps the car features other remaining details | F1  Air Conditioning |

Address Dimension

|  |  |  |
| --- | --- | --- |
| **Attribute Name** | **Description** | **Sample Values** |
| address\_id  address\_line  town\_city  state\_County\_province  Country  Post\_zip\_code  Other\_detail | It keeps the value of a particular address  It keeps the information regarding address line  It keeps the information of city/town  It keeps the information of state/province  It keeps the information of Country  It keeps the information of postal zip code  It keeps the information of other details | A1  BOR  Lahore  Punjab  Pakistan  54000  Johar Town |

Car Dimension

|  |  |
| --- | --- |
| **Attribute Name** | **Description** |
| car\_id  car\_desc  model\_id  model\_desc manufacturer\_id  manufacturer\_desc  vehicle\_category\_id  vehicle\_category\_desc | It keeps the value of a particular car  It keeps the information regarding a particular car  It keeps the value of a particular model  It keeps the information regarding a particular model  It keeps the value of a particular manufacturer  It keeps the information regarding a particular manufacturer  It keeps the value of a particular category  It keeps the information regarding a particular category |

Fact Tables:

Car Sale Fact Table (BASE):

|  |  |  |
| --- | --- | --- |
| **Fact Name** | **Description** | **Default Aggregation rule** |
| Customer\_id | It tells about the specific customer | One way aggregate |
| Car\_id | It tells about the specific car | One way aggregate |
| Customer\_pref\_id | It tells about the specific customer pref | One way agg |
| Car\_feature\_id | It tells about the specific feature | One way agg |
| Address\_id | It tells about the specific address | One way agg |

Car Demand Aggregate Fact Table :

|  |  |  |
| --- | --- | --- |
| **Fact Name** | **Description** | **Default Aggregation rule** |
| Customer\_id | It tells about the specific customer | One way aggregate |
| Model\_id | It tells about the specific model | Two way aggregate |
| Car\_pref\_id | It tells about the specific car preference | One way agg |
|  |  |  |

Preferred Car Aggregate Fact Table :

|  |  |  |
| --- | --- | --- |
| **Fact Name** | **Description** | **Default Aggregation rule** |
| Customer\_id | It tells about the specific customer | One way aggregate |
| Car\_id | It tells about the specific car | One way aggregate |
| Car\_pref\_id | It tells about the specific car preference | One way agg |
|  |  |  |

Car Feature Aggregate Fact Table :

|  |  |  |
| --- | --- | --- |
| **Fact Name** | **Description** | **Default Aggregation rule** |
| Customer\_id | It tells about the specific customer | One way aggregate |
| Car\_id | It tells about the specific car | One way aggregate |
| Car\_feature\_id | It tells about the specific car feature | One way agg |
|  |  |  |

Data Dictionary

1. Customer Dimension Table

|  |  |  |  |
| --- | --- | --- | --- |
| **Dimension name** | Customer | **Model name** | Sales DM |
| **Description** | Customer Record | | |
| **Attributes** | Customer\_id, Cell\_mobile\_phone, Email\_Address, Other\_details | | |
| **Primary keys** | Customer\_id | | |
| **Foreign keys** | None | | |
| **Associated Fact Tables** | Car Sale, car demand, preferred car, car feature | | |

1. Customer Preference Dimension Table

|  |  |  |  |
| --- | --- | --- | --- |
| **Dimension name** | Customer Preference | **Model name** | Sales DM |
| **Description** | Customer Preference Record | | |
| **Attributes** | Customer\_pref\_id, Customer pref details | | |
| **Primary keys** | Customer\_pref\_id | | |
| **Foreign keys** | None | | |
| **Associated Fact Tables** | Car demand, preferred car | | |

1. Car Feature Dimension Table

|  |  |  |  |
| --- | --- | --- | --- |
| **Dimension name** | Car Feature | **Model name** | Sales DM |
| **Description** | Car Feature Record | | |
| **Attributes** | Car\_feature\_id, Car Feature Desc | | |
| **Primary keys** | Car\_feature\_id | | |
| **Foreign keys** | None | | |
| **Associated Fact Tables** | Car feature | | |

1. Address Dimension Table

|  |  |  |  |
| --- | --- | --- | --- |
| **Dimension name** | Address | **Model name** | Sales DM |
| **Description** | Address Record | | |
| **Attributes** | address\_id, address\_line, town\_city, state\_County\_province, Country,Other\_detail | | |
| **Primary keys** | address\_id | | |
| **Foreign keys** | None | | |
| **Associated Fact Tables** |  | | |

1. Address Line Dimension Table

|  |  |  |  |
| --- | --- | --- | --- |
| **Dimension name** | Address Line | **Model name** | Sales DM |
| **Description** | Address line Record | | |
| **Attributes** | address\_id, address\_line, town\_city\_id | | |
| **Primary keys** | address\_id | | |
| **Foreign keys** | Town\_city\_id | | |
| **Associated Fact Tables** |  | | |

1. City Dimension Table

|  |  |  |  |
| --- | --- | --- | --- |
| **Dimension name** | City | **Model name** | Sales DM |
| **Description** | City wise Record | | |
| **Attributes** | Town\_city\_id, town\_city\_desc, state\_County\_province\_id | | |
| **Primary keys** | Town\_city\_id | | |
| **Foreign keys** | State\_county\_province\_id | | |
| **Associated Fact Tables** |  | | |

1. Province Dimension Table

|  |  |  |  |
| --- | --- | --- | --- |
| **Dimension name** | Province | **Model name** | Sales DM |
| **Description** | Province wise Record | | |
| **Attributes** | state\_County\_province\_id, state\_County\_province\_desc, Country\_id | | |
| **Primary keys** | State\_county\_province\_id | | |
| **Foreign keys** | country\_id | | |
| **Associated Fact Tables** |  | | |

1. Country Dimension Table

|  |  |  |  |
| --- | --- | --- | --- |
| **Dimension name** | Country | **Model name** | Sales DM |
| **Description** | Country wise Record | | |
| **Attributes** | Country\_id, Country\_desc, Other\_detail\_id | | |
| **Primary keys** | country\_id | | |
| **Foreign keys** | Other\_detail\_id | | |
| **Associated Fact Tables** |  | | |

1. Other\_Detail Dimension Table

|  |  |  |  |
| --- | --- | --- | --- |
| **Dimension name** | Other\_detail | **Model name** | Sales DM |
| **Description** | Other detail Record | | |
| **Attributes** | Other\_detail\_id, Other\_details\_desc | | |
| **Primary keys** | Other\_detail\_id | | |
| **Foreign keys** |  | | |
| **Associated Fact Tables** |  | | |

1. Car Dimension Table

|  |  |  |  |
| --- | --- | --- | --- |
| **Dimension name** | Car | **Model name** | Sales DM |
| **Description** | Car Record | | |
| **Attributes** | car, model, manufacturer, vehicle\_category | | |
| **Primary keys** | Car | | |
| **Foreign keys** | none | | |
| **Associated Fact Tables** |  | | |

1. Car Wise Dimension Table

|  |  |  |  |
| --- | --- | --- | --- |
| **Dimension name** | Car Wise | **Model name** | Sales DM |
| **Description** | Car Wise Record | | |
| **Attributes** | Car\_id, car\_desc, model\_id | | |
| **Primary keys** | Car-ID | | |
| **Foreign keys** | Model\_id | | |
| **Associated Fact Tables** |  | | |

1. Model Dimension Table

|  |  |  |  |
| --- | --- | --- | --- |
| **Dimension name** | Model | **Model name** | Sales DM |
| **Description** | Model wise Record | | |
| **Attributes** | Model\_id, model\_desc, manufacturer\_id | | |
| **Primary keys** | Model\_id | | |
| **Foreign keys** | Manufacturer\_id | | |
| **Associated Fact Tables** |  | | |

1. Manufacturer Dimension Table

|  |  |  |  |
| --- | --- | --- | --- |
| **Dimension name** | Manufacturer | **Model name** | Sales DM |
| **Description** | Manufacturer Record | | |
| **Attributes** | Manufacturer\_id, manufacturer\_desc,vehicle\_category\_id | | |
| **Primary keys** | Manufacturer\_id | | |
| **Foreign keys** | Vehicle\_category\_id | | |
| **Associated Fact Tables** |  | | |

1. Vehicle Category Dimension Table

|  |  |  |  |
| --- | --- | --- | --- |
| **Dimension name** | Vehicle Wise Category | **Model name** | Sales DM |
| **Description** | Vehicle wise Record | | |
| **Attributes** | vehicle\_category\_id,vehicle\_category\_desc | | |
| **Primary keys** | Vehicle\_category\_id | | |
| **Foreign keys** | none | | |
| **Associated Fact Tables** |  | | |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Attribute(s) of "Customer" Dimension** | | | | |
| ***Name*** | **Description** | ***Data Type*** | **(Domain Constraints )Is PK** | **Is FK** |
| Customer\_id | primary key of customer | decimal(10) | Yes | No |
| Cell\_mobile\_phone | Phone number of the customer | char(18) | No | No |
| Email | Email customer | Char(18) | No | No |
| Other\_details | Other Remaining details | Char(18) | No | No |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Attribute(s) of "Customer Preference" Dimension** | | | | |
| ***Name*** | **Description** | ***Data Type*** | **(Domain Constraints )Is PK** | **Is FK** |
| Customer\_pref\_id | primary key of customer preference | decimal(10) | Yes | No |
| Customer\_pref\_details | Preference details | char(18) | No | No |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Attribute(s) of "Car Feature" Dimension** | | | | |
| ***Name*** | **Description** | ***Data Type*** | **(Domain Constraints )Is PK** | **Is FK** |
| Car\_feature\_id | primary key of customer | decimal(10) | Yes | No |
| Car\_feature\_desc | Description of the car feature | char(18) | No | No |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Attribute(s) of "Address" Dimension** | | | | |
| ***Name*** | **Description** | ***Data Type*** | **(Domain Constraints )Is PK** | **Is FK** |
| address\_id | primary key of address | decimal(10) | Yes | No |
| Address\_line | Address line of customer | char(18) | No | No |
| Town\_city | Town/city wise of customer | Char(18) | No | No |
| State\_county\_province | State/Province of customer | Char(18) | No | No |
| Country | Country of Customer | Char(18) | No | No |
| Other\_details | Other remaining details | Char(30) | NO | No |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Attribute(s) of "Address Line" Dimension** | | | | |
| ***Name*** | **Description** | ***Data Type*** | **(Domain Constraints )Is PK** | **Is FK** |
| Address\_line\_id | primary key of Address Line | decimal(10) | Yes | No |
| Address\_line\_desc | Description of the Address Line | char(18) | No | No |
| Town\_city\_id | Town/city identifier | Decimal(10) | No | Yes |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Attribute(s) of "City" Dimension** | | | | |
| ***Name*** | **Description** | ***Data Type*** | **(Domain Constraints )Is PK** | **Is FK** |
| Town\_city\_\_id | primary key of City | decimal(10) | Yes | No |
| Town\_city\_desc | Description of the City/town | char(18) | No | No |
| State\_county\_province\_id | State/county/province identifier | Decimal(10) | No | Yes |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Attribute(s) of "Province" Dimension** | | | | |
| ***Name*** | **Description** | ***Data Type*** | **(Domain Constraints )Is PK** | **Is FK** |
| State\_county\_province\_id | primary key of province | decimal(10) | Yes | No |
| State\_county\_province\_desc | Description of the State/Province | char(18) | No | No |
| Country\_id | State/county/province identifier | Decimal(10) | No | Yes |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Attribute(s) of "Country" Dimension** | | | | |
| ***Name*** | **Description** | ***Data Type*** | **(Domain Constraints )Is PK** | **Is FK** |
| country\_\_id | primary key of Country | decimal(10) | Yes | No |
| country\_desc | Description of the Country | char(18) | No | No |
| Other\_details\_id | Other\_details identifier | Decimal(10) | No | Yes |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Attribute(s) of "Other Details" Dimension** | | | | |
| ***Name*** | **Description** | ***Data Type*** | **(Domain Constraints )Is PK** | **Is FK** |
| Other\_details\_id | primary key of other\_details | decimal(10) | Yes | No |
| Other\_details\_desc | Description of the City/town | char(18) | No | No |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Attribute(s) of "Car" Dimension** | | | | |
| ***Name*** | **Description** | ***Data Type*** | **(Domain Constraints )Is PK** | **Is FK** |
| car\_\_id | primary key of Car | decimal(10) | Yes | No |
| model | Model of the car | char(18) | No | No |
| Manufacturer | Manufacture of the car | Char(18) | No | No |
| Vehicle\_category | Category of the car | Char(18) | No | NO |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Attribute(s) of "Car Wise" Dimension** | | | | |
| ***Name*** | **Description** | ***Data Type*** | **(Domain Constraints )Is PK** | **Is FK** |
| car\_id | primary key of Car | decimal(10) | Yes | No |
| car\_desc | Description of the Car | char(18) | No | No |
| model\_id | model identifier | Decimal(10) | No | Yes |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Attribute(s) of "Model" Dimension** | | | | |
| ***Name*** | **Description** | ***Data Type*** | **(Domain Constraints )Is PK** | **Is FK** |
| model\_id | primary key of Model | decimal(10) | Yes | No |
| model\_desc | Description of the model | char(18) | No | No |
| manufacturer\_id | Manufacture identifier | Decimal(10) | No | Yes |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Attribute(s) of "Manufacture" Dimension** | | | | |
| ***Name*** | **Description** | ***Data Type*** | **(Domain Constraints )Is PK** | **Is FK** |
| manufacturer\_id | primary key of manufacturer | decimal(10) | Yes | No |
| manufacturer\_desc | Description of the manufacturer | char(18) | No | No |
| Vehicle\_category\_id | Vehicle details identifier | Decimal(10) | No | Yes |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Attribute(s) of "Vehicle Category" Dimension** | | | | |
| ***Name*** | **Description** | ***Data Type*** | **(Domain Constraints )Is PK** | **Is FK** |
| Vehicle\_categry\_id | primary key of Vehicle Category | decimal(10) | Yes | No |
| Vehicle\_category\_desc | Description of the Car | char(18) | No | No |

|  |  |  |  |
| --- | --- | --- | --- |
| **Fact Table name** | **Car Sales Fact Table(Base)** | **Model name** | Sales DM |
| **Description** | It calculates the sales Related facts like car quantity, product profits margins, or customer related stuff | | |
| **Attributes** | Customer\_id, Car\_id, Customer\_pref\_id, Car\_feature\_id, Address\_id | | |
| **Primary keys** | Customer\_id, Car\_id, Customer\_pref\_id, Car\_feature\_id, Address\_id | | |
| **Foreign keys** | Customer\_id, Car\_id, Customer\_pref\_id, Car\_feature\_id, Address\_id | | |
| **Facts / Measures** | Car\_quantity\_count, Profit\_margin\_count,total\_sale | | |
| **Associated**  **Dimensions** | Customer, Car, Customer Preference, car feature, address | | |

|  |  |  |  |
| --- | --- | --- | --- |
| **Fact Table name** | **Car Demand Aggregate Fact Table(Base)** | **Model name** | Sales DM |
| **Description** | It calculates the sales Related facts like remaining car quantity or trending cars or models | | |
| **Attributes** | Customer\_id, model\_id, Customer\_pref\_id | | |
| **Primary keys** | Customer\_id, model\_id, Customer\_pref\_id | | |
| **Foreign keys** | Customer\_id, model\_id, Customer\_pref\_id | | |
| **Facts / Measures** | like remaining car quantity or trending cars or models | | |
| **Associated**  **Dimensions** | Customer, Model , Car Preference, | | |

|  |  |  |  |
| --- | --- | --- | --- |
| **Fact Table name** | **Preferred Car Aggregate Fact Table(Base)** | **Model name** | Sales DM |
| **Description** | It calculates the sales Related facts like car preference or most contribution in total | | |
| **Attributes** | Customer\_id, car\_id, Car\_pref\_id | | |
| **Primary keys** | Customer\_id, car\_id, Car\_pref\_id | | |
| **Foreign keys** | Customer\_id, car\_id, Car\_pref\_id | | |
| **Facts / Measures** | car preference or most contribution in total | | |
| **Associated**  **Dimensions** | Customer, Car , Car Preference | | |

|  |  |  |  |
| --- | --- | --- | --- |
| **Fact Table name** | **Car Feature Aggregate Fact Table(Base)** | **Model name** | Sales DM |
| **Description** | It calculates the sales Related facts like sales of featured cars or cost for featured | | |
| **Attributes** | Customer\_id, car\_id, Car\_feature\_id | | |
| **Primary keys** | Customer\_id, car\_id, Car\_feature\_id | | |
| **Foreign keys** | Customer\_id, car\_id, Car\_feature\_id | | |
| **Facts / Measures** | sales of featured cars or cost for featured | | |
| **Associated**  **Dimensions** | Customer, Car , Car Featured | | |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Attribute(s) of "Car Sale fact(BASE)"** | | | | |
| ***Name*** | **Description** | ***Data Type*** | **(Domain Constraints )Is PK** | **Is FK** |
| Customer\_id | Foreign key of Customer dimension | Decimal | Yes | Yes |
| Car\_id | foreign key of Car dimension | Decimal | Yes | Yes |
| Customer\_pref\_id | Foreign key of the customer pref dimension | Decimal | Yes | Yes |
| Car\_feature\_id | Foreign key of the car feature dimension | Decimal | Yes | Yes |
| Address\_id | Foreign key of the address dimension | Decimal | Yes | Yes |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Attribute(s) of "Preferred Car aggregate fact table"** | | | | |
| ***Name*** | **Description** | ***Data Type*** | **(Domain Constraints )Is PK** | **Is FK** |
| Customer\_id | Foreign key of Customer dimension | Decimal | Yes | Yes |
| car\_id | foreign key of car dimension | Decimal | Yes | Yes |
| Car\_pref\_id | Foreign key of the car pref dimension | Decimal | Yes | Yes |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Attribute(s) of "Car Demand aggregate fact table"** | | | | |
| ***Name*** | **Description** | ***Data Type*** | **(Domain Constraints )Is PK** | **Is FK** |
| Customer\_id | Foreign key of Customer dimension | Decimal | Yes | Yes |
| Model\_id | foreign key of Model dimension | Decimal | Yes | Yes |
| Car\_pref\_id | Foreign key of the car pref dimension | Decimal | Yes | Yes |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Attribute(s) of "Car Feature aggregate fact table"** | | | | |
| ***Name*** | **Description** | ***Data Type*** | **(Domain Constraints )Is PK** | **Is FK** |
| Customer\_id | Foreign n key of Customer dimension | Decimal | Yes | Yes |
| Model\_id | foreign key of Model dimension | Decimal | Yes | Yes |
| Car\_feature\_id | Foreign key of the car feature dimension | Decimal | Yes | Yes |

**Data Mart 2 – Sales Service System**

Logical Model:

1. **Contact dimension**

|  |  |  |
| --- | --- | --- |
| **Attribute Name** | **Description** | **Sample Values** |
| First name | Customer first name | Hassan, Muhammad |
| Last name | Customer Last name | Zia, Umair |
| Middle Name | Customer Middle Name | None |
| Gender | Male/Female | M/F |
| Email Address | Customer’s Email Address | [xyz@gmail.com](mailto:xyz@gmail.com) |
| Phone\_number | Customer Phone number | 090078601 |
| Address line 1 | Customer’s primary address | 52-B Faisal Town |
| Address Line 2 | Customer’s Secondary Address | 53-B faisal Town |
| Address Line 3 | Customer’s address | - |
| Address Line 4 | Customer’s address | - |
| Town\_city | The city of the customer. | Lahore, Karachi |
| District | The District of the customer. | Lahore, Karachi |
| State | The state of the customer. | Punjab, Sind |
| Country | The country of the customer. | Pakistan. |

1. **Car dimension**

|  |  |  |
| --- | --- | --- |
| **Attribute Name** | **Description** | **Sample Values** |
| License number | Car’s license number | 757 111 123 |
| Model number | Car’s model number | 1.3 |
| Manufacturer code | Manufacturer’s identifier | 121 |
| Manufacturer name | Name of manufacturer | Toyota |
| Manufacturer details(Address) | Manufacturer’s address | 78 K karachi |
| Manufacturer details(contact) | Manufacturer contact | 090078602 |
| Model name | Car’s model name | Vitara |
| Current mileage | Car’s mileage | 15 |
| Egine Capacity | Car’s Engine Capacity | 1528CC |
| Other\_Car details | Car’s features (may be) | Navigation etc |
| Defect id | Defect id for defects in the car | 12 |
| Defect description | Reason etc | Crash |
| Date Defect recorded | When it occurred for first time | 10/03/19 |

1. **Parts Ordered dimension**

|  |  |  |
| --- | --- | --- |
| **Attribute Name** | **Description** | **Sample Values** |
| Part\_id | Part id number | 45454 |
| Part Name | Name of part | Wheel |
| Number in stock | Current availability | 5 |

1. **Mechanic dimension**

|  |  |  |
| --- | --- | --- |
| **Attribute Name** | **Description** | **Sample Values** |
| Mechanic\_id | Identifier for mechanic | 35201-2434444 |
| Mechanic Name | Name of mechanic | Ahsan Rehman |
| Mechanic Details | Address etc | FAST-NUCES LHR |
|  | Date of feedback placement | 24-06-2007 |
| Customer\_id | Customer id who place the feedback | 252552 |
|  |  |  |

1. **Booking dimension**

|  |  |  |
| --- | --- | --- |
| **Attribute Name** | **Description** | **Sample Values** |
| Booking Id | Identifier for Booking | B1 |
| Date Booked | Date part was booked | 1-1-2001 |
| Booking Details | Address etc |  |

Fact Tables:

Base Fact Table:

|  |  |  |
| --- | --- | --- |
| **Fact Name** | **Description** | **Default Aggregation rule** |
| Mechanic\_id | Identifier for Mechanic | One way aggregate |
| Car\_id | Identifier for car | One way aggregate |
| Contact\_id | Identifier for contact | One way aggregate |
| Part\_id | Identifier for Part | One way aggregate |
| Booking id | Identifier for Booking | One way aggregate |

Manufacturer Aggregate Fact Table:

|  |  |  |
| --- | --- | --- |
| **Fact Name** | **Description** | **Default Aggregation rule** |
| Manufacturer id | Identifier for Manufacturer | Three way aggregate |
| Car\_id | Identifier for car | One way aggregate |
| Booking id | Identifier for Booking | One way aggregate |

Mechanic Aggregate Fact Table:

|  |  |  |
| --- | --- | --- |
| **Fact Name** | **Description** | **Default Aggregation rule** |
| Mechanic id | Identifier for Mechanic | One way aggregate |
| Car\_id | Identifier for car | One way aggregate |
| Booking id | Identifier for Booking | One way aggregate |

Car Part Aggregate Fact Table:

|  |  |  |
| --- | --- | --- |
| **Fact Name** | **Description** | **Default Aggregation rule** |
| Part\_id | Identifier for Part | One way aggregate |
| Booking id | Identifier for Booking | One way aggregate |

Data Dictionary

|  |  |  |  |
| --- | --- | --- | --- |
| **Dimension name** | **Contact Dimension** | **Model name** | Sale Service Center |
| **Description** | This table will keep the record of Contacts for cars | | |
| **Attributes** | First Name, Middle Name, Last Name , Gender , Email\_Address, phone\_number, address line 1, address line 2, address line 3, address line 4 | | |
| **Primary keys** |  | | |
| **Foreign keys** |  | | |
| **Associated Fact Tables** | Base Fact | | |
|  |  | | |

|  |  |  |  |
| --- | --- | --- | --- |
| **Dimension name** | **Town\_City Dimension** | **Model name** | Sale Service Center |
| **Description** | This table will keep the record of City of customer | | |
| **Attributes** | Town\_city\_id, town\_city\_desc, state\_country\_province\_id | | |
| **Primary keys** | Town\_city\_id | | |
| **Foreign keys** | state\_country\_province\_id | | |
| **Associated Fact Tables** | Base Fact | | |

|  |  |  |  |
| --- | --- | --- | --- |
| **Dimension name** | **District Dimension** | **Model name** | Sale Service Center |
| **Description** | This table will keep the record of City of customer | | |
| **Attributes** | District\_id, State\_Country\_Province\_id | | |
| **Primary keys** | District\_id | | |
| **Foreign keys** | State\_Country\_province\_id | | |
| **Associated Fact Tables** | Base Fact | | |

|  |  |  |  |
| --- | --- | --- | --- |
| **Dimension name** | **State\_Country\_Province Dimension** | **Model name** | Sale Service Center |
| **Description** | This table will keep the record State country customer | | |
| **Attributes** | State\_country\_province\_id, State\_country\_province\_desc,country\_id | | |
| **Primary keys** | State\_country\_province\_id | | |
| **Foreign keys** | Country\_id | | |
| **Associated Fact Tables** | Base Fact | | |

|  |  |  |  |
| --- | --- | --- | --- |
| **Dimension name** | **Country Dimension** | **Model name** | Sale Service Center |
| **Description** | This table will keep the record of City of customer | | |
| **Attributes** | Country id | | |
| **Primary keys** | Country\_id | | |
| **Foreign keys** |  | | |

|  |  |  |  |
| --- | --- | --- | --- |
| **Dimension name** | **Manufacturer Dimension** | **Model name** | Sale Service Center |
| **Description** | This table will keep the record of Contacts for cars | | |
| **Attributes** | Manufacturer code, Manufacturer details, Manufacturer name, model\_code | | |
| **Primary keys** | Manufacturer code | | |
| **Foreign keys** | Model\_code | | |
| **Associated Fact Tables** | Base Fact, Mechanic aggregate Fact Table, Manufacturer aggregate fact table | | |

|  |  |  |  |
| --- | --- | --- | --- |
| **Dimension name** | **Model Dimension** | **Model name** | Sale Service Center |
| **Description** | This table will keep the record of Contacts for cars | | |
| **Attributes** | Model\_code, model\_number, license number | | |
| **Primary keys** | Model\_code | | |
| **Foreign keys** | License number | | |
| **Associated Fact Tables** | Base Fact, Mechanic aggregate Fact Table, Manufacturer aggregate fact table | | |

|  |  |  |  |
| --- | --- | --- | --- |
| **Dimension name** | **Car Dimension** | **Model name** | Sale Service Center |
| **Description** | This table will keep the record of Contacts for cars | | |
| **Attributes** | License\_no, current\_mileage, engine\_capacity, other\_car\_detials, defect\_id, defect\_description, date\_Defect\_recorded | | |
| **Primary keys** | License\_no | | |
| **Foreign keys** |  | | |
| **Associated Fact Tables** | Base Fact. | | |

|  |  |  |  |
| --- | --- | --- | --- |
| **Dimension name** | **Parts Ordered Dimension** | **Model name** | Sale Service Center |
| **Description** | This table will keep the record of Ordered Parts | | |
| **Attributes** | Part\_id, Part Name, Number in Stock | | |
| **Primary keys** | Part\_id | | |
| **Foreign keys** |  | | |
| **Associated Fact Tables** | Base Fact, Car Part Aggregate Fact table | | |

|  |  |  |  |
| --- | --- | --- | --- |
| **Dimension name** | **Mechanic Dimension** | **Model name** | Sale Service Center |
| **Description** | This table will keep the record of Contacts for cars | | |
| **Attributes** | Mechanic\_id, Mechanic\_name, Mechanic\_details | | |
| **Primary keys** | Mechanic\_id | | |
| **Foreign keys** |  | | |
| **Associated Fact Tables** | Base Fact., Mechanic aggregate | | |

|  |  |  |  |
| --- | --- | --- | --- |
| **Dimension name** | **Booking Dimension** | **Model name** | Sale Service Center |
| **Description** | This table will keep the record of Contacts for cars | | |
| **Attributes** | Booking id, Date\_Booked, Booking\_details | | |
| **Primary keys** | Booking\_id | | |
| **Foreign keys** |  | | |
| **Associated Fact Tables** | Base Fact, Manufacturer aggregate Fact table, mechanic aggregate Fact Table, car part aggregate fact table | | |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Attribute(s) of "Contact" Dimension** | | | | |
| ***Name*** | **Description** | ***Data Type*** | **(Domain Constraints )Is PK** | **Is FK** |
| Contact\_id | primary key of Contact | decimal(10) | Yes | No |
| First Name | First Name of Customer | char(50) | No | No |
| Middle Name | Middle Name of Customer | Char(50) | No | No |
| Last Name | Last Name of Customer | Char(18) | No | No |
| Gender | Gender of Customer | Char(5) | No | No |
| Email | Email of Customer | Char(30) | No | No |
| Phone\_No | Phone Number of Customer | Char(25) | No | No |
| Address Line 1 | Primary Address of Customer | Char(100) | NO | No |
| Address Line 2 | Secondary Address of Customer | Char(100) | No | No |
| Address Line 3 | Address line 3 for customer | Char(100) | No | No |
| Address Line 4 | Customer’s Address | Char(100) | No | No |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Attribute(s) of "Town\_City" Dimension** | | | | |
| ***Name*** | **Description** | ***Data Type*** | **(Domain Constraints )Is PK** | **Is FK** |
| Town\_City\_id | primary key of Town city | decimal(10) | Yes | No |
| Town\_City\_Desc | Town City | Char(20) | NO | No |
| State\_country\_province\_id | Province id | Int | No | Yes |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Attribute(s) of "District" Dimension** | | | | |
| ***Name*** | **Description** | ***Data Type*** | **(Domain Constraints )Is PK** | **Is FK** |
| District\_id | primary key of Town city | decimal(10) | Yes | No |
| District\_Desc | Town City | Char(20) | NO | No |
| State\_country\_province\_id | Province id | Int | No | Yes |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Attribute(s) of "State\_Country\_Province" Dimension** | | | | |
| ***Name*** | **Description** | ***Data Type*** | **(Domain Constraints )Is PK** | **Is FK** |
| State\_country\_province\_id | primary key of Town city | decimal(10) | Yes | No |
| State\_country\_province\_Desc | Town City | Char(20) | NO | No |
| country\_id | Province id | Int | No | Yes |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Attribute(s) of "Country" Dimension** | | | | |
| ***Name*** | **Description** | ***Data Type*** | **(Domain Constraints )Is PK** | **Is FK** |
| Country\_id | primary key of Country | decimal(10) | Yes | No |
| Country\_Desc | Country | CHAR(20) | No | No |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Attribute(s) of "Manufacturer" Dimension** | | | | |
| ***Name*** | **Description** | ***Data Type*** | **(Domain Constraints )Is PK** | **Is FK** |
| Manufacturer Code | Car’s license number | Decimal(10) | Yes | No |
| Manufacturer Name | Model\_number of car | Char(10) | No | No |
| Manufacturer Details | Manufacturer’s Address | Char(50) | No | No |
| Model code | Model by manufacturer | Char(50) | No | Yes |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Attribute(s) of "Model" Dimension** | | | | |
| ***Name*** | **Description** | ***Data Type*** | **(Domain Constraints )Is PK** | **Is FK** |
| Model\_code | Model’s code | Decimal(10) | Yes | No |
| Model\_number | Model\_number of car | Char(10) | No | No |
| License\_number | License number of car | Char(55) | No | Yes |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Attribute(s) of "Car" Dimension** | | | | |
| ***Name*** | **Description** | ***Data Type*** | **(Domain Constraints )Is PK** | **Is FK** |
| License\_Number | Car’s license number | Decimal(10) | Yes | No |
| Current Mileage | Car’s Mileage | Decimal(10) | No | No |
| Engine Capacity | Car’s Engine Capacity | Char(20) | No | No |
| Other\_Car\_Details | Car’s features etc | Char(50) | No | No |
| Defect\_id | Car defects | Decimal(10) | No | No |
| Defect Description | Details about defects | Char(100) | No | No |
| Date Defect Recorded | Date when it appeared for first time | Date | No | No |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Attribute(s) of "Parts Ordered" Dimension** | | | | |
| ***Name*** | **Description** | ***Data Type*** | **(Domain Constraints )Is PK** | **Is FK** |
| Parts\_Id | primary key of Parts | decimal(10) | Yes | No |
| Part\_Name | Name of the part | char(20) | No | NO |
| Number in Stock | Availability of part | Decimal(10) | No | No |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Attribute(s) of "Mechanic" Dimension** | | | | |
| ***Name*** | **Description** | ***Data Type*** | **(Domain Constraints )Is PK** | **Is FK** |
| Mechanic\_id | Primary Key of Mechanic | decimal(10) | Yes | No |
| Mechanic\_Name | Name of Mechanic | char(30) | No | No |
| Mechanic details | Mechanic’s Address etc | Char(18) | No | No |
| Mechanic Phone No | Machinic Contact | Char(18) | No | No |
| Customer\_Id | Customer who places feedback | Decimal((10 | No | Yes |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Attribute(s) of "Booking Dimension" Dimension** | | | | |
| ***Name*** | **Description** | ***Data Type*** | **(Domain Constraints )Is PK** | **Is FK** |
| Booking id | primary key of booking | decimal(10) | Yes | No |
| Date Booked | Date when the car was booked for service | char(18) | No | No |
| Booking Details | Reason fpr Booking | Char(100 | No | No |

|  |  |  |  |
| --- | --- | --- | --- |
| **Fact Table name** | **Car Service Fact Table(Base)** | **Model name** | Sales Service DM |
| **Description** | It calculates the Service Related facts like car serviced count etc | | |
| **Attributes** | Mechanic\_id, Car\_id, Contact\_id, Part\_id, Booking\_id | | |
| **Primary keys** | Mechanic\_id, Car\_id, Contact\_id, Part\_id, Booking\_id | | |
| **Foreign keys** | Mechanic\_id, Car\_id, Contact\_id, Part\_id, Booking\_id | | |
| **Facts / Measures** | Car Service Count, Defects resolved, bookings count, | | |
| **Associated**  **Dimensions** | Mechanic, Car, Contact, Part, Booking | | |

|  |  |  |  |
| --- | --- | --- | --- |
| **Fact Table name** | **Mechanic Aggregate Fact Table** | **Model name** | Sales Service DM |
| **Description** | It calculates the facts for Manufacturer related issues | | |
| **Attributes** | Mechanic\_id, Car\_id, Booking\_id | | |
| **Primary keys** | Customer Mechanic\_id, Car\_id, Booking\_id | | |
| **Foreign keys** | Customer Mechanic\_id, Car\_id, Booking\_id | | |
| **Facts / Measures** | bookings\_resolved\_by\_mechanic, bookings\_by\_car | | |
| **Associated**  **Dimensions** | Mechanic, Car, Booking | | |

|  |  |  |  |
| --- | --- | --- | --- |
| **Fact Table name** | **Car Part Aggregate Fact Table** | **Model name** | Sales Service DM |
| **Description** | It calculates the car parts most used | | |
| **Attributes** | Part\_id, booking\_id | | |
| **Primary keys** | Customer\_id, car\_id, Car\_pref\_id | | |
| **Foreign keys** | Customer\_id, car\_id, Car\_pref\_id | | |
| **Facts / Measures** | Part used, Parts used by booking | | |
| **Associated**  **Dimensions** | Part, Booking | | |

|  |  |  |  |
| --- | --- | --- | --- |
| **Fact Table name** | **Manufacturer Aggregate Fact Table(Base)** | **Model name** | Sales Service DM |
| **Description** | It calculates the sales Related facts like sales of featured cars or cost for featured | | |
| **Attributes** | Manufacturer\_id, Car\_id, Booking\_id | | |
| **Primary keys** | Customer\_id, Car\_id, Booking\_id | | |
| **Foreign keys** | Customer\_id, Car\_id, Booking\_id | | |
| **Facts / Measures** | Issues\_by \_Manufacturer, bookings by manufacturer, mechanics by manufacturer | | |
| **Associated**  **Dimensions** | Manufactuer, Car , Booking | | |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Attribute(s) of "Car Sale fact(BASE)"** | | | | |
| ***Name*** | **Description** | ***Data Type*** | **(Domain Constraints )Is PK** | **Is FK** |
| Mechanic\_Id | Foreign key of Customer dimension | Decimal | Yes | Yes |
| Car\_id | foreign key of Car dimension | Decimal | Yes | Yes |
| Contact\_id | Foreign key of the customer pref dimension | Decimal | Yes | Yes |
| Car\_ id | Foreign key of the car feature dimension | Decimal | Yes | Yes |
| Booking\_id | Foreign key of the address dimension | Decimal | Yes | Yes |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Attribute(s) of "Manufacturer aggregate fact table"** | | | | |
| ***Name*** | **Description** | ***Data Type*** | **(Domain Constraints )Is PK** | **Is FK** |
| Manufacturer\_id | Foreign key of Customer dimension | Decimal | Yes | Yes |
| car\_id | foreign key of car dimension | Decimal | Yes | Yes |
| booking\_id | Foreign key of the booking dimension | Decimal | Yes | Yes |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Attribute(s) of "Mechanic aggregate fact table"** | | | | |
| ***Name*** | **Description** | ***Data Type*** | **(Domain Constraints )Is PK** | **Is FK** |
| Mechanic\_id | Foreign key of Mechanic dimension | Decimal | Yes | Yes |
| Car\_id | foreign key of Car dimension | Decimal | Yes | Yes |
| Booking\_id | Foreign key of the car booking dimension | Decimal | Yes | Yes |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Attribute(s) of "Car Part aggregate fact table"** | | | | |
| ***Name*** | **Description** | ***Data Type*** | **(Domain Constraints )Is PK** | **Is FK** |
| Part ID | Foreign n key of Customer dimension | Decimal | Yes | Yes |
| Booking\_id | foreign key of Model dimension | Decimal | Yes | Yes |

Data Mart 3 – Cars Parts Module

**Logical Model**

(STAR SCHEMA DIMENSIONS)

**Part Manufacturer Dimension**

|  |  |  |
| --- | --- | --- |
| **Attribute Name** | **Description** | **Sample Values** |
| Part\_manufactuere\_key | It uniquely idenstifies each part manufacturer | 8876655 |
| Part\_manufacturer\_Name | Keeps manufacturer name | Sadiq Sons |

**Car Manufacturer Dimension**

|  |  |  |
| --- | --- | --- |
| **Attribute Name** | **Description** | **Sample Values** |
| Car\_manufacturer\_id | Keeps car manufacturer’s PK | 7236776 |
| Car\_manufacturer\_name | It has car manufacturer name | Toyota |

**Time Dimension**

|  |  |  |
| --- | --- | --- |
| **Attribute Name** | **Description** | **Sample Values** |
| Time\_key | Uniquely identifies time entity i.e PK | 767552 |
| Day\_of\_month | It keeps day number | 23 |
| Month\_id | It keeps id of the month related to that day i.e FK | 87867 |
| Day name | Stores name of day of week | Monday |
| Off day flag | Stores flag of off days of week | True |
| Half day flag | Stores flag of half day of week if existed | False |
| Month name | Stores month name | June |
| Quarter Name | Stores quarter name | 1st Quarter |
| Total no. of days in month | Stores total days of that specific month | 28 |
| Year | Stores year part of date | 2012 |
| Leap\_year\_flag | Stores leap year flag | FALSE |

**Supplier Dimension**

|  |  |  |
| --- | --- | --- |
| **Attribute Name** | **Description** | **Sample Values** |
| Supplier\_id | Keeps specific value PK to identify each supplier | 763765 |
| Supplier\_details | Keeps details of supplier | Jalal Sons, Lahore |

**Car Part Dimension**

|  |  |  |
| --- | --- | --- |
| **Attribute Name** | **Description** | **Sample Values** |
| Part\_id | Keeps PK of part | 77676 |
| Parent\_part\_id | Keeps PK of parent part id as FK | 76755 |
| Part\_level | Keeps level in hierarchy of that part | Component |
| Part\_manufacturer\_key | Keeps PK of part manufacturer as FK | 23223 |
| Part\_name | Name of part | Engine’s screw |
| Weight | Keeps weight in grams | 23 |
| Condition | Keeps usage condition | Used |
| Mileage Donor\_vehicle | Keeps mileage of donor vehicle | 7km/L |
| price | Keeps price of part in USD | 2.1 |
| Car id | Keeps FK of Car | 12121 |
| Part\_type | Keeps part type | Engine part |

**Car Dimension**

|  |  |  |
| --- | --- | --- |
| **Attribute Name** | **Description** | **Sample Values** |
| Car\_id | Keeps PK of car | 656565 |
| Car\_model | Keeps model of car | Civic |
| Car year of manufacture | Keeps manufacture year | 2019 |
| Other car details | Keeps cars remaiinig details e.g price mileage | Honda Civic, 70km/L, 12000 |

Fact Table for 3rd Module (Cars Parts Module)

**Cars Parts Fact Table (BASE FACT TABLE) :**

|  |  |  |
| --- | --- | --- |
| **Fact Name** | **Description** | **Default Aggregation rule** |
| Time\_key | Tell about date of part sale | One way agg |
| Supplier id | Tell about supplier who sales that part | One way agg |
| Part id | Tell about part Key | One way agg |
| Car manufacturer id | Tells about specific car manufacturer to whom car, that part will be used | One way agg |
| Car id | Keeps specific key of each car | One way agg |
| Part\_manufacturer\_key | Keeps part manufacturer key to identify them uniquely | One way agg |

**Part Demand by Car Model Wise Aggregate Fact Table :**

|  |  |  |
| --- | --- | --- |
| **Fact Name** | **Description** | **Default Aggregation rule** |
| Car model key | Keeps car model PK | Two way agg |
| Part\_id | Keep part’s unique PK | Two way agg |

**Supplier Wise Aggregate Fact Table :**

|  |  |  |
| --- | --- | --- |
| **Fact Name** | **Description** | **Default Aggregation rule** |
| Supplier\_id | It stores PK of Supplier | One way agg |
| Part\_id | It stores PK of a part | One way agg |

Physical Model:

Data Dictionary

**Time Dimension**

|  |  |  |  |
| --- | --- | --- | --- |
| Dimension name | **Time** | Model name | Cars Parts Model |
| Description | It will keep the time information. | | |
| Attributes | Time\_key, Day, off day flag, half day flag, week\_id, | | |
| Primary keys | Time\_key | | |
| Foreign keys | Week\_id | | |
| Associated Fact Tables | Car Part sales Fact Table | | |

**Week**

|  |  |  |  |
| --- | --- | --- | --- |
| Dimension name | **Week** | Model name | Cars Parts Model |
| Description | It will keep the week information. | | |
| Attributes | Week\_id, month\_id | | |
| Primary keys | Week\_id | | |
| Foreign keys | Month id | | |
| Associated Fact Tables | None | | |

**Month**

|  |  |  |  |
| --- | --- | --- | --- |
| Dimension name | **Month** | Model name | Cars Parts Model |
| Description | It will keep the month information. | | |
| Attributes | Month\_id, quarter id, month name | | |
| Primary keys | Month\_id | | |
| Foreign keys | Quarter id | | |
| Associated Fact Tables | None | | |

**Quarter**

|  |  |  |  |
| --- | --- | --- | --- |
| Dimension name | **Quarter** | Model name | Cars Parts Model |
| Description | It will keep the quarter information. | | |
| Attributes | Quarter key, year key, quarter name | | |
| Primary keys | Quarter key | | |
| Foreign keys | Year key | | |
| Associated Fact Tables | None | | |

**Year**

|  |  |  |  |
| --- | --- | --- | --- |
| Dimension name | **Year** | Model name | Cars Parts Model |
| Description | It will keep the year information. | | |
| Attributes | Year\_key, year\_description | | |
| Primary keys | Year key | | |
| Foreign keys | None | | |
| Associated Fact Tables | None | | |

**Supplier**

|  |  |  |  |
| --- | --- | --- | --- |
| Dimension name | **Supplier** | Model name | Cars Parts Model |
| Description | It will keep the supplier information. | | |
| Attributes | Supplier id, supplier details | | |
| Primary keys | Supplier id | | |
| Foreign keys | none | | |
| Associated Fact Tables | Car Part sales Fact Table, Supplier Wise Agg Fact Table | | |

**Car Part**

|  |  |  |  |
| --- | --- | --- | --- |
| Dimension name | **Car Part** | Model name | Cars Parts Model |
| Description | It will keep the car part information. | | |
| Attributes | Part\_id, parent\_part id, part level id, part name, weight, condition, mileage donor vehicle, price, part type | | |
| Primary keys | Part id | | |
| Foreign keys | Parent part id, part level | | |
| Associated Fact Tables | Car Part sales Fact Table, Supplier Wise Agg Fact Table, Part demand by car model wise agg fact table | | |

**Part Level**

|  |  |  |  |
| --- | --- | --- | --- |
| Dimension name | **Part Level** | Model name | Cars Parts Model |
| Description | It will keep the part level information. | | |
| Attributes | Part\_level\_id, part level description | | |
| Primary keys | Part\_level\_id | | |
| Foreign keys | None | | |
| Associated Fact Tables | Car Part Sales Fact Table | | |

**Part Types**

|  |  |  |  |
| --- | --- | --- | --- |
| Dimension name | **Part Types** | Model name | Cars Parts Model |
| Description | It will keep the part types information. | | |
| Attributes | Part type id, part type description | | |
| Primary keys | Part type id | | |
| Foreign keys | None | | |
| Associated Fact Tables | Car Part Sales fact Table | | |

**Part Manufacturer**

|  |  |  |  |
| --- | --- | --- | --- |
| Dimension name | **Part Manufacturer** | Model name | Cars Parts Model |
| Description | It will keep the part manufacturer information. | | |
| Attributes | Part manufacturer key, part manufacturer name | | |
| Primary keys | Part manufacturer key | | |
| Foreign keys | None | | |
| Associated Fact Tables | None | | |

**Car Manufacturer**

|  |  |  |  |
| --- | --- | --- | --- |
| Dimension name | **Car Manufacturer** | Model name | Cars Parts Model |
| Description | It will keep the Car Manufacturer information. | | |
| Attributes | Car manufacturer id, car manufacturer name | | |
| Primary keys | Car manufacturer id | | |
| Foreign keys | None | | |
| Associated Fact Tables | Car Part Sales fact Table | | |

**Car**

|  |  |  |  |
| --- | --- | --- | --- |
| Dimension name | **Car** | Model name | Cars Parts Model |
| Description | It will keep the car information. | | |
| Attributes | Car id, price, car model key, car year of manufacture, other car details | | |
| Primary keys | Car id | | |
| Foreign keys | car model key | | |
| Associated Fact Tables | Car Part Sales Fact Table | | |

**Car Model**

|  |  |  |  |
| --- | --- | --- | --- |
| Dimension name | **Car Model** | Model name | Cars Parts Model |
| Description | It will keep the car model information. | | |
| Attributes | Car model key, model name, description | | |
| Primary keys | Car model key | | |
| Foreign keys | None | | |
| Associated Fact Tables | Car Part Sales fact Table, Part Demand by car model wise agg Fact Table | | |

| **Attribute(s) of " Time" Dimension** | | | | |
| --- | --- | --- | --- | --- |
| ***Name*** | **Description** | ***Data Type*** | **(Domain Constraints )Is PK** | **Is FK** |
| Time key | PK of time dimension | Decimal(10) | Yes | No |
| Day | Name of day | Char(10) | No | No |
| Off day flag | Flag for holiday IN WEEK | Boolean | No | No |
| Week id | Week’s PK from its table | Integer(10) | No | yes |

| **Attribute(s) of " Week" Dimension** | | | | |
| --- | --- | --- | --- | --- |
| ***Name*** | **Description** | ***Data Type*** | **(Domain Constraints )Is PK** | **Is FK** |
| Week id | Pk of week dimension | Decimal(10) | Yes | No |
| Month id | PK of month dimension | Decimal(10) | No | Yes |

| **Attribute(s) of " Month" Dimension** | | | | |
| --- | --- | --- | --- | --- |
| ***Name*** | **Description** | ***Data Type*** | **(Domain Constraints )Is PK** | **Is FK** |
| Month id | Keeps PK of month table | Decimal(10) | Yes | No |
| Month name | Month name | Char(16) | No | No |
| Quarter id | Pk of quarter dimension | Decimal(10) | No | Yes |

| **Attribute(s) of " Quarter" Dimension** | | | | |
| --- | --- | --- | --- | --- |
| ***Name*** | **Description** | ***Data Type*** | **(Domain Constraints )Is PK** | **Is FK** |
| Quarter key | Keeps PK of quarter dimension | Decimal(10) | Yes | No |
| Quarter name | Name of quarter | Char(20) | No | No |
| Year key | PK of year dimension | Decimal(10) | No | yes |

| **Attribute(s) of " Year" Dimension** | | | | |
| --- | --- | --- | --- | --- |
| ***Name*** | **Description** | ***Data Type*** | **(Domain Constraints )Is PK** | **Is FK** |
| Year key | PK of Year dimension | Decimal(10) | Yes | No |
| Year description | Year’s value e.g 2019 | Decimal(10) | No | no |

| **Attribute(s) of " Supplier" Dimension** | | | | |
| --- | --- | --- | --- | --- |
| ***Name*** | **Description** | ***Data Type*** | **(Domain Constraints )Is PK** | **Is FK** |
| Supplier id | PK of supplier dimension | Decimal(10) | Yes | No |
| Supplier details | Details of supplier of parts | Varchar(1000) | No | no |

| **Attribute(s) of " Car Part" Dimension** | | | | |
| --- | --- | --- | --- | --- |
| ***Name*** | **Description** | ***Data Type*** | **(Domain Constraints )Is PK** | **Is FK** |
| Part id | PK of PART dimension | Decimal(10) | Yes | No |
| Parent part id | FK of parent of that part | Decimal(10) | No | Yes |
| Part level id | Pk of PART LEVEL dimension | Decimal(10) | No | Yes |
| Part manufacturer key | PK of part manufacturer | Decimal(10) | No | Yes |
| Part name | Name of part | Char(30) | No | No |
| Weight | Weight of part in grams | Float | No | No |
| Condition | Consition of part | Varchar(12) | No | No |
| Mileage donor vehicle | Mileage of donor vehicle km/L | Integer | No | No |
| Price | Price in US dollars | Float | No | No |
| Part type | Category under which part falls | Char(20) | No | no |

| **Attribute(s) of " Part Level" Dimension** | | | | |
| --- | --- | --- | --- | --- |
| ***Name*** | **Description** | ***Data Type*** | **(Domain Constraints )Is PK** | **Is FK** |
| Part level id | PK of part level | Decimal(10) | Yes | No |
| Part level description | Description of part level | Varchar(100) | No | no |

| **Attribute(s) of "Part Type " Dimension** | | | | |
| --- | --- | --- | --- | --- |
| ***Name*** | **Description** | ***Data Type*** | **(Domain Constraints )Is PK** | **Is FK** |
| Part type id | PK of part type | Decimal(10) | Yes | No |
| Part type description | Description of part type | varchar(100) | No | No |

| **Attribute(s) of " Part Manufacturer" Dimension** | | | | |
| --- | --- | --- | --- | --- |
| ***Name*** | **Description** | ***Data Type*** | **(Domain Constraints )Is PK** | **Is FK** |
| Part manufacturer key | PK of part manufacturer | Decimal(10) | Yes | No |
| Part manufacturer name | Name of part manufacturer | Varchar(50) | No | no |

| **Attribute(s) of " Car Manufacturer" Dimension** | | | | |
| --- | --- | --- | --- | --- |
| ***Name*** | **Description** | ***Data Type*** | **(Domain Constraints )Is PK** | **Is FK** |
| Car manufacturer id | PK of car manufacturer | Decimal(10) | Yes | No |
| Car manufacturer name | Name of car manufacturer | Char(50) | No | no |

| **Attribute(s) of "Car " Dimension** | | | | |
| --- | --- | --- | --- | --- |
| ***Name*** | **Description** | ***Data Type*** | **(Domain Constraints )Is PK** | **Is FK** |
| Car id | PK of car dimension | Decimal(10) | Yes | No |
| Price | Price in US dollars | Float | No | No |
| Car model key | PK of car model | Decimal(10) | No | Yes |
| Car year of manufacture | Year of manufacture of car | Int | No | No |
| Other car detais | Other specific car details | Varchar(100) | No | No |

| **Attribute(s) of " Car Model" Dimension** | | | | |
| --- | --- | --- | --- | --- |
| ***Name*** | **Description** | ***Data Type*** | **(Domain Constraints )Is PK** | **Is FK** |
| Car model key | PK of car model | Decimal(10) | Yes | No |
| Car model name | Name of car model | Char(20) | No | No |
| Description | Description of car model | Varchar(100) | No | no |

Fact Tables:

**Car Part Fact Table (BASE Fact table)**

|  |  |  |  |
| --- | --- | --- | --- |
| Fact Table name | **Car Part Fact Table (BASE Fact table)** | Model name | Car Parts Module |
| Description | It is base fact table and calculates part related facts like day wise part sales, etc | | |
| Attributes | Time key, supplier id, part id, car manufacturer id, car id, part manufacturer key  Price per unit, discount percentage, expected sales, actual sales, profit, no. of units sold, part name, supplier name, value of supplier by percentile | | |
| Primary keys | Time key, supplier id, part id, car manufacturer id, car id, part manufacturer key | | |
| Foreign keys | Time key, supplier id, part id, car manufacturer id, car id, part manufacturer key | | |
| Facts / Measures | Price per unit, discount percentage, expected sales, actual sales, profit, no. of units sold, part name, supplier name, value of supplier by percentile | | |
| Associated  Dimensions | Time, Supplier, Part, Car Manufacturer, Car , Part Manufacturer | | |

**Part Demand by Car Model Wise Aggregate Fact Table**

|  |  |  |  |
| --- | --- | --- | --- |
| Fact Table name | **Part Demand by Car Model Wise Aggregate Fact Table** | Model name | Car Parts Module |
| Description | It calculates facts by car model wise | | |
| Attributes | Car model key, part id  Expected sales, actual sales, profit, no. of units sold, model name | | |
| Primary keys | Car model key, part id | | |
| Foreign keys | Car model key, part id | | |
| Facts / Measures | Expected sales, actual sales, profit, no. of units sold, model name | | |
| Associated  Dimensions | Car Model, Part | | |

**Supplier Wise Aggregate Fact Table**

|  |  |  |  |
| --- | --- | --- | --- |
| Fact Table name | **Supplier Wise Aggregate Fact Table** | Model name | Car Parts Module |
| Description | It calculates fact supplier wise | | |
| Attributes | Supplier id, part id  Supplier name, actual sales, profit, no of units sold, model name | | |
| Primary keys | Supplier id, part id | | |
| Foreign keys | Supplier id, part id | | |
| Facts / Measures | Supplier name, actual sales, profit, no of units sold, model name | | |
| Associated  Dimensions | Supplier, Part | | |

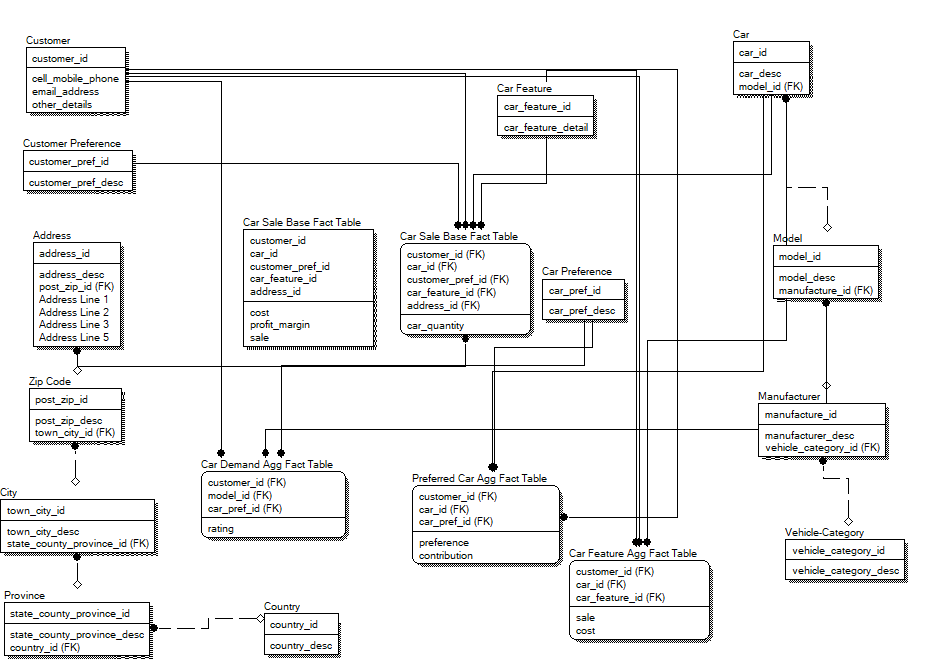
| **Attribute(s) of "** Car Part Fact Table (BASE Fact table)**"** | | | | |
| --- | --- | --- | --- | --- |
| ***Name*** | **Description** | ***Data Type*** | **(Domain Constraints )Is PK** | **Is FK** |
| Time key | PK of time dimension | Decimal(10) | Yes | Yes |
| Supplier id | PK of supplier dimension | Decimal(10) | Yes | Yes |
| Part id | PK of PART dimension | Decimal(10) | Yes | Yes |
| Car manufacturer id | PK of car manufacturer | Decimal(10) | Yes | Yes |
| Part manufacturer key | PK of part manufacturer | Decimal(10) | Yes | Yes |
| Car id | PK of CAR dimension | Decimal(10) | Yes | Yes |
| Price per unit | Price of part in US dollars | Float | No | No |
| Discount percentage | Discount on part sales | Float | No | No |
| Expected sales | Sales value expected on grain level of attributes | Float | No | No |
| Actual sales | Actual sales value | Float | No | No |
| Profit | Profit made | Float | No | No |
| No. of units sold | Total units sold on grain level of attrubutes | Integer | No | No |
| Part name | Part name | Char(30) | No | No |
| Supplier name | Supplier of part’s name | Char(30) | No | No |
| Value of supplier by percentile | Rank of supplier among all suppliers based on mathematical percentile | Integer | No | no |

| **Attribute(s) of "** Part Demand by Car Model Wise Aggregate Fact Table**"** | | | | |
| --- | --- | --- | --- | --- |
| ***Name*** | **Description** | ***Data Type*** | **(Domain Constraints )Is PK** | **Is FK** |
| Car model key | PK of car model dimenaion | Decimal(10) | Yes | Yes |
| Part id | PK of part dimension | Decimal(10) | Yes | Yes |
| Expected sales | Sales expected by DW in US dollars | float | No | No |
| Actual sales | Actual sales of parts in US dollars | float | No | No |
| Profit | Profit made in US dollars | Float | No | No |
| No. of units sold | Total units sold | Integer | No | No |
| Model name | Model name of part | Char(30) | No | no |

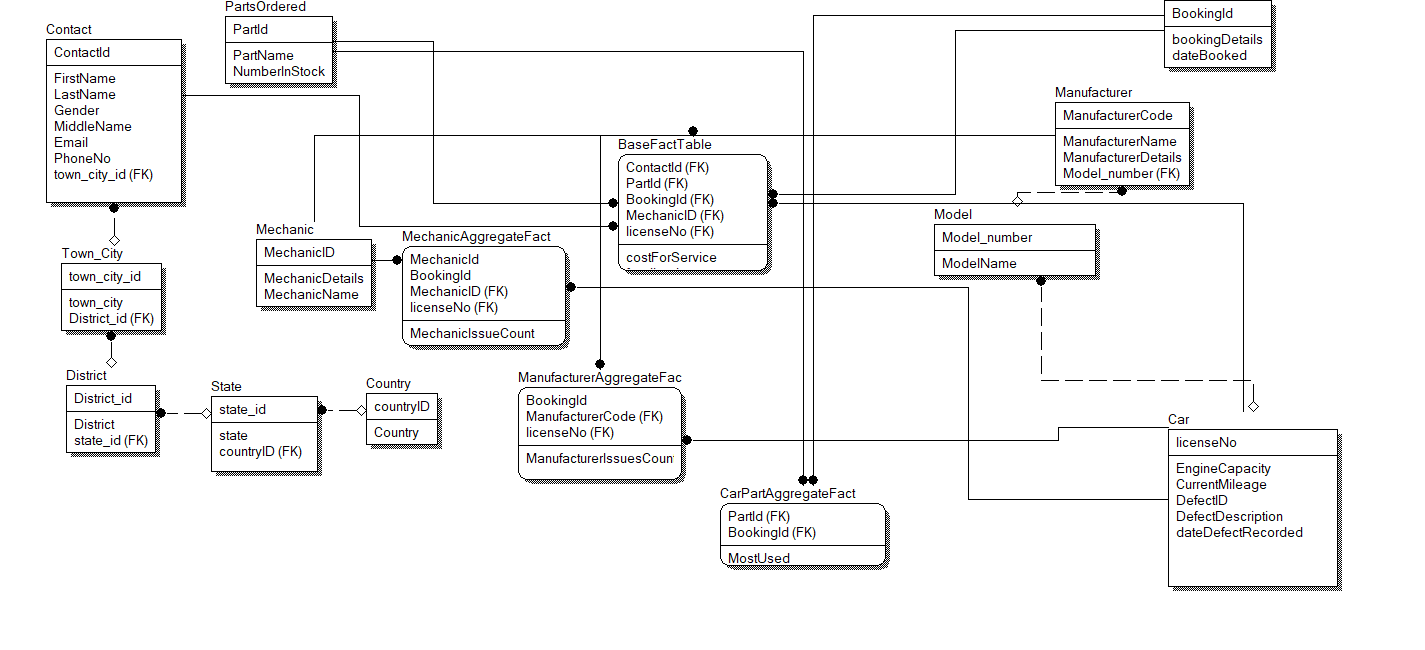
| **Attribute(s) of "** Supplier Wise Aggregate Fact Table**"** | | | | |
| --- | --- | --- | --- | --- |
| ***Name*** | **Description** | ***Data Type*** | **(Domain Constraints )Is PK** | **Is FK** |
| Supplier id | PK of supplier | Decimal(10) | Yes | Yes |
| Part id | PK of part dimension | Decimal(10) | Yes | yes |
| Supplier name | Name of part supplier | Char(30) | No | no |
| Actual sales | Actual sales of parts in US dollars | float | No | No |
| Profit | Profit made in US dollars | Float | No | No |
| No. of units sold | Total units sold | Integer | No | No |
| Model name | Model name of part | Char(30) | No | no |

**Dimensional Data Models**

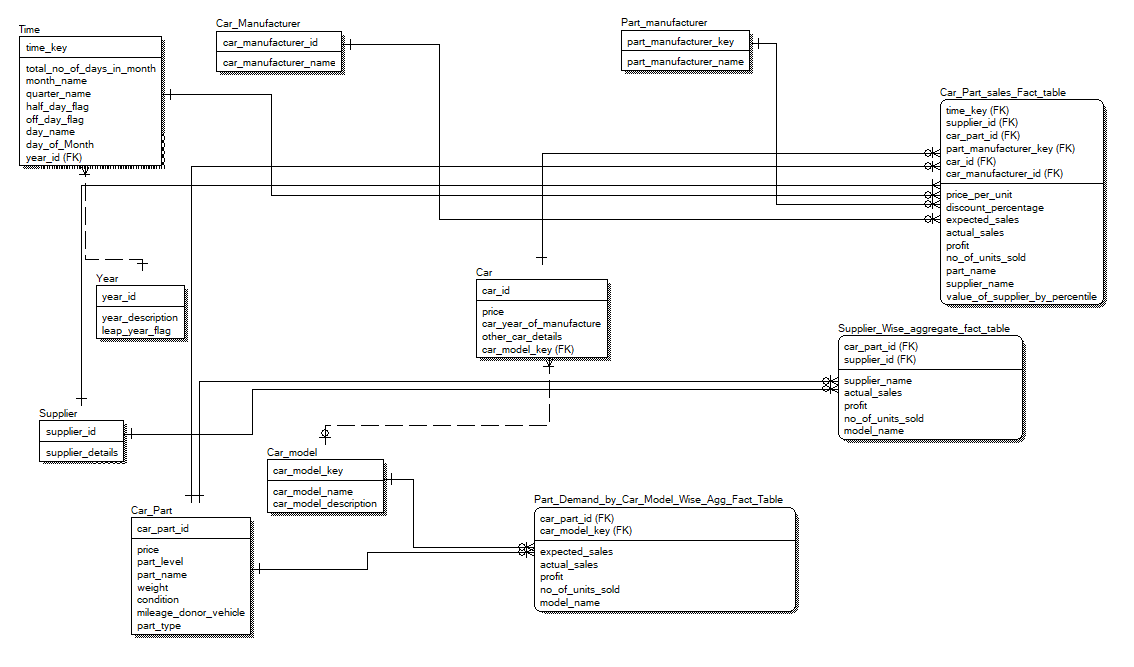
1. Car Sales

****

2) Car Parts Supplier:

****

3) Car Parts Supplier:

****