
# 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_Group< >

## Project Team


| | |
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## Submission Date

11, October, 2019

# Revision History

| Date | Version | Description | Author |
|---|---|---|---|
| 2-October-2019 | 1.0 | Revision of the first data mart logical diagrams | Shanzay Gauhar |
| 6-October-2019 | 1.0 | Revision of the document and finalization of the ER Diagrams | Fatima Hasan |
| 9-October-2019 | 1.0 | Identified and fixed discrepancy in the third data mart | Nuzha Khalid |
| 11-October-2019 | 1.0 | Finalized the complete document with full review | Samra Fakhar |

# Job log

| Job Performed | Performed By | Job Description | Time Taken |
|---|---|---|---|
| E.R. diagrams. | Fatima<br>Samra<br>Nuzha<br>Shanzay | Involved transfer of E.R. diagrams from paper into Erwin, identify and fill holes. | 5 days |
| Source System design | Fatima | Data design of the source system including Car sales, car service center. | 1 day |
| Source System design and introduction of the project | Samra | Data design of the source system (cars parts suppliers) along with the purpose, scope and user requirements | 1 day |
| Car Sales module of the dimensional model | Shanzay | Design of the car sales module including the data dictionaries as well as the logical model | 2 days |
| Car service center module of the dimensional model | Fatima | Design of the car service center module including the data dictionaries and the logical model | 2 days |
| Cars parts supplier's module of the dimensional model | Nuzha | Design of the car's parts supplier including the data dictionaries and the logical model | 2 days |
| ER Models + SQL generation | Samra | Created the ER Models on SQL Management studio and created the sql for the dimensions as well as the aggregate tables | 2 days |

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# Data Design Document

## 1. Introduction

### 1.1. Purpose

This project is about the Car Industry that sells and services (repairs) the cars. The purpose of this document is to provide a detailed description of the design of a Car Industry Data Warehouse used for building reports from the data. The benefits of having a data warehouse are numerous and it is imperative that a fully-fledged design document is created beforehand to ensure the success of the project.

This document clearly mentions the requirements of the users, which are the most important part of any data warehouse project. The design revolves around these requirements. The document includes description of the source system, mapping from the source system to the target system, fully detailed description of the data marts to be created along with their physical models, and an integrated view of the entire warehouse. The main purpose of this data warehouse is better business understanding and increasing business profit for their industry.

The design document is helpful both for the users as well as the developers because it helps in the maintenance of the warehouse.

### 1.2.Scope

The design of the Car Industry Data Warehouse will allow users (executives) of Car Industry to monitor the business activities like demands, sales, services, supplies more easily and efficiently and find the needed information faster. 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 which are stated as under.

- Car Sales Module (CSM)
- Car Service Center (CSC)
- Car Parts Suppliers (CPS)

So, all the Strategic information or BI will be done by getting the information from these systems and the resulting Data ware house 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. 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 Car Industry Data Warehouse.

## Definitions, Acronyms and Abbreviations

**CSM** Car Sales Module
**CSC** Car Service Center
**CPS** Car Parts Suppliers
**SRS** Software Requirements Specification
**GUI** (Graphical User Interface) - a visually based application that serves to provide an interactive medium between the user and the applicoation.
**E-R** Entity-Relationship
**ETL** Extraction, Transformation, Loading (of data for Data warehouse)
**DW** Abbreviation of Data Warehouse
**SRS** Software Requirements Specification
**SDS** Software Design Specifications
**OLTP** Online Transaction Processing Systems (Operational Systems)
**BI** business Intelligence

## 1.3. References

Data Warehousing Fundamentals, Paulraj Ponniah

Building the Data Warehouse, W. H. Inmon

# 2. Project Overview

## 2.1. Project Description

This project is about the Car Industry that sells and services (repairs) the cars. These business processes are handled via a Car Sales Module (CSM), Car Service Center (CSC) and Car Parts Suppliers (CPS). It enables the car industry to tackle everyday queries regarding the sales and demands. Moreover, it can also provide monthly and yearly analysis for all these stats. It will help keep a record of all the car features, customer preferences, customer demands, the parts in high demands. Car industry provides car services and handles defects. This project works to develop a system that enables to keep a record of all those defects and the mechanics who dealt with them. It also, covers in detail, the aspect of spare parts, their demand, manufacturers and suppliers.
The management wants to build a data warehouse based on these three source systems for the purpose of better business understanding and increasing business profit for their industry.

## 2.2. Goals

The goals of the project are categorized as following

- Building a small data warehouse for Car Industry that integrates the given three systems (CSM, CSC, CPS) 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.

System must support a wide range of queries, the results of which will be used by the car industry in decision making.
It must provide detailed as well as summarized record of all the business requirements.

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

## 2.3 Scope

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

- Enabling efficient decision making and analysis on basis of the query results generated by the system.
- Quality of service provided to customers.
- keeping a check on the products in demand and the customer preferences to improve customer relations management.
- Efficient analysis of Car sales and demands.
- Detailed analysis of the service center, its working, mechanics and industry needs.

## 2.4 High Level User Requirements

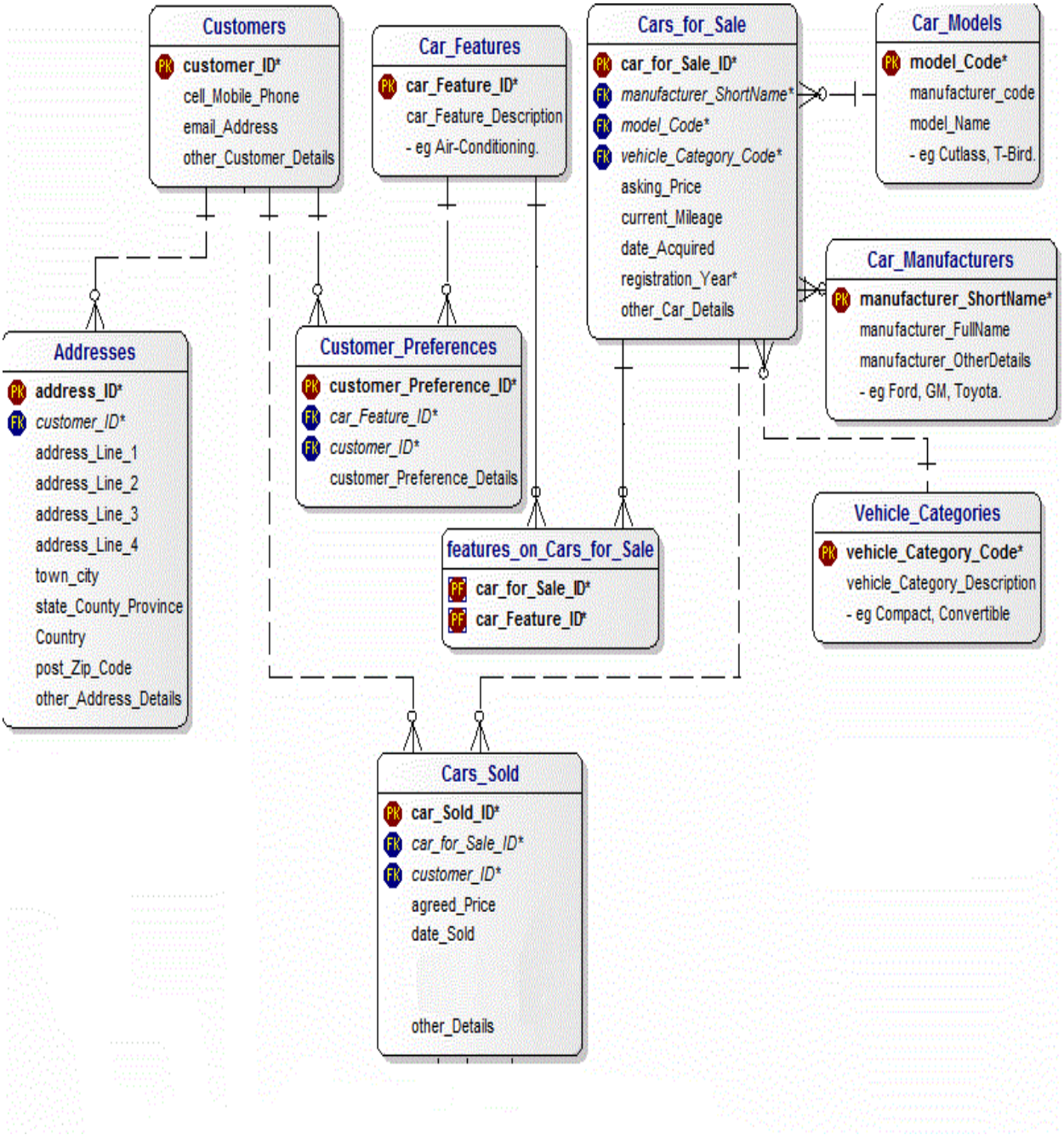
The required system is a data warehouse system, which is used for business analysis purposes. The major analysis needs of the customer are as following

- 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?

## 2.5 Source Design

### 2.5.1 Car Sales Module

### Data Model



# Data Dictionary

## Customer

| **Table name** | Customer | **Database name** | CarSalesModule |
|---|---|---|---|
| **Description** | This will provide information regarding customers. | | |
| **Attributes** | customer _id, cell_Mobile_Phone, email_Address, other_Customer_Details | | |
| **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 |
| cell_Mobile_Phone | It will contain the contact number of the customer | CHAR (18) | - |
| email_Address | This has the email address of the customer | CHAR (18) | - |
| other_Customer_Details | This contains miscellaneous details. | CHAR (18) | - |

## Addresses

| **Table name** | Addresses | **Database name** | CarSalesModule |
|---|---|---|---|
| **Description** | This will provide information regarding addresses. | | |
| **Attributes** | adderess_ID, customer_ID, address_Line_1, address_Line_2, address_Line_3, address_Line_4, town_city, state_County_Province, Country, post_Zip_Code, other_Address_Details | | |
| **Primary keys** | address_ID | | |
| **Foreign keys** | customer_ID | | |

| **Attribute Name** | **Description** | **Data type** | **Domain Constraint** |
|---|---|---|---|
| address_ID | It will uniquely identify the addresses. | DECIMAL (10) | PK |
| customer_ID | Contains the ID of the customer whose address is stored. | CHAR (18) | FK |
| address_Line_1 | Contains information of the address. | CHAR (18) | - |
| address_Line_2 | Contains information of the address. | CHAR (18) | - |
| address_Line_3 | Contains information of the address. | CHAR (18) | - |
| address_Line_4 | Contains information of the address. | CHAR (18) | - |
| town City | provides the information regarding the town/city of the address | CHAR (18) | - |
| state_County_Province | provides the information regarding the state/county/province of the address | CHAR (18) | - |

| | | | |
|---|---|---|---|
| Country | provides the information regarding the country of the address | CHAR (18) | - |
| post_Zip_Code | provides the information regarding the zip code of the address | DECIMAL (6) | - |
| other_Address_Details | Contains other details of the address | CHAR (18) | - |

## Car_Features

| **Table name** | Car_Features | **Database name** | CarSalesModule |
|---|---|---|---|
| **Description** | This will provide information regarding the car features. | | |
| **Attributes** | car_Feature_ID, car_Feature_Description | | |
| **Primary keys** | car_Feature_ID | | |
| **Foreign keys** | - | | |

| **Attribute Name** | **Description** | **Data type** | **Domain Constraint** |
|---|---|---|---|
| car_Feature_ID | Uniquely identifies the feature | DECIMAL (10) | PK |
| Car_Feature_Description | Contains the description of the car feature e.g Air Conditioning | CHAR (18) | - |

## Customer_Preferences

| **Table name** | Customer_Preferences | **Database name** | CarSalesModule |
|---|---|---|---|
| **Description** | This will provide information regarding the preferences of the customers. | | |
| **Attributes** | customer_Preference_ID, car_Feature_ID, customer_ID, customer_Preference_Details | | |
| **Primary keys** | customer_Preference_ID | | |
| **Foreign keys** | car_Feature_ID, customer_ID | | |

| **Attribute Name** | **Description** | **Data type** | **Domain Constraint** |
|---|---|---|---|
| customer_Preference_ID | Uniquely identifies the preference of the customer | DECIMAL (10) | PK |
| car_Feature_ID | Contains the feature ID of the car | DECIMAL (10) | FK |
| customer_ID | Contains the ID of the customer | DECIMAL (10) | FK |
| customer_Preference_Details | Contains the description of the customer preference | CHAR (18) | - |

## Car_Models

| **Table name** | Car_Models | **Database name** | CarSalesModule |
|---|---|---|---|
| **Description** | This will provide information regarding the models of the cars | | |
| **Attributes** | model_Code, manufacturer_Code, model_Name | | |
| **Primary keys** | model_Code | | |
| **Foreign keys** | - | | |

| **Attribute Name** | **Description** | **Data type** | **Domain Constraint** |
|---|---|---|---|
| model_Code | Uniquely identifies the model. | DECIMAL (10) | PK |
| manufacturer_Code | Contains the code of the manufacturer of this particular model | DECIMAL (10) | - |
| model_Name | Contains the name of the model e.g Cutlass, T-Bird | CHAR (18) | - |

## Car_Manufacturers

| **Table name** | Car_Manufacturers | **Database name** | CarSalesModule |
|---|---|---|---|
| **Description** | This will provide information regarding the car manufacturers. | | |
| **Attributes** | manufacturer_ShortName, manufacturer_FullName, manufacturer_OtherDetails | | |
| **Primary keys** | manufacturer_ShortName | | |
| **Foreign keys** | - | | |

| **Attribute Name** | **Description** | **Data type** | **Domain Constraint** |
|---|---|---|---|
| manufacturer_ShortName | Uniquely identifies the manufacturer | CHAR (18) | PK |
| manufacturer_FullName | Provides the name of the manufacturer of the model | CHAR (18) | - |
| manufacturer_OtherDetails | Contains the name | | |

## Vehicle_Categories

| **Table name** | Vehicle_Categories | **Database name** | CarSalesModule |
|---|---|---|---|
| **Description** | This will provide information regarding the categories of vehicles. | | |
| **Attributes** | vehicle_Category_Code, vehicle_Category_Description | | |
| **Primary keys** | vehicle_Category_Code | | |
| **Foreign keys** | - | | |

| **Attribute Name** | **Description** | **Data type** | **Domain Constraint** |
|---|---|---|---|
| vehicle_Category_Code | Uniquely identifies the vehicle category | DECIMAL (10) | PK |
| vehicle_Category_Description | Provides the description of the vehicle category | CHAR (18) | - |

## Cars_For_Sale

| **Table name** | Cars_For_Sale | **Database name** | CarSalesModule |
|---|---|---|---|
| **Description** | This will provide information regarding the cars that are for sale | | |
| **Attributes** | car_for_Sale_ID, manufacturer_ShortName, model_Code, vehicle_Category_Code, asking_Price, current_Mileage, date_Acquired, registration_Year, other_Car_Details | | |
| **Primary keys** | car_for_Sale_ID | | |
| **Foreign keys** | manufacturer_ShortName, model_Code, vehicle_Category_Code | | |

| **Attribute Name** | **Description** | **Data type** | **Domain Constraint** |
|---|---|---|---|
| car_for_Sale_ID | Uniquely identifies the car that is for sale | DECIMAL (10) | PK |
| manufacturer_ShortName | Provides the name of the manufacturer of the car | CHAR (18) | FK |
| model_Code | Contains the code of the model | DECIMAL (10) | FK |
| vehicle_Category_Code | Contains the code of the car's vehicle category | DECIMAL (10) | FK |
| asking_Price | The price of the car being sold | DECIMAL (10) | - |
| current_Mileage | The mileage of the car | DECIMAL (10) | - |
| date_Acquired | Date when the car was aquired | DATE | - |
| Registration_Year | Registration year of the car | DECIMAL (4) | - |
| Other_Car_Details | Other details of the car to be sold | CHAR (18) | - |

## Features_On_Cars_For_Sale

| **Table name** | Features_On_Cars_For_Sale | **Database name** | CarSalesModule |
|---|---|---|---|
| **Description** | This will provide information of the features on the cars for sale | | |
| **Attributes** | car_for_Sale_ID, car_Feature_ID | | |
| **Primary keys** | car_for_Sale_ID, car_Feature_ID | | |
| **Foreign keys** | car_for_Sale_ID, car_Feature_ID | | |

| **Attribute Name** | **Description** | **Data type** | **Domain Constraint** |
|---|---|---|---|
| Car_For_Sale_ID | ID of the car being sold | DECIMAL (10) | PK, FK |
| car_Feature_ID | ID of the feature | DECIMAL (10) | PK, FK |

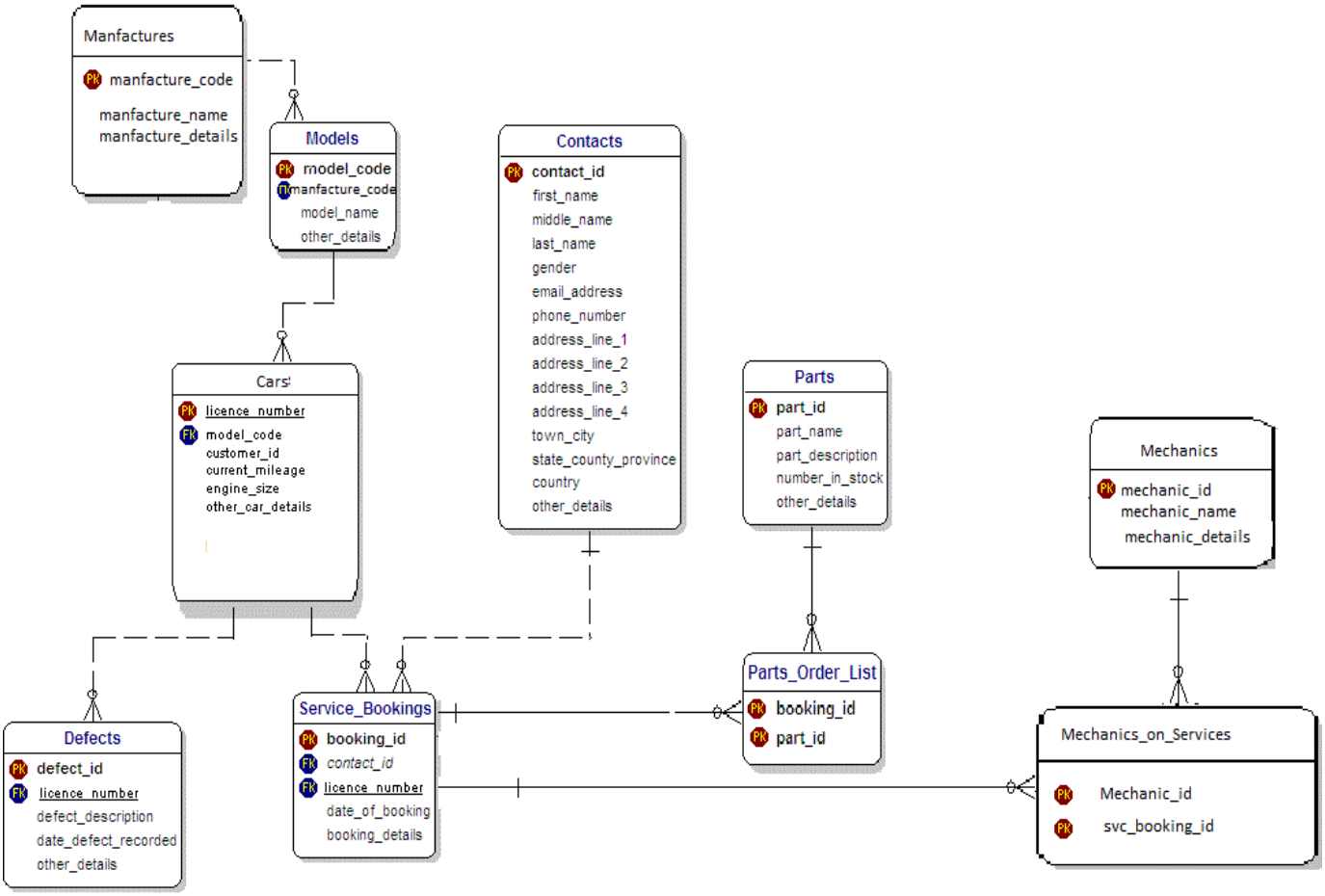
## Cars_Sold

| **Table name** | Cars_Sold | **Database name** | CarSalesModule |
|---|---|---|---|
| **Description** | This will provide information regarding the cars that have been 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 is the unique id of the car sold | DECIMAL (10) | PK |
| car_for_Sale_ID | Provides the id of the same car when it was for sale | DECIMAL (10) | FK |
| customer_ID | ID of the customer who bought the car | DECIMAL (10) | FK |
| agreed_Price | Sale price of the car | DECIMAL (10) | - |
| date_sold | Date when the car was sold | DATE | - |
| other_Details | Some miscellaneous details of the sold car | CHAR (18) | - |

## 2.5.2 Car Service Centre

### Data Model



# Data Dictionary

## Manufactures

| **Table name** | Manufactures | **Database name** | CarServiceCenter |
|---|---|---|---|
| **Description** | This will provide information regarding the manufactures of the cars. | | |
| **Attributes** | manufacture_Code, manufacture_name, manufacture_details | | |
| **Primary keys** | manufacture_Code | | |
| **Foreign keys** | - | | |

| **Attribute Name** | **Description** | **Data type** | **Domain Constraint** |
|---|---|---|---|
| manufacture_Code | Uniquely identifies the manufacture | DECIMAL (10) | PK |
| manufacture_name | Name of the manufacture | CHAR (18) | - |
| manufacture_details | Details of the manufacture | CHAR (18) | |

## Models

| **Table name** | Models | **Database name** | CarServiceCenter |
|---|---|---|---|
| **Description** | This will provide information regarding the models of the cars. | | |
| **Attributes** | model_Code, manufacture_Code, model_name, other_details | | |
| **Primary keys** | manufacture_Code | | |
| **Foreign keys** | - | | |

| **Attribute Name** | **Description** | **Data type** | **Domain Constraint** |
|---|---|---|---|
| model_Code | Uniquely identifies the model | DECIMAL (10) | PK |
| manufacture_code | code of the manufacture | DECIMAL (10) | FK |
| nodel_name | Name of the model | CHAR (18) | |
| Other_details | Some other details of the model | CHAR (18) | - |

## Cars

| **Table name** | Cars | **Database name** | CarServiceCenter |
|---|---|---|---|
| **Description** | This will provide information regarding the cars. | | |
| **Attributes** | licence_number, model_code, customer_id, current_mileage, engine_size, other_car_details | | |
| **Primary keys** | licence_number | | |
| **Foreign keys** | model_code | | |

| **Attribute Name** | **Description** | **Data type** | **Domain Constraint** |
|---|---|---|---|
| licence_number | Uniquely identifies the car | DECIMAL (10) | PK |
| model_code | code of the model | DECIMAL (10) | FK |
| customer_id | Provides the id of the customer who this car belongs to | DECIMAL (10) | - |
| current_mileage | Current mileage of the car | DECIMAL (10) | - |
| engine_size | Provides the size of the engine of the car | DECIMAL (10) | - |
| Other_car_details | Some other details of the car | CHAR (18) | - |

## Defects

| **Table name** | Defects | **Database name** | CarServiceCenter |
|---|---|---|---|
| **Description** | This will provide information regarding the defects of the cars. | | |
| **Attributes** | defect_id, licence_number, defect_description, date_defect_recorded, other_details | | |
| **Primary keys** | defect_id | | |
| **Foreign keys** | licence_number | | |

| **Attribute Name** | **Description** | **Data type** | **Domain Constraint** |
|---|---|---|---|
| defect_id | Uniquely identifies the defect | DECIMAL (10) | PK |
| licence_number | Licence number of the car brought in with the defect | DECIMAL (10) | FK |
| Defect_description | Description of the defect in the car | CHAR (18) | - |
| date_defect_recorded | The date when the defect was recorded | DATE | - |
| Other_details | Other details of the defect | CHAR (18) | - |

## Contacts

| **Table name** | Contacts | **Database name** | CarServiceCenter |
|---|---|---|---|
| **Description** | This will provide information regarding the contacts of the service center. | | |
| **Attributes** | contact_id, first_name, middle_name, last_name, gender, email_address, phone_number, address_line_1, address_line_2, address_line_3, address_line_4, town_city, state_county_province, country, other_details | | |
| **Primary keys** | contact_id | | |
| **Foreign keys** | - | | |

| **Attribute Name** | **Description** | **Data type** | **Domain Constraint** |
|---|---|---|---|
| contact_id | The ssn or id of the contact | DECIMAL (10) | PK |
| first_name | First name of the contact | CHAR (18) | - |
| middle_name | Middle name of the contact | CHAR (18) | - |
| last_name | Last name of the contact | CHAR (18) | - |
| email_address | Email details of the contact | CHAR (18) | - |
| phone_number | Contact number | CHAR (18) | - |
| address_line_1 | The first line of the address of the contact | CHAR (18) | - |
| address_line_2 | The second line of the address of the contact | CHAR (18) | - |
| address_line_3 | The third line of the address of the contact | CHAR (18) | - |
| address_line_4 | The fourth line of the address of the contact | CHAR (18) | - |

| | | | |
|---|---|---|---|
| town_city | The city information of contact | CHAR (18) | - |
| state_county_province | The state/county/province information | CHAR (18) | - |
| country | The country where the contact lives | CHAR (18) | - |
| other_details | Other miscellaneous details | CHAR (18) | - |

## Service_Bookings

| **Table name** | Service_Bookings | **Database name** | CarServiceCenter |
|---|---|---|---|
| **Description** | This will provide information regarding the bookings of the services | | |
| **Attributes** | booking_id, contact_id, licence_number, date_of_booking, booking_details | | |
| **Primary keys** | booking_id | | |
| **Foreign keys** | contact_id, licence_number | | |

| **Attribute Name** | **Description** | **Data type** | **Domain Constraint** |
|---|---|---|---|
| booking_id | Uniquely identifies the booking | DECIMAL (10) | PK |
| contact_id | The id of the contact who has got the booking for service | DECIMAL (10) | FK |
| licence_number | The licence number of the car for service | DECIMAL (10) | FK |
| date_of_booking | The date when the booking was made | DATE | - |
| booking_details | Other details of the booking | CHAR (18) | - |

## Parts

| **Table name** | Parts | **Database name** | CarServiceCenter |
|---|---|---|---|
| **Description** | This will provide information regarding the parts of the cars | | |
| **Attributes** | part_id, part_name, part_description, number_in_stock, other_details | | |
| **Primary keys** | part_id | | |
| **Foreign keys** | - | | |

| **Attribute Name** | **Description** | **Data type** | **Domain Constraint** |
|---|---|---|---|
| part_id | Uniquely identifies the part | DECIMAL (10) | PK |
| part_name | Contains the name of the part | CHAR (18) | - |
| part_description | Provides the description of the part | CHAR (18) | - |
| number_in_stock | The quantity of the parts in stock | DECIMAL (10) | - |
| other_details | Other details of the part | CHAR (18) | - |

## Mechanics

| **Table name** | Mechanics | **Database name** | CarServiceCenter |
|---|---|---|---|
| **Description** | This will provide information regarding the mechanics | | |
| **Attributes** | mechanic_id, mechanic_name, mechanic_details | | |
| **Primary keys** | mechanic_id | | |
| **Foreign keys** | - | | |

| **Attribute Name** | **Description** | **Data type** | **Domain Constraint** |
|---|---|---|---|
| mechanic_id | The id of the mechanic | DECIMAL (10) | PK |
| mechanic_name | Contains the name of the mechanic | CHAR (18) | - |
| mechanic_details | The details of the mechanics | CHAR (18) | - |

## Parts_Order_List

| **Table name** | Parts_Order_List | **Database name** | CarServiceCenter |
|---|---|---|---|
| **Description** | This will provide information regarding the orders of the parts | | |
| **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 | The id of the booking | DECIMAL (10) | PK, FK |
| part_id | The id of the part bought in the booking | DECIMAL (10) | PK, FK |

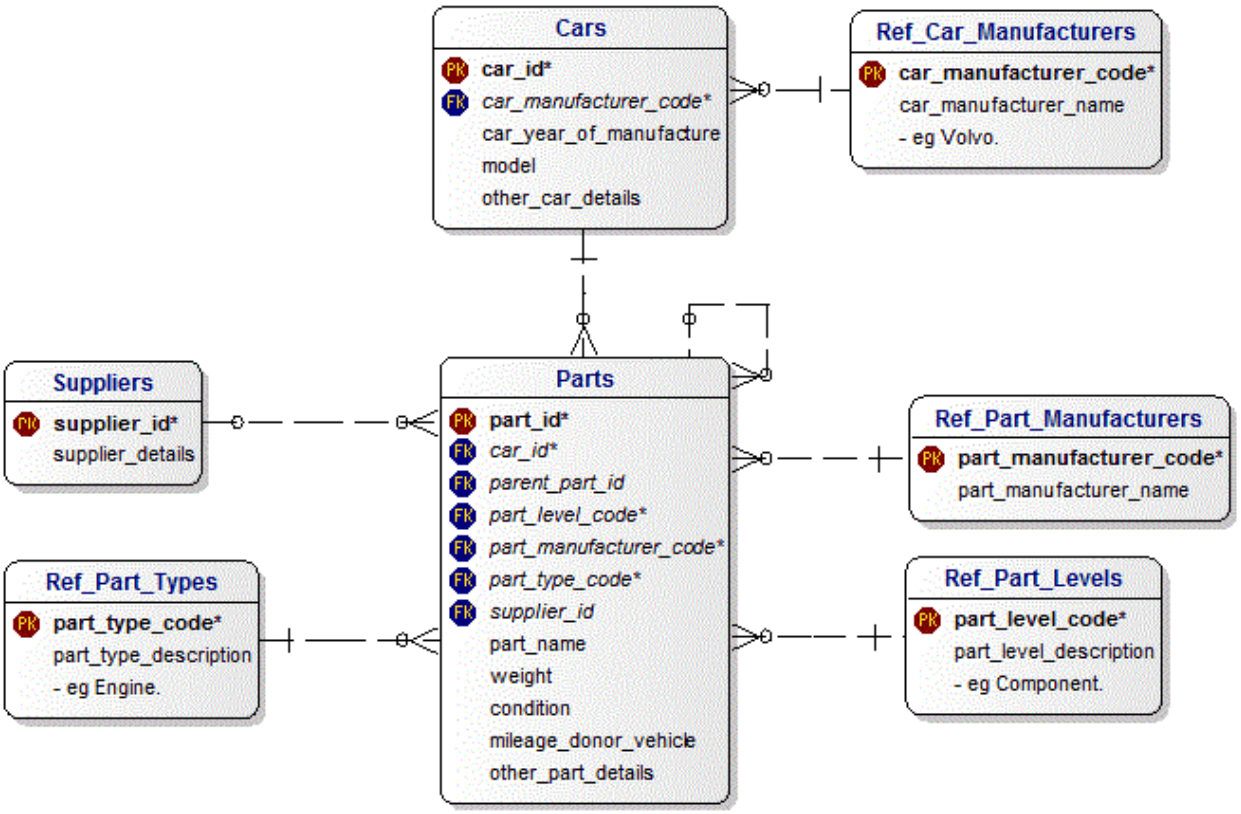
## Mechanics_On_Services

| **Table name** | Mechanics_On_Services | **Database name** | CarServiceCenter |
|---|---|---|---|
| **Description** | This will provide information regarding the services provided by the mechanics | | |
| **Attributes** | mechanic_id, svc_booking_id | | |
| **Primary keys** | mechanic_id, svc_booking_id | | |
| **Foreign keys** | mechanic_id, svc_booking_id | | |

| **Attribute Name** | **Description** | **Data type** | **Domain Constraint** |
|---|---|---|---|
| mechanic_id | The id of the mechanic | DECIMAL (10) | PK, FK |
| svc_booking_id | The id of the booking | DECIMAL (10) | PK, FK |

## 2.5.3 Cars Parts Suppliers

### Data Model



# Data Dictionary

## Ref_Car_Manufacturers

| **Table name** | Ref_Car_Manufacturers | **Database name** | CarsPartsSuppliers |
|---|---|---|---|
| **Description** | This will provide information regarding the manufacturers of the cars | | |
| **Attributes** | car_manufacturer_code, car_manufacturer_name | | |
| **Primary keys** | car_manufacturer_code | | |
| **Foreign keys** | - | | |

| **Attribute Name** | **Description** | **Data type** | **Domain Constraint** |
|---|---|---|---|
| car_manufacturer_code | The unique code of the manufacturer | DECIMAL (10) | PK |
| car_manufacturer_name | The name of the manufacturer e.g Volvo | CHAR (18) | - |

## Cars

| **Table name** | Cars | **Database name** | CarsPartsSuppliers |
|---|---|---|---|
| **Description** | This will provide information regarding the cars | | |
| **Attributes** | car_id, car_manufacturer_code, car_year_of_manufacture, model, other_car_details | | |
| **Primary keys** | car_id | | |
| **Foreign keys** | car_manufacturer_code | | |

| **Attribute Name** | **Description** | **Data type** | **Domain Constraint** |
|---|---|---|---|
| car_id | The unique id of each car | DECIMAL (10) | PK |
| car_manufacturer_code | The code of the manufacturer of the car | DECIMAL (10) | FK |
| car_year_of_manufacture | This contains the year in which the car was made | DECIMAL (4) | - |
| model | Contains the model of the car | CHAR (18) | - |
| other_car_details | Provides other details related to the car | CHAR (18) | - |

## Suppliers

| **Table name** | Suppliers | **Database name** | CarsPartsSuppliers |
|---|---|---|---|
| **Description** | This will provide information regarding the suppliers of the parts | | |
| **Attributes** | supplier_id, supplier_details | | |
| **Primary keys** | supplier_id | | |
| **Foreign keys** | - | | |

| **Attribute Name** | **Description** | **Data type** | **Domain Constraint** |
|---|---|---|---|
| supplier_id | The unique id of the supplier | DECIMAL (10) | PK |
| supplier_details | Provides the details of the supplier | CHAR (18) | - |

## Ref_Part_Types

| **Table name** | Ref_Part_Types | **Database name** | CarsPartsSuppliers |
|---|---|---|---|
| **Description** | This will provide information regarding the part types | | |
| **Attributes** | part_type_code, part_type_description | | |
| **Primary keys** | part_type_code | | |
| **Foreign keys** | - | | |

| **Attribute Name** | **Description** | **Data type** | **Domain Constraint** |
|---|---|---|---|
| part_type_code | The unique code of the type of part | DECIMAL (10) | PK |
| part_type_description | Provides the description of the part type | CHAR (18) | - |

## Ref_Part_Manufacturers

| **Table name** | Ref_Part_Manufacturers | **Database name** | CarsPartsSuppliers |
|---|---|---|---|
| **Description** | This will provide information regarding the manufacturers of the parts of the cars | | |
| **Attributes** | part_manufacturer_code, part_manufacturer_name | | |
| **Primary keys** | part_manufacturer_code | | |
| **Foreign keys** | - | | |

| **Attribute Name** | **Description** | **Data type** | **Domain Constraint** |
|---|---|---|---|
| part_manufacturer_code | The unique code of the manufacturer of the part | DECIMAL (10) | PK |
| part_manufacturer_name | The name of the manufacturer | CHAR (18) | - |

## Ref_Part_Levels

| **Table name** | Ref_Part_Levels | **Database name** | CarsPartsSuppliers |
|---|---|---|---|
| **Description** | This will provide information regarding the levels of the parts of the cars | | |
| **Attributes** | part_level_code, part_level_description | | |
| **Primary keys** | part_level_code | | |
| **Foreign keys** | - | | |

| **Attribute Name** | **Description** | **Data type** | **Domain Constraint** |
|---|---|---|---|
| part_level_code | The unique code of the level of the part | DECIMAL (10) | PK |
| part_level_description | The description of the level | CHAR (18) | - |

## Parts

| **Table name** | Parts | **Database name** | CarsPartsSuppliers |
|---|---|---|---|
| **Description** | This will provide information regarding the parts of the cars | | |
| **Attributes** | part_id, car_id, parent_part_id, part_level_code, part_manufacturer_code, part_type_code, supplier_id, part_name, weight, condition, mileage_donor_vehicle, other_part_details | | |
| **Primary keys** | part_id | | |
| **Foreign keys** | car_id, parent_part_id, part_level_code, part_manufacturer_code, part_type_code, supplier_id | | |

| **Attribute Name** | **Description** | **Data type** | **Domain Constraint** |
|---|---|---|---|
| part_id | The unique id of the part | DECIMAL (10) | PK |
| car_id | The id of the car | DECIMAL (10) | FK |
| parent_part_id | The id of the parent part | DECIMAL (10) | FK |
| part_level_code | The code of the level of the part | DECIMAL (10) | FK |
| part_manufacturer_code | The code of the manufacturer of the part | DECIMAL (10) | FK |
| part_type_code | Contains the code of the part type | DECIMAL (10) | FK |
| supplier_id | Contains the id of the supplier of the part | DECIMAL (10) | FK |
| part_name | Provides the name of the part | CHAR (18) | - |

| | | | |
|---|---|---|---|
| weight | Contains the weight of the part | DECIMAL (10) | - |
| condition | The condition of the part | CHAR (18) | - |
| mileage_donor_vehicle | The mileage of the car which donated this part | DECIMAL (10) | - |
| other_part_details | Some other details of the part | CHAR (18) | - |

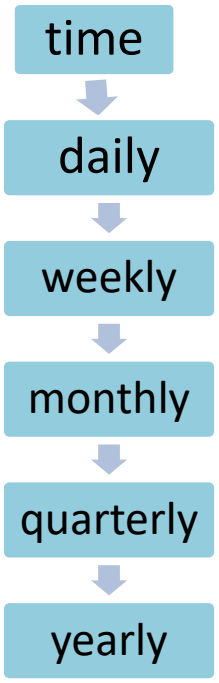
# 3 Data Marts

## 3.1 Data Mart 2 - Sales Information System

**Logical Model**

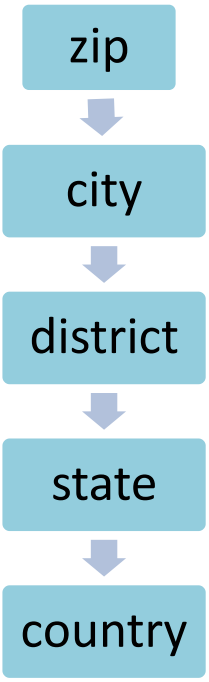
### Time Dimension

| Attribute Name | Description | Sample Values |
|---|---|---|
| timeID | Unique identifier | 1,2,3 |
| Day | It keeps the value of a particular day | Friday |
| Week | It keeps the value of a particular week | Week3 |
| Month | It keeps the value of a particular month | July |
| Quarter | It keeps the value of a particular Quarter | Third Quarter |
| Year | It keeps the value of a particular Year | 2010 |



## Region Dimension

| Attribute Name | Description | Sample Values |
|---|---|---|
| Zip | It stores the zip code of an area | 54000 |
| City | It stores the city name | Karachi |
| District | It stores the district name | Lahore |
| State | It stores the state name | Punjab |
| Country | It stores the country name | Pakistan |

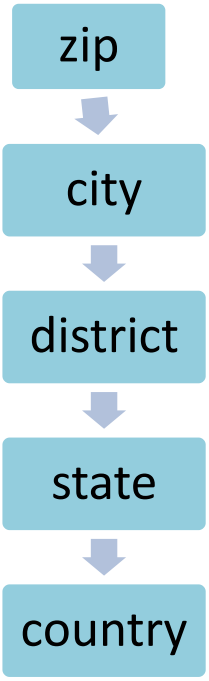


## Customer dimension

| Attribute Name | Description | Sample Values |
|---|---|---|
| Customer ID | Primary Key, Unique Customer Identifier | 1910 |
| First name | Customer first name | Sania |
| Last name | Customer Last name | Saeed |
| Cell Phone Number | Contact details of the customer | 0300 1234567 |
| Email Address | Email id of the customer for contacting purposes | saniasaeed@hotmail.com |
| Address | Stores the address of the customer | 4-B Valencia Town, Lahore |
| Customer type | It stores the customer type either corporate or individual | Corporate/individual |
| Zip | The zip of the customer. | 02214 |
| City | The city of the customer. | Lahore |
| District | The District of the customer. | Lahore |
| State | The state of the customer. | Punjab |
| Country | The country of the customer. | Pakistan. |

## Car dimension

| Attribute Name | Description | Sample Values |
|---|---|---|
| CarID | Car ID number (Primary key) | 7578 |
| Vehicle_CategoryCode | Category code under which vehicle befalls | 123 |
| Manufacturer_ShortName | Identifier of the manufacturer | Toyota |
| Model_Code | Identifier for the model | 90809 |
| Registration_Year | Registration Year | 1998 |



## Feature Dimension

| Attribute Name | Description | Sample Values |
|---|---|---|
| Feature_ID | Feature ID number | 12345 |
| Feature_Description | Description of the feature | Air Conditioner |
| Feature_Cost | Cost of the feature | 10000 |

## Car_Feature_Bridge_Table

| Attribute Name | Description | Sample Values |
|---|---|---|
| Car_ID | Unique Identifier (Primary key) | 7578 |
| Feature_ID | Unique Identifier (Primary Key) | 20 |

**Composite Primary Key, identifying n to n relationship.**

## Car_Manufacturer

| Attribute Name | Description | Sample Values |
|---|---|---|
| Manufacturer_ShortName | Unique Identifier (Primary key) | 7578 |
| Manufacturer_FullName | Full Name of the manufacturer | Toyota |
| Manufacturer_Location | Location of the manufacturer | Japan |

## Car_Models

| Attribute Name | Description | Sample Values |
|---|---|---|
| Model_Code | Unique Identifier (Primary key) | 7578 |
| Model_Name | Name of the model | Cutlass |
| Manufacturer_ShortName | Foreign key manufacturer | 7578 |

## Vehicle Categories

| Attribute Name | Description | Sample Values |
|---|---|---|
| Vehicle_Category_Code | Unique Identifier (Primary key) | 7109 |
| Vehicle_Category_Description | Description of the category | Convertible |
| Model_Code | Code of the model | 12345 |

## Customer-Preferences

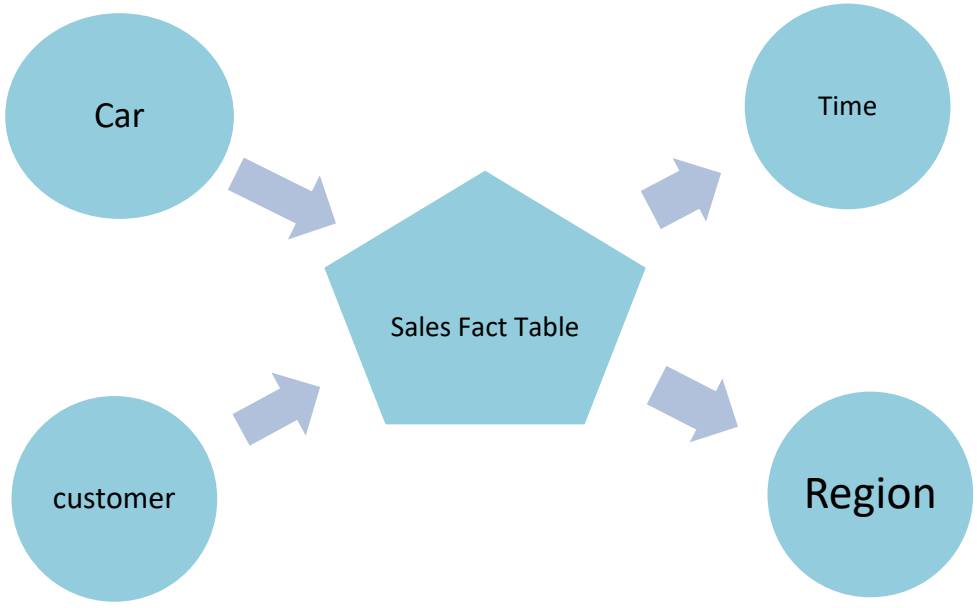
(We give preferences in the triplets, with the choice to enter null in any preference column)

| Attribute Name | Description | Sample Values |
|---|---|---|
| Preference_Code | Unique Identifier (Primary key) | 7578 |
| Preference_FeatureID_1 | Feature ID number | 234 |
| Preference_FeatureID_2 | Feature ID number | 244 |
| Preference_FeatureID_3 | Feature ID number | 222 |

# Fact Table

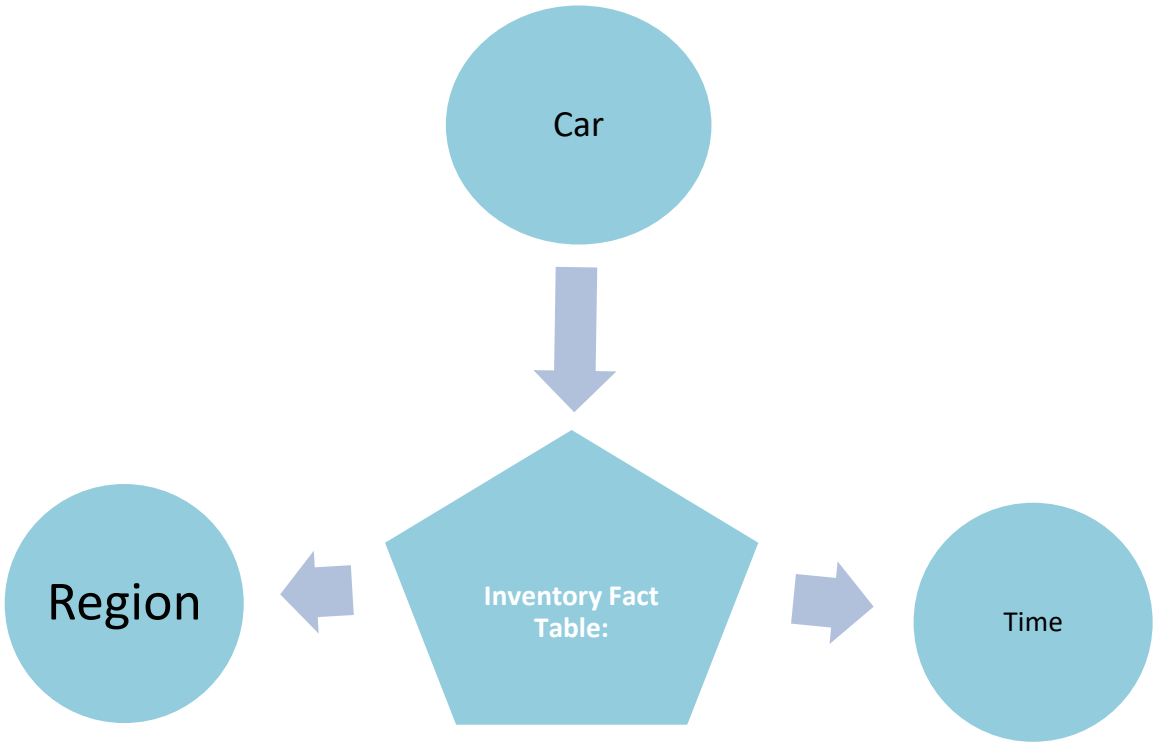
## Sales Fact Table

| Fact Name | Description | Default Aggregation rule |
|---|---|---|
| Quantity_Sold | It measures the product quantity sold count | Base |
| Total Cost | Cost involved in making of product | Base |
| Selling Price | Price at which car is sold | Base |
| Profit_margin | It measures the product profit margin count | Base |



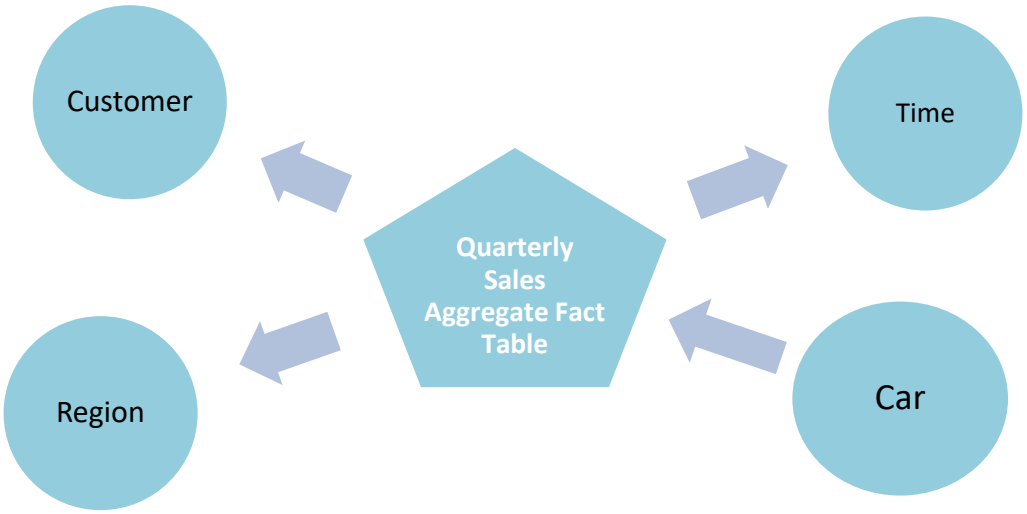
## Inventory Fact Table:

| Fact Name | Description | Default Aggregation rule |
|---|---|---|
| Asking_Price | It enlists the initial offer price | Base |
| Current_mileage | It measures the mileage of the car | Base |
| Profit margin | Indicates the profit allocated on each sale | Base |
| productQuantity | Total number of products | Base |



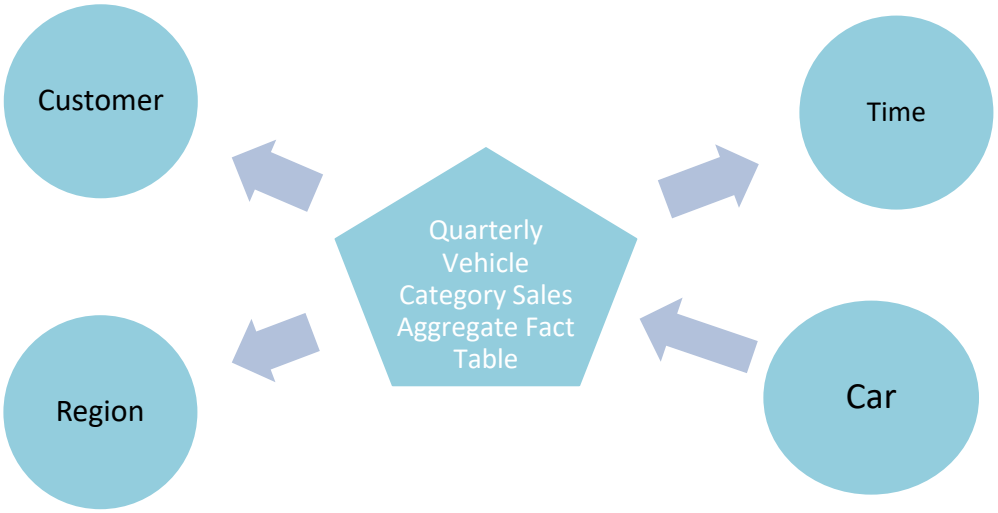
## Quarterly Sales Aggregate Fact Table

| Fact Name | Description | Default Aggregation rule |
|---|---|---|
| Quantity_Sold | It measures the product quantity sold count | One-way aggregate |
| Total Cost | Cost involved in making of product | One-way aggregate |
| Selling Price | Price at which car is sold | One-way aggregate |
| Profit_margin | It measures the product profit margin count | One-way aggregate |



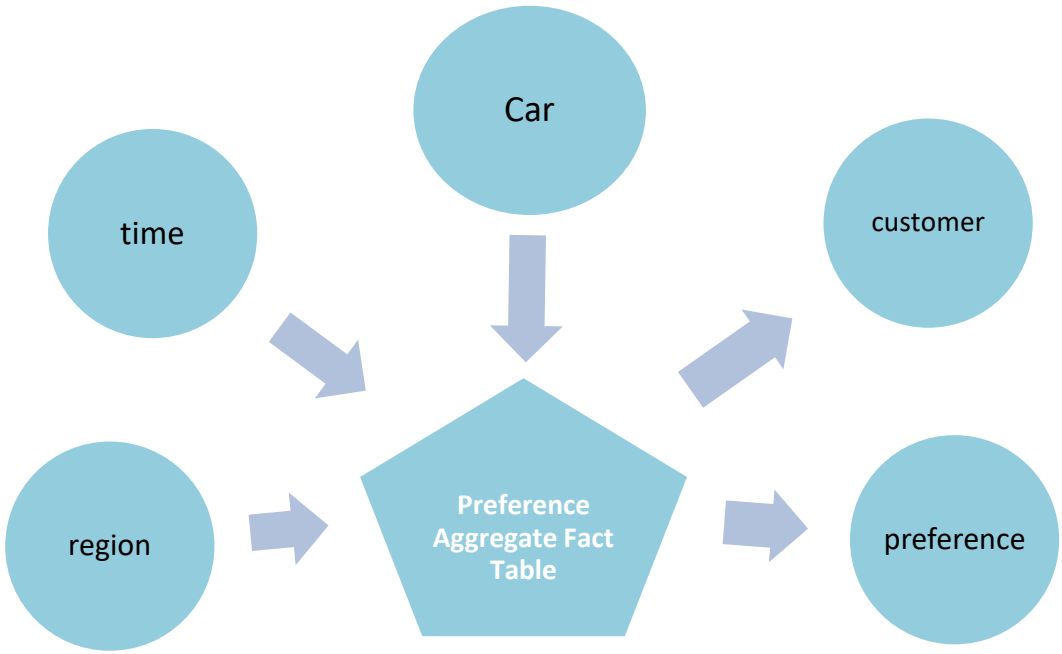
## Quarterly Vehicle Category Sales Aggregate Fact Table

| Fact Name | Description | Default Aggregation rule |
|---|---|---|
| Quantity_Sold | It measures the product quantity sold count | Two-way aggregate |
| Total Cost | Cost involved in making of product | Two-way aggregate |
| Selling Price | Price at which car is sold | Two-way aggregate |
| Profit_margin | It measures the product profit margin count | Two-way aggregate |

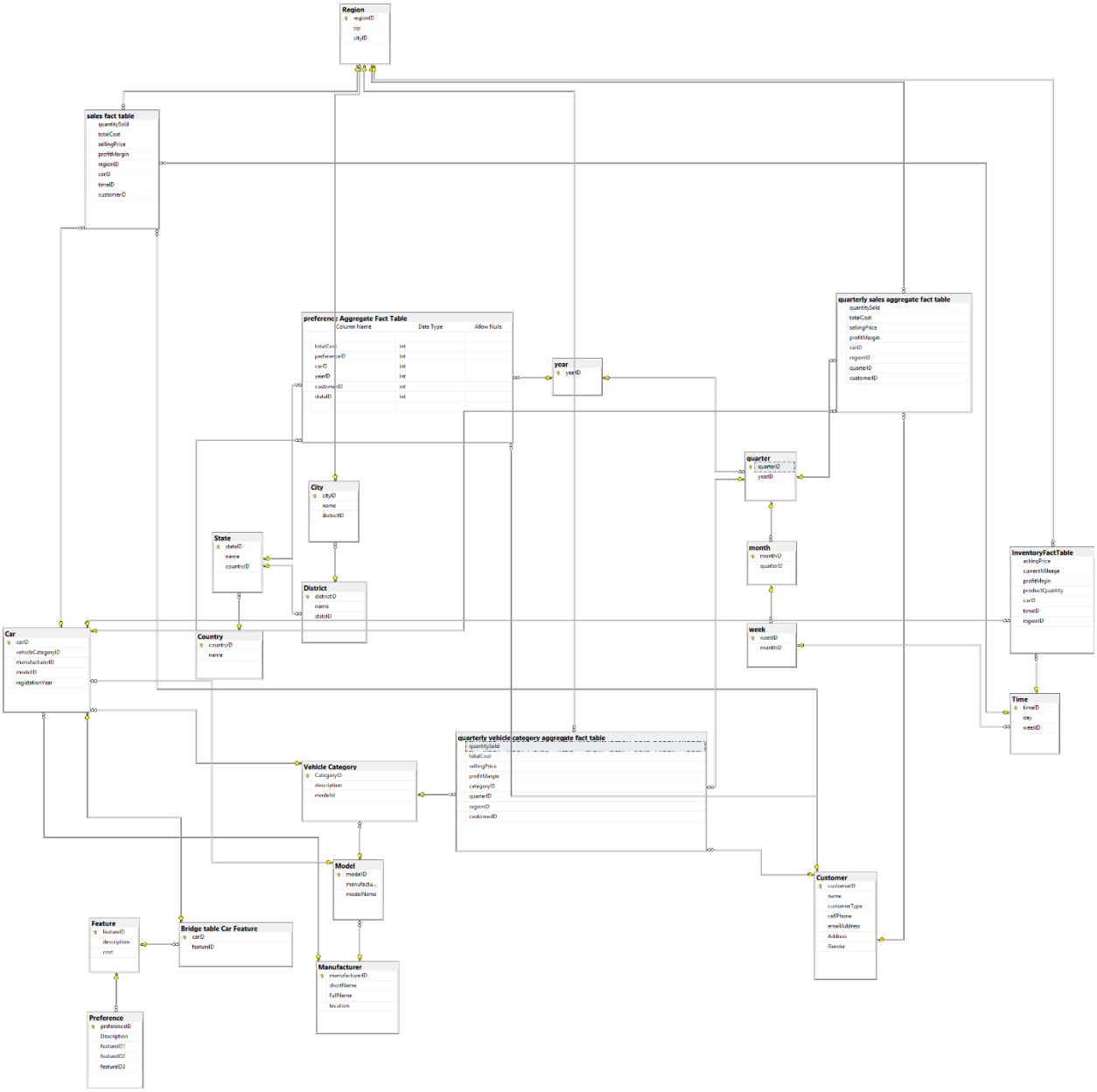


## Preference Aggregate Fact Table

| Fact Name | Description | Default Aggregation rule |
|---|---|---|
| Total Cost | Cost involved in making preferences | Two-way aggregate |



# Physical Model



# Data Dictionary

## Customer

| **Dimension name** | Customer | **Model name** | Car Sales |
|---|---|---|---|
| **Description** | It will keep the customer personal information. | | |
| **Attributes** | Customer_ID<br>First name<br>Last name<br>Cell Phone Number<br>Email Address<br>Address<br>Customer type<br>Zip<br>City<br>District<br>State<br>Country | | |
| **Primary keys** | Customer_ID | | |
| **Foreign keys** | None | | |
| **Associated Fact Tables** | Customer_Preference_Aggregate_Table,<br>Quaterly_Vehicle_Category_Aggregate_Fact_Table,<br>Quaterly_Aggregate_FactTable<br>Sales_Fact_Table | | |

## Time Dimension Table

| **Dimension name** | Time | **Model name** | Car Sales |
|---|---|---|---|
| **Description** | Records time | | |
| **Attributes** | Time_Key<br>Week_Key<br>Day | | |
| **Primary keys** | Time_Key | | |
| **Foreign keys** | Week_Key | | |
| **Associated Fact Tables** | Sales_ Fact_Table, inventory_fact_table | | |

## Week Dimension Table

| **Dimension name** | Week | **Model name** | Car Sales |
|---|---|---|---|
| **Description** | Records time in week format | | |
| **Attributes** | Week_Key<br>Month_Key | | |
| **Primary keys** | Week_Key | | |
| **Foreign keys** | Month_Key | | |
| **Associated Fact Tables** | | | |

## Month Dimension Table

| **Dimension name** | Month | **Model name** | Car Sales |
|---|---|---|---|
| **Description** | Records time in month format | | |
| **Attributes** | Month<br>Quarter_Key<br>Month_Key | | |
| **Primary keys** | Month_Key | | |
| **Foreign keys** | Quarter_Key | | |
| **Associated Fact Tables** | | | |

## Quarter Dimension Table

| **Dimension name** | Quarter | **Model name** | Car Sales |
|---|---|---|---|
| **Description** | Records time in quarter format | | |
| **Attributes** | Quarter<br>Quarter_Key<br>Year_Key | | |
| **Primary keys** | Quarter_Key | | |
| **Foreign keys** | Year_Key | | |
| **Associated Fact Tables** | Aggregate_Table, Quaterly_Vehicle_Category_Aggregate_Fact_Table, Quaterly_Aggregate_FactTable | | |

## Year Dimension Table

| **Dimension name** | Year | **Model name** | Car Sales |
|---|---|---|---|
| **Description** | Records time in year format | | |
| **Attributes** | Year_Key<br>Year | | |
| **Primary keys** | Year_Key | | |
| **Foreign keys** | | | |
| **Associated Fact Tables** | Preference_Aggregate_Table | | |

## Car Dimension Table

| **Dimension name** | Car | **Model name** | Car Sales |
|---|---|---|---|
| **Description** | Records the data related to car | | |
| **Attributes** | CarID<br>Vehicle_CategoryCode<br>Manufacturer_ShortName<br>Model_Code<br>Registration_Year | | |
| **Primary keys** | CarID | | |
| **Foreign keys** | Vehicle_CategoryCode<br>Manufacturer_ShortName<br>Model_Code | | |
| **Associated Fact Tables** | Preference_Aggregate_Table<br>Quaterly_Aggregate_FactTable<br>Sales_Fact_Table<br>Inventory Fact Table | | |

## Model Dimension Table

| **Dimension name** | Model | **Model name** | Car Sales |
|---|---|---|---|
| **Description** | This table will keep the information about model | | |
| **Attributes** | Model_Code<br>Model_Name<br>Manufacturer_ShortName | | |
| **Primary keys** | Model_Code | | |
| **Foreign keys** | Manufacturer_ShortName | | |
| **Associated Fact Tables** | | | |

## Manufacturer Dimension Table

| **Dimension name** | Manufacturer | **Model name** | Car Sales |
|---|---|---|---|
| **Description** | Record manufacturer details | | |
| **Attributes** | Manufacturer_ShortName<br>Manufacturer_FullName<br>Manufacturer_Location | | |
| **Primary keys** | Manufacturer_ShortName | | |
| **Foreign keys** | | | |
| **Associated Fact Tables** | | | |

## Vehicle Category Dimension Table

| **Dimension name** | Vehicle Category | **Model name** | Car Sales |
|---|---|---|---|
| **Description** | Record vehicle category | | |
| **Attributes** | Vehicle_Category_Code<br>Vehicle_Category_Description<br>Model_Code | | |
| **Primary keys** | Vehicle_Category_Code | | |
| **Foreign keys** | Model_Code | | |
| **Associated Fact Tables** | Quaterly_Vehicle_Category_Aggregate_Fact_Table, | | |

## Feature Dimension Table

| **Dimension name** | Feature | **Model name** | Car Sales |
|---|---|---|---|
| **Description** | Stores feature details | | |
| **Attributes** | Feature_ID<br>Feature_Description<br>Feature_Cost | | |
| **Primary keys** | Feature_ID | | |
| **Foreign keys** | | | |
| **Associated Fact Tables** | | | |

## Car_Feature_Bridge Dimensional_Table

| **Dimension name** | Car_Feature_Bridge | **Model name** | Car Sales |
|---|---|---|---|
| **Description** | Stores car and features combinations | | |
| **Attributes** | Car_ID<br>Feature_ID | | |
| **Primary keys** | Car_ID, Feature_ID | | |
| **Foreign keys** | Car_ID, Feature_ID | | |
| **Associated Fact Tables** | | | |

## Region Zip Dimension Table

| **Dimension name** | Region_zip | **Model name** | Car Sales |
|---|---|---|---|
| **Description** | Zip wise record | | |
| **Attributes** | Zip_ID<br>Zip<br>City_ID | | |
| **Primary keys** | Zip_ID | | |
| **Foreign keys** | City_ID | | |
| **Associated Fact Tables** | Sales_Fact_Table<br>Inventory_Fact_Table | | |

## Region city Dimension Table

| **Dimension name** | Region_city | **Model name** | Car Sales |
|---|---|---|---|
| **Description** | City wise record | | |
| **Attributes** | City_id, city, district_id | | |
| **Primary keys** | City_id | | |
| **Foreign keys** | district_id | | |
| **Associated Fact Tables** | | | |

## Region district Dimension Table

| **Dimension name** | Region_district | **Model name** | Car Sales |
|---|---|---|---|
| **Description** | District wise record | | |
| **Attributes** | District_id, district, state_id | | |
| **Primary keys** | District_id | | |
| **Foreign keys** | state_id | | |
| **Associated Fact Tables** | | | |

## Region state Dimension Table

| **Dimension name** | Region_state | **Model name** | Car Sales |
|---|---|---|---|
| **Description** | State wise record | | |
| **Attributes** | State_ID<br>State<br>Country_ID | | |
| **Primary keys** | State_ID | | |
| **Foreign keys** | Country_ID | | |
| **Associated Fact Tables** | Preference_Aggregate_Table | | |

## Region country Dimension Table

| **Dimension name** | Region_country | **Model name** | Car Sales |
|---|---|---|---|
| **Description** | Country wise record | | |
| **Attributes** | Country_id, country | | |
| **Primary keys** | Country_id | | |
| **Foreign keys** | | | |
| **Associated Fact Tables** | | | |

## Preference Dimensional Table

| **Dimension name** | Customer-Preferences | **Model name** | Car sales |
|---|---|---|---|
| **Description** | Customer preference records | | |
| **Attributes** | Preference_Code<br>Preference_FeatureID_1<br>Preference_FeatureID_2<br>Preference_FeatureID_3 | | |
| **Primary keys** | Preference_Code | | |
| **Foreign keys** | Preference_FeatureID_1<br>Preference_FeatureID_2<br>Preference_FeatureID_3 | | |
| **Associated Fact Tables** | Preference Aggregate Fact Table | | |

# Fact Tables

## Sales Fact Table

| **Fact Table name** | Sales Fact Table | **Model name** | Car Sales |
|---|---|---|---|
| **Description** | It calculates the sales Related facts like product quantity or product profits margins | | |
| **Attributes** | Time_Key<br>Zip_Key<br>Customer_Key<br>Car_ID<br>Quantity_Sold<br>Total Cost<br>Selling Price<br>Profit_margin | | |
| **Primary keys** | Time_Key, Zip_Key, Customer_Key, Car_ID | | |
| **Foreign keys** | Time_Key, Zip_Key, Customer_Key, Car_ID | | |
| **Facts / Measures** | Quantity_Sold<br>Total Cost<br>Selling Price<br>Profit_margin | | |
| **Associated Dimensions** | Time, Region_zip, Customer, Car | | |

## Inventory Fact Table:

| **Fact Table name** | Inventory Fact Table | **Model name** | Car Sales |
|---|---|---|---|
| **Description** | It calculates the inventory related facts like product quantity or product profits margins | | |
| **Attributes** | Time_Key<br>Zip_Key<br>Car_ID<br>Asking_Price<br>Current_mileage<br>Profit margin<br>Product Quantity | | |
| **Primary keys** | Time_Key, Zip_Key, Car_ID | | |
| **Foreign keys** | Time_Key, Zip_Key, Car_ID | | |
| **Facts / Measures** | Asking_Price<br>Current_mileage<br>Profit margin<br>Product Quantity | | |
| **Associated Dimensions** | Time, Region_zip, Car | | |

## Quarterly Sales Aggregate Fact Table

| **Fact Table name** | Quarterly Sales Aggregate Fact Table | **Model name** | Car Sales |
|---|---|---|---|
| **Description** | It calculates the sales Related facts like product quantity or product profits margins | | |
| **Attributes** | Quarter_Key, Zip_Key, Customer_Key, Car_ID, Quantity_Sold, Total Cost, Selling Price, Profit_margin | | |
| **Primary keys** | Quarter_Key, Zip_Key, Customer_Key, Car_ID | | |
| **Foreign keys** | Quater_Key, Zip_Key, Customer_Key, Car_ID | | |
| **Facts / Measures** | Quantity_Sold<br>Total Cost<br>Selling Price<br>Profit_margin | | |
| **Associated Dimensions** | Quater, Region_zip, Customer, Car | | |

## Quarterly Vehicle Category Sales Aggregate Fact Table

| **Fact Table name** | Quarterly Vehicle Category Sales Aggregate Fact Table | **Model name** | Car Sales |
|---|---|---|---|
| **Description** | It calculates the sales Related facts like product quantity or product profits margins | | |
| **Attributes** | Quarter_Key, Zip_Key, Customer_Key, Vehicle Category_Code, Quantity_Sold, Total Cost, Selling Price, Profit_margin | | |
| **Primary keys** | Quarter_Key, Zip_Key, Customer_Key, Vehicle Category_Code | | |
| **Foreign keys** | Quater_Key, Zip_Key, Customer_Key, Vehicle Category_Code | | |
| **Facts / Measures** | Quantity_Sold<br>Total Cost<br>Selling Price<br>Profit_margin | | |
| **Associated Dimensions** | Quater, Region_zip, Customer, Vehicle_Category_Code | | |

# Preference Aggregate Fact Table

| **Fact Table name** | Preference Aggregate Fact Table | **Model name** | Car Sales |
|---|---|---|---|
| **Description** | It calculates the sales Related facts like total cost | | |
| **Attributes** | Car_ID, Customer_Key, State_ID, PreferenceCode, Year_Key, Total Customers, Total Cost | | |
| **Primary keys** | Car_ID, Customer_Key, State_ID, PreferenceCode, Year_Key, | | |
| **Foreign keys** | Car_ID, Customer_Key, State_ID, PreferenceCode, Year_Key, | | |
| **Facts / Measures** | Total Cost | | |
| **Associated Dimensions** | Region_State, Car, Customer, preference, Year | | |

| **Attribute(s) of "Customer" Dimension** | | | | |
|---|---|---|---|---|
| ***Name*** | **Description** | ***Data Type*** | **(Domain Constraints )Is PK** | **Is FK** |
| Customer ID | Primary Key, Unique Customer Identifier | decimal(10) | Yes | No |
| First name | Customer first name | char(18) | No | No |
| Last name | Customer Last name | Char(18) | No | No |
| Cell Phone Number | Contact details of the customer | Char(18) | No | No |
| Email Address | Email id of the customer for contacting purposes | Char(18) | No | No |
| Address | Stores the address of the customer | char(18) | No | No |
| Customer type | It stores the customer type either corporate or individual | Char(18) | No | No |
| Zip | The zip of the customer. | Decimal(5) | No | No |
| City | The city of the customer. | Char(18) | No | No |
| District | The District of the customer. | char(18) | No | No |
| State | The state of the customer. | char(18) | No | No |
| Country | The country of the customer. | char(18) | No | No |

| Attribute(s) of "Time" Dimension | | | | |
|---|---|---|---|---|
| ***Name*** | **Description** | ***Data Type*** | **(Domain Constraints )Is PK** | **Is FK** |
| Time_Key | Key of time dimension | Integer | Yes | No |
| Week_Key | Foreign key of week | Integer | No | Yes |

| Attribute(s) of "Week" Dimesnion | | | | |
|---|---|---|---|---|
| ***Name*** | **Description** | ***Data Type*** | **(Domain Constraints )Is PK** | **Is FK** |
| Week_Key, | primary key of week | Integer | Yes | No |
| Month_Key | Foreign key of month | Integer | No | Yes |

| Attribute(s) of "Month" Dimension | | | | |
|---|---|---|---|---|
| ***Name*** | **Description** | ***Data Type*** | **(Domain Constraints )Is PK** | **Is FK** |
| Month_Key | Primary key of month | Integer | Yes | No |
| Month | Month name | char(18) | No | No |
| Quarter_Key | Foreign key of quarter | Integer | No | Yes |

| Attribute(s) of "Quarter" Dimension | | | | |
|---|---|---|---|---|
| ***Name*** | **Description** | ***Data Type*** | **(Domain Constraints )Is PK** | **Is FK** |
| quarter_key | quarter primary key | Integer | Yes | No |
| quarter | quarter information | char(18) | No | No |
| year_key | foregin key of year | Integer | No | Yes |

| Attribute(s) of "Year" Dimension | | | | |
|---|---|---|---|---|
| ***Name*** | **Description** | ***Data Type*** | **(Domain Constraints )Is PK** | **Is FK** |
| Year_Key | primary key of year | Integer | Yes | No |
| year | The name of the year | char(18) | No | No |

| Attribute(s) of "Car" Dimension | | | | |
|---|---|---|---|---|
| ***Name*** | **Description** | ***Data Type*** | **(Domain Constraints )Is PK** | **Is FK** |
| CarID | primary key of car | Integer | Yes | No |
| Vehicle_CategoryCode | Foreign key of vehicle category | Integer | No | Yes |
| Manufacturer_ShortName | Foreign key of manufacturer | Integer | No | Yes |
| Model_Code | Foreign key of model | Integer | No | Yes |
| Registration_Year | The registration year of the car | Integer | No | No |

| Attribute(s) of "Model" Dimension | | | | |
|---|---|---|---|---|
| ***Name*** | **Description** | ***Data Type*** | **(Domain Constraints )Is PK** | **Is FK** |
| Model_Code | primary key of model | integer | Yes | No |
| Model_Name | Name of the model | char(18) | No | No |
| Manufacturer_ShortName | foregin key of manufacturer | integer | No | Yes |

| **Attribute(s) of "Manufacturer" Dimension** | | | | |
|---|---|---|---|---|
| ***Name*** | **Description** | ***Data Type*** | **(Domain Constraints )Is PK** | **Is FK** |
| Manufacturer_ShortName | Primary key of the manufacturer | Char(18) | Yes | No |
| Manufacturer_FullName | Full name of the manufacturer | char(18) | No | No |
| Manufacturer_Location | Location of the manufacturer | Char(18) | No | No |

| **Attribute(s) of "Vehicle Category" Dimension** | | | | |
|---|---|---|---|---|
| ***Name*** | **Description** | ***Data Type*** | **(Domain Constraints )Is PK** | **Is FK** |
| Vehicle_Category_Code | primary key of vehicle category | integer | Yes | No |
| Vehicle_Category_Description | Description of the vehicle category | Char(18) | No | No |
| Model_Code | foregin key of model | integer | No | Yes |

| **Attribute(s) of "Feature" Dimension** | | | | |
|---|---|---|---|---|
| ***Name*** | **Description** | ***Data Type*** | **(Domain Constraints )Is PK** | **Is FK** |
| Feature_ID | Primary key of the feature dimension | integer | Yes | No |
| Feature_Description | Description of the feature | integer | No | No |

| Attribute(s) of " Car_Feature_Bridge Dimension | | | | |
|---|---|---|---|---|
| ***Name*** | **Description** | ***Data Type*** | **(Domain Constraints )Is PK** | **Is FK** |
| Car_ID | Part of the composite key | integer | Yes | yes |
| Feature_ID | Part of the composite key | Integer | Yes | yes |

| Attribute(s) of " Region_zip" Dimension | | | | |
|---|---|---|---|---|
| ***Name*** | **Description** | ***Data Type*** | **(Domain Constraints )Is PK** | **Is FK** |
| zip_id, | Primary key of zip | integer | Yes | No |
| zip | Zip code | Integer | No | no |
| city_id | Foreign key of year | char(18) | No | yes |

| Attribute(s) of " Region_city" Dimension | | | | |
|---|---|---|---|---|
| ***Name*** | **Description** | ***Data Type*** | **(Domain Constraints )Is PK** | **Is FK** |
| City_id | Primary key of city | integer | Yes | No |
| city | Name of the city | Char(18) | No | no |
| district_id | Foreign key of year | Integer | No | Yes |

| **Attribute(s) of " Region_district" Dimension** | | | | |
|---|---|---|---|---|
| ***Name*** | **Description** | ***Data Type*** | **(Domain Constraints )Is PK** | **Is FK** |
| District_id | Primary key of district | integer | Yes | No |
| district | Name of the district | Char(18) | No | no |
| state_id | Foreign key of state | Integer | No | Yes |

| **Attribute(s) of " Region_state" Dimension** | | | | |
|---|---|---|---|---|
| ***Name*** | **Description** | ***Data Type*** | **(Domain Constraints )Is PK** | **Is FK** |
| State_id, | Primary key of state | integer | Yes | No |
| state | Name of the state | Char(18) | No | no |
| country_id | Foreign key of country | Integer | No | Yes |

| **Attribute(s) of " Region_country" Dimension** | | | | |
|---|---|---|---|---|
| ***Name*** | **Description** | ***Data Type*** | **(Domain Constraints )Is PK** | **Is FK** |
| country_id, | Primary key of country | integer | Yes | No |
| country | Name of the country | Char(18) | No | no |

| **Attribute(s) of " Customer-Preferences" Dimension** | | | | |
|---|---|---|---|---|
| ***Name*** | **Description** | ***Data Type*** | **(Domain Constraints )Is PK** | **Is FK** |
| Preference_Code | Primary key of the preference | integer | Yes | No |
| Preference_FeatureID_1 | Id of the first feature | Integer | No | yes |
| Preference_FeatureID_2 | Id of the second feature | Integer | No | yes |
| Preference_FeatureID_3 | Id of the third feature | Integer | No | yes |

| **Attribute(s) of "Sales Fact Table"** | | | | |
|---|---|---|---|---|
| ***Name*** | **Description** | ***Data Type*** | **(Domain Constraints )Is PK** | **Is FK** |
| Time_Key, | Key of time dimension | integer | Yes | Yes |
| Zip_Key | Key of zip dimension | integer | Yes | Yes |
| Customer_Key | Key of customer dimension | integer | Yes | Yes |
| Car_ID | Key of car dimension | integer | Yes | Yes |
| Quantity_Sold | Measures the quantity of cars sold | integer | No | No |
| Total Cost | Measure the total cost | integer | No | No |
| Selling Price | Measures the selling price of the cars | integer | No | No |
| Profit_margin | Keeps the profit | integer | No | No |

| **Attribute(s) of " Inventory Fact Table "** | | | | |
|---|---|---|---|---|
| ***Name*** | **Description** | ***Data Type*** | **(Domain Constraints )Is PK** | **Is FK** |
| Time_Key | primary key of time dimension | integer | Yes | No |
| Zip_Key | Primary key of zip dimension | integer | Yes | Yes |
| Car_ID | Primary key of car dimension | integer | Yes | Yes |
| Asking_Price | Asking price of a car | integer | No | No |
| Current_mileage | Current miles travelled by the car | integer | No | No |
| Profit margin | Profit margin of a particular car | integer | No | No |
| Product Quantity | Quantity of cars in stock | integer | No | No |

| **Attribute(s) of " Quarterly Sales Aggregate Fact Table "** | | | | |
|---|---|---|---|---|
| ***Name*** | **Description** | ***Data Type*** | **(Domain Constraints )Is PK** | **Is FK** |
| Quarter_Key | foreign key of feedback dimension | integer | Yes | Yes |
| Zip_Key | foreign key of zip dimension | integer | Yes | Yes |
| Customer_Key | time id key of the time dimension | integer | Yes | Yes |
| Car_ID | keeps the counting of sales rating | integer | yes | yes |
| Quantity_Sold | keeps the couting of service ratings | integer | No | No |
| Total Cost | Total cost of the car | Integer | No | No |
| Selling Price | Total amount taken from customer | Integer | No | No |
| Profit_margin | Profit amount | integer | No | No |

| **Attribute(s) of " Quarterly Vehicle Category Sales Aggregate Fact Table "** | | | | |
|---|---|---|---|---|
| ***Name*** | **Description** | ***Data Type*** | **(Domain Constraints )Is PK** | **Is FK** |
| Quarter_Key, | foreign key of the quarter dimension | integer | Yes | Yes |
| Zip_Key, | foreign key of the zip dimension | integer | Yes | Yes |
| Customer_Key | foreign key of the customer dimension | integer | Yes | Yes |
| Vehicle Category_Code, | foreign key of the vehicle category dimension | integer | Yes | Yes |
| Quantity_Sold, | Quantity of the cars sold | integer | No | No |
| Total Cost, | Total cost of the car | integer | No | No |
| Selling Price, | Total amount taken from the customer | integer | No | No |
| Profit_margin | Profit amount from the sale | integer | No | No |

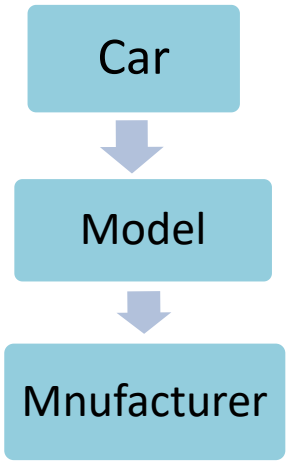
| **Attribute(s) of " Preference Aggregate Fact Table"** | | | | |
|---|---|---|---|---|
| ***Name*** | **Description** | ***Data Type*** | **(Domain Constraints )Is PK** | **Is FK** |
| Car_ID | foreign key of the car dimension | integer | Yes | Yes |
| Customer_Key | foreign key of the customer dimension | integer | Yes | Yes |
| State_id, | foreign key of the state dimension | integer | Yes | Yes |
| PreferenceCode, | foreign key of the customer preference dimension | integer | Yes | Yes |
| Year_Key, | Foreign key of year | integer | yes | yes |

## 3.2 Data Mart 2 - Car Service Center

### Logical Model

### Car Dimension

| Attribute Name | Description | Sample Values |
|---|---|---|
| License_number | It keeps the license number of a particular car | 8925 |
| Current_mileage | It keeps the value of current mileage of any car | 100 |
| Engine_size | It keeps the size of the engine of a car | 6 |
| Model_name | It keeps the name of the model of the car | Cutlus |
| Manufacturer_name | It keeps the name of the manufacturer of the car | Suzuki |



## Parts Dimension

| Attribute Name | Description | Sample Values |
|---|---|---|
| Part_name | It keeps the name of the part of the car | Gear Lever |
| Part_description | It keeps the description of the part | To change gears 6 |
| Number_in_stock | It keeps the number of parts available in stock | 105 |
| Other_Details | It keeps some other details if required | Cover black |

## Customer Dimension

| Attribute Name | Description | Sample Values |
|---|---|---|
| Customer_name | It keeps the name of the customer | Sara Ali |
| gender | It keeps the gender of the customer | Female |
| email | It keeps the email of the customer | saraali@gmail.com |
| contact_no | It keeps the phone number | 03001234567 |
| address | Has the address | Tech society, house 1 |
| city | Contains the city of the customer's residence | Lahore |
| state | It keeps the state where the customer lives | Punjab |
| country | It keeps the country of the customer | Pakistan |
| other_details | It keeps some other details | - |

## Mechanic Dimension

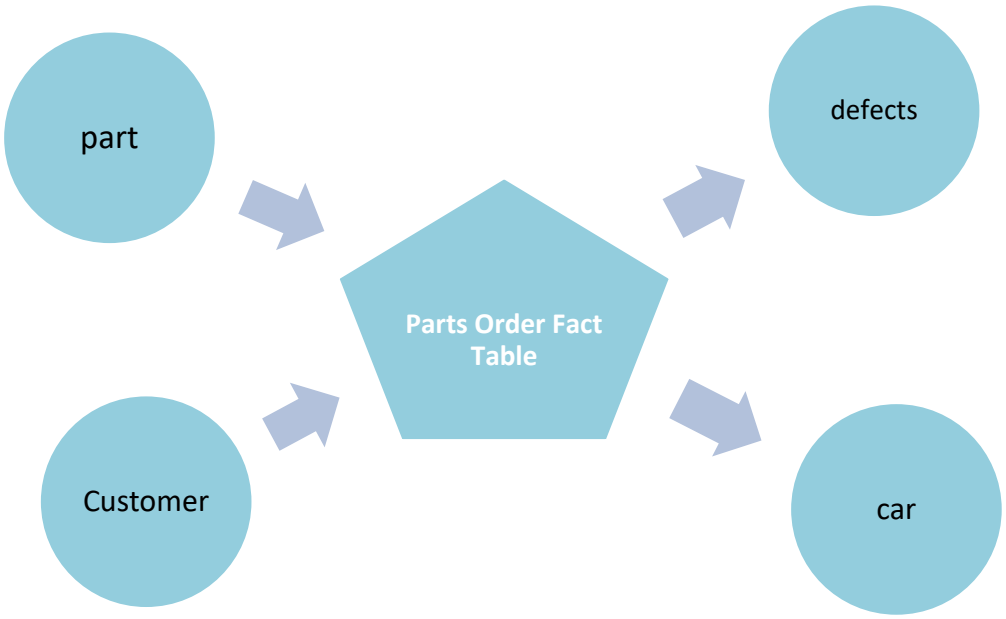
| Attribute Name | Description | Sample Values |
|---|---|---|
| Mechanic_name | It keeps the name of the mechanic | Zia Ali |
| Mechanic_details | It keeps some details of the mechanic | 10 years' service |

## Defects Dimension

| Attribute Name | Description | Sample Values |
|---|---|---|
| Defect_description | It keeps the description of the defect | Steering problem |
| Date_defect_recorded | It keeps the date when the defect was first recorded | 10-12-19 |
| Other_details | Some other details of the defect are kept here | Problem with wiring |

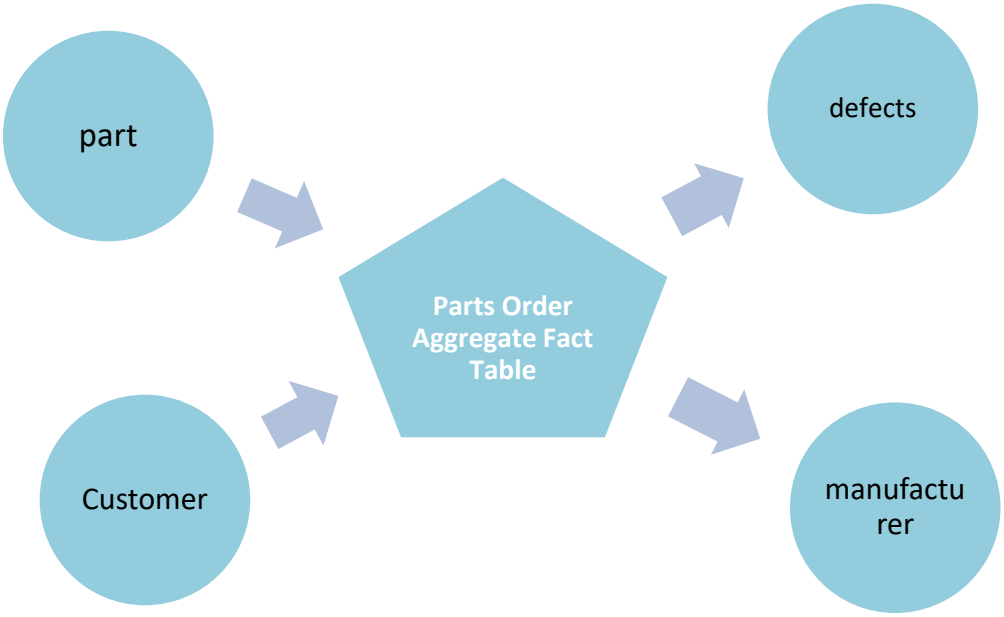
## Parts Order Fact Table

| Fact Name | Description | Default Aggregation rule |
|---|---|---|
| Unit_price | It measures the cost price of a part | Base |
| Sale_price | It measures the sale price of a part | Base |
| Profit_margin | It measures the profit in each order | Base |
| Percent_profit | It measures the percentage of the profit | Base |



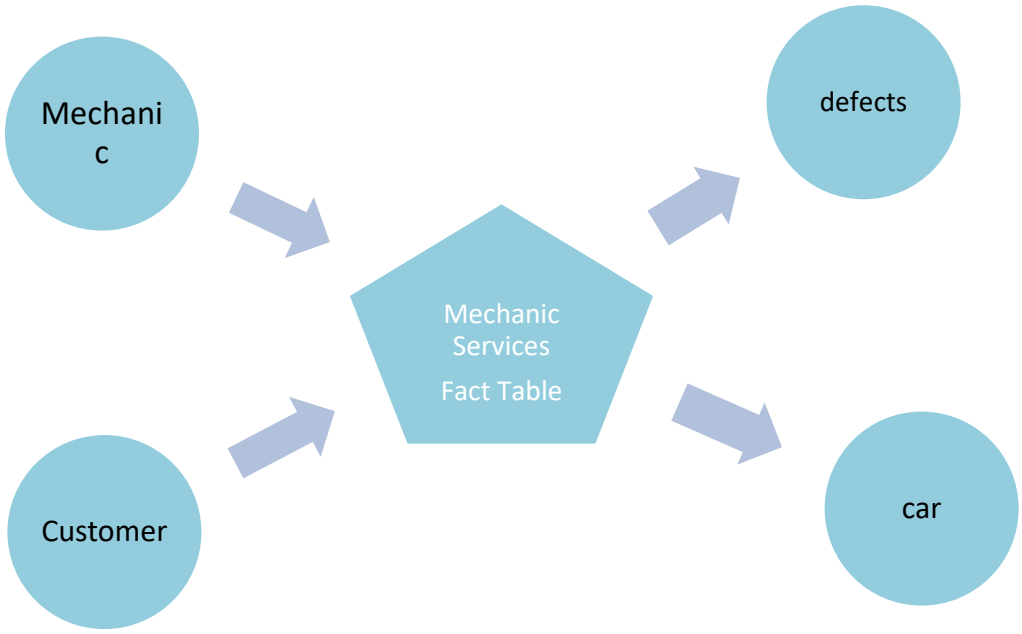
## Parts Order Aggregate Fact Table

| Fact Name | Description | Default Aggregation rule |
|---|---|---|
| Gross sales | It measures the total sales of a part, for all cars made by a particular manufacturer | One-way Aggregate |
| Total_cost | It measures the total sales of a part for any manufacturer | One-way Aggregate |
| Total_profit | It measures the total profit | One-way Aggregate |



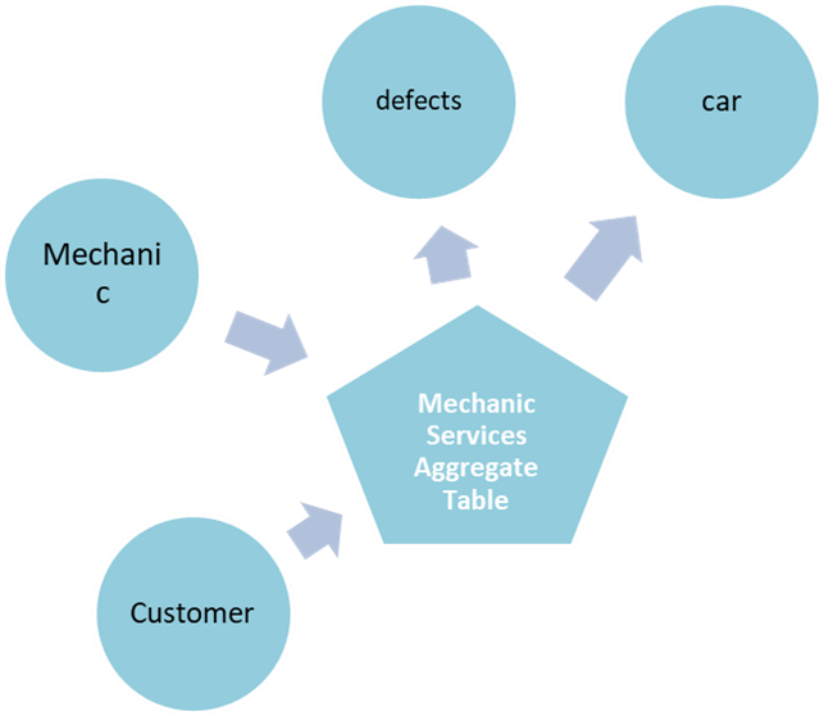
## Mechanic Services Fact Table

| Fact Name | Description | Default Aggregation rule |
|---|---|---|
| Service_cost | It contains the total service cost of the mechanic | Base |
| Profit_margin | It contains the profit earned by the service center | Base |

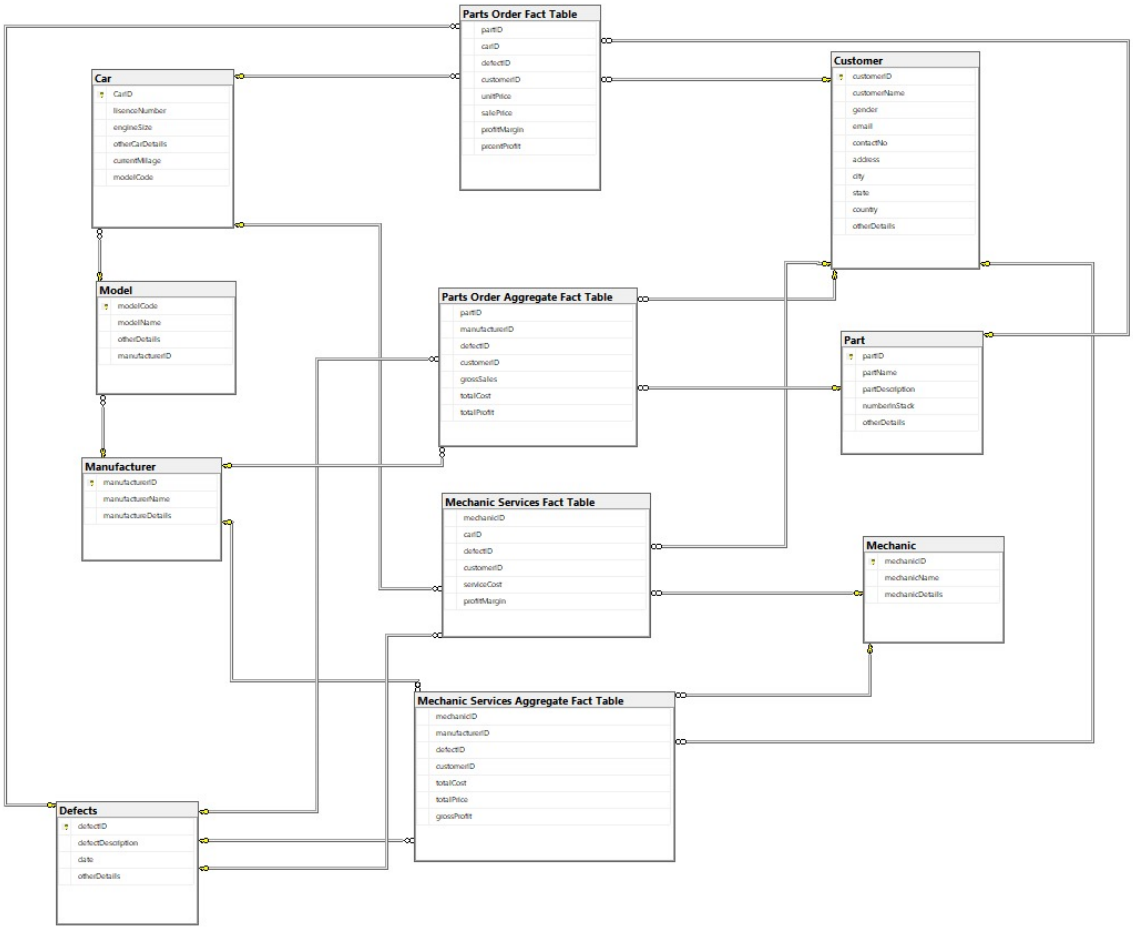


## Mechanic Services Aggregate Table

| Fact Name | Description | Default Aggregation rule |
|---|---|---|
| Total_cost | It contains the total service cost of the mechanic by manufacturer of cars | One-way Aggregate |
| Total_price | It contains the amount taken by the customers | One-way Aggregate |
| Total_profit | It measures the total profit | One-way Aggregate |



# Physical Model



# Data Dictionary

## Car Dimension Table

| **Dimension name** | Car | **Model name** | Service DM |
|---|---|---|---|
| **Description** | Records information of cars | | |
| **Attributes** | Car_id, licence_number, current_mileage, engine_size, other_car_details, model_code | | |
| **Primary keys** | Car_id | | |
| **Foreign keys** | Model_code | | |
| **Associated Fact Tables** | Parts orders fact table, parts orders aggregate table, mechanic services fact table, mechanic services aggregate table | | |

## Model Dimension Table

| **Dimension name** | Model | **Model name** | Service DM |
|---|---|---|---|
| **Description** | Records information of models of cars | | |
| **Attributes** | Model_code, model_name, other_details, manufacturer_code | | |
| **Primary keys** | Model_code | | |
| **Foreign keys** | Manufacturer_code | | |
| **Associated Fact Tables** | Parts orders fact table, parts orders aggregate table, mechanic services fact table, mechanic services aggregate table | | |

## Manufacturer Dimension Table

| **Dimension name** | Manufacturer | **Model name** | Service DM |
|---|---|---|---|
| **Description** | Records information of manufacturers of cars | | |
| **Attributes** | Model_code, model_name, other_details, manufacturer_code | | |
| **Primary keys** | Model_code | | |
| **Foreign keys** | Manufacturer_code | | |
| **Associated Fact Tables** | Parts orders fact table, parts orders aggregate table, mechanic services fact table, mechanic services aggregate table | | |

## Defects Dimension Table

| **Dimension name** | Defects | **Model name** | Service DM |
|---|---|---|---|
| **Description** | Records information of defects of cars | | |
| **Attributes** | Defect_id, defect_description, date_defect_recorded, other_details | | |
| **Primary keys** | Defect_id | | |
| **Foreign keys** | - | | |
| **Associated Fact Tables** | Parts orders fact table, parts orders aggregate table, mechanic services fact table, mechanic services aggregate table | | |

## Customer Dimension Table

| **Dimension name** | Customer | **Model name** | Service DM |
|---|---|---|---|
| **Description** | Records information of customers of the services | | |
| **Attributes** | Customer_id, customer_name, gender, email, contact_number, address, city, state, country, other_details | | |
| **Primary keys** | customer_id | | |
| **Foreign keys** | - | | |
| **Associated Fact Tables** | Parts orders fact table, parts orders aggregate table, mechanic services fact table, mechanic services aggregate table | | |

## Parts Dimension Table

| **Dimension name** | Parts | **Model name** | Service DM |
|---|---|---|---|
| **Description** | Records information of parts of cars | | |
| **Attributes** | Part_id, part_name, part_description, number_in_stock, other_details | | |
| **Primary keys** | Part_id | | |
| **Foreign keys** | - | | |
| **Associated Fact Tables** | Parts orders fact table, parts orders aggregate table | | |

## Mechanic Dimension Table

| **Dimension name** | Mechanic | **Model name** | Service DM |
|---|---|---|---|
| **Description** | Records information of mechanics | | |
| **Attributes** | Mechanic_id, mechanic_name, mechanic_details | | |
| **Primary keys** | Mechanic_id | | |
| **Foreign keys** | - | | |
| **Associated Fact Tables** | Mechanic services fact table, mechanic services aggregate table | | |

| **Attribute(s) of "Car" Dimension** | | | | |
|---|---|---|---|---|
| ***Name*** | **Description** | ***Data Type*** | **(Domain Constraints) Is PK** | **Is FK** |
| Car_id | primary key of car | integer | Yes | No |
| Licence_number | Contains licence number of the car | char (18) | No | No |
| Current_mileage | Mileage of the car | integer | No | No |
| Engine_size | Contains the size of engine | integer | No | No |
| Other_car_details | Contains other details | Char (18) | No | No |
| Model_code | Contains the model code of the car | Integer | No | Yes |

| Attribute(s) of "Model" Dimension | | | | |
|---|---|---|---|---|
| ***Name*** | **Description** | ***Data Type*** | **(Domain Constraints) Is PK** | **Is FK** |
| Model_code | primary key of model | integer | Yes | No |
| Model_name | Name of the model | char (18) | No | No |
| Other_details | Some other model details | Char (18) | No | No |
| Manufacturer_code | Foreign key from the manufacturer dimension | Integer | No | Yes |

| Attribute(s) of "Manufacturer" Dimension | | | | |
|---|---|---|---|---|
| ***Name*** | **Description** | ***Data Type*** | **(Domain Constraints) Is PK** | **Is FK** |
| Manufacturer_code | primary key of manufacturer | integer | Yes | No |
| Manufacturer_name | Name of the manufacturer | char (18) | No | No |
| Manufacturer_details | Other details | Char (18) | No | No |
| **Attribute(s) of "Defects" Dimension** | | | | |
| ***Name*** | **Description** | ***Data Type*** | **(Domain Constraints) Is PK** | **Is FK** |
| Defect_id | primary key of defect | integer | Yes | No |
| Defect_description | Description of the defect | char (18) | No | No |
| Date_defect_recorded | The date when the defect was recorded | Date | No | No |
| Other_details | Some other details | Char (18) | No | No |

| **Attribute(s) of "Parts" Dimension** | | | | |
|---|---|---|---|---|
| ***Name*** | **Description** | ***Data Type*** | **(Domain Constraints) Is PK** | **Is FK** |
| Part_id | primary key of part | integer | Yes | No |
| Part_name | Name of the part | char (18) | No | No |
| Part_description | Description of the part | Char (18) | No | No |
| Number_in_stock | Number of parts currently in stock | Integer | No | No |
| Other_details | Some other details | Char (18) | No | No |

| Attribute(s) of "Customer" Dimension | | | | |
|---|---|---|---|---|
| ***Name*** | **Description** | ***Data Type*** | **(Domain Constraints) Is PK** | **Is FK** |
| Customer_id | primary key of the customer | integer | Yes | No |
| Customer_name | Name of the customer | char (18) | No | No |
| gender | The customer's gender | Char (18) | No | No |
| email | The customer's email | Integer | No | No |
| Contact_number | The phone number of the customer | Char (18) | No | No |
| address | The address of the customer | Char (18) | No | No |
| city | The city information of the customer | Char (18) | No | No |
| state | The state information | Char (18) | No | No |
| country | The country name | Char (18) | No | No |
| Other_details | Some other details | Char (18) | No | No |

| Attribute(s) of "Mechanic" Dimension | | | | |
|---|---|---|---|---|
| ***Name*** | **Description** | ***Data Type*** | **(Domain Constraints) Is PK** | **Is FK** |
| Mechanic_id | primary key of mechanic | integer | Yes | No |
| Mechanic_name | Name of the mechanic | char (18) | No | No |
| Mechanic_details | Other details | Char (18) | No | No |

# Fact Tables

## Parts Order Fact Table

| **Fact Table name** | Parts Order | **Model name** | Service DM |
|---|---|---|---|
| **Description** | It calculates the sales Related facts like cost and sale price | | |
| **Attributes** | Part_id, car_id, defect_id, customer_id, unit_price, sale_price, profit_margin, percent_profit | | |
| **Primary keys** | Part_id, car_id, defect_id, customer_id | | |
| **Foreign keys** | Part_id, car_id, defect_id, customer_id | | |
| **Facts / Measures** | unit_price, sale_price, profit_margin, percent_profit | | |
| **Associated Dimensions** | Part, car, defect, customer | | |

## Parts Order Aggregate Table

| **Fact Table name** | Parts Order aggregate | **Model name** | Service DM |
|---|---|---|---|
| **Description** | It calculates the sales related facts like cost and sale price | | |
| **Attributes** | Part_id, manufacturer_id, defect_id, customer_id, unit_price, sale_price, profit_margin, percent_profit | | |
| **Primary keys** | Part_id, manufacturer _id, defect_id, customer_id | | |
| **Foreign keys** | Part_id, manufacturer _id, defect_id, customer_id | | |
| **Facts / Measures** | unit_price, sale_price, profit_margin, percent_profit | | |
| **Associated Dimensions** | Part, manufacturer, defect, customer | | |

## Mechanic Services Fact Table

| **Fact Table name** | Mechanic Services | **Model name** | Service DM |
|---|---|---|---|
| **Description** | It calculates the service-related facts | | |
| **Attributes** | mechanic_id, car_id, defect_id, customer_id, service_cost, profit_margin | | |
| **Primary keys** | mechanic_id, car _id, defect_id, customer_id | | |
| **Foreign keys** | mechanic_id, car _id, defect_id, customer_id | | |
| **Facts / Measures** | service_cost, profit_margin | | |
| **Associated Dimensions** | Mechanic, car, defect, customer | | |

## Mechanic Services Aggregate Table

| **Fact Table name** | Mechanic Services Aggregate | **Model name** | Service DM |
|---|---|---|---|
| **Description** | It calculates the service-related facts | | |
| **Attributes** | mechanic_id, manufacturer_id, defect_id, customer_id, total_cost, total_price, gross_profit | | |
| **Primary keys** | mechanic_id, manufacturer _id, defect_id, customer_id | | |
| **Foreign keys** | mechanic_id, manufacturer _id, defect_id, customer_id | | |
| **Facts / Measures** | Total_cost, total_price, gross_profit | | |
| **Associated Dimensions** | Mechanic, manufacturer, defect, customer | | |

| **Attribute(s) of "Parts Order Fact Table"** | | | | |
|---|---|---|---|---|
| ***Name*** | **Description** | ***Data Type*** | **(Domain Constraints) Is PK** | **Is FK** |
| Part_id | Foreign key of part dimension | integer | Yes | Yes |
| Car_id | Foreign key of the car dimension | integer | Yes | Yes |
| Defect_id | foreign key of defect | integer | Yes | Yes |
| Customer_id | foreign key of customer dimension | integer | Yes | Yes |
| Unit_price | keeps the unit price (cost) of a part of a car | integer | No | No |
| Sale_price | keeps the sale price of the part | integer | No | No |
| Profit_margin | Keeps the profit of a part | Integer | No | no |
| Percent_profit | Keeps the percentage of the profit | Decimal (5) | No | no |

| **Attribute(s) of "Parts Order Aggregate Table"** | | | | |
|---|---|---|---|---|
| ***Name*** | **Description** | ***Data Type*** | **(Domain Constraints) Is PK** | **Is FK** |
| Part_id | Foreign key of part dimension | integer | Yes | Yes |
| Manufacturer_id | Foreign key of the manufacturer dimension | integer | Yes | Yes |
| Defect_id | foreign key of defect | integer | Yes | Yes |
| Customer_id | foreign key of customer dimension | integer | Yes | Yes |
| Gross_sales | keeps the total of a part for a manufacturer | integer | No | No |
| Total_cost | keeps the total cost of a part sold to a manufacturer | integer | No | No |
| Total_profit | Keeps the total profit of a part | Integer | No | no |

| **Attribute(s) of "Mechanic Service Fact Table"** | | | | |
|---|---|---|---|---|
| ***Name*** | **Description** | ***Data Type*** | **(Domain Constraints) Is PK** | **Is FK** |
| mechanic_id | Foreign key of mechanic dimension | integer | Yes | Yes |
| Car_id | key of the car dimension | integer | Yes | Yes |
| Defect_id | foreign key of defect | integer | Yes | Yes |
| Customer_id | foreign key of customer dimension | integer | Yes | Yes |
| Service_cost | keeps the cost of the service of the mechanic | integer | No | No |
| Profit_margin | keeps profit earned | integer | No | No |

| **Attribute(s) of "Mechanic Service Aggregate Table"** | | | | |
|---|---|---|---|---|
| ***Name*** | **Description** | ***Data Type*** | **(Domain Constraints) Is PK** | **Is FK** |
| mechanic_id | Foreign key of mechanic dimension | integer | Yes | Yes |
| manufacturer | key of the manufacturer dimension | integer | Yes | Yes |
| Defect_id | foreign key of defect | integer | Yes | Yes |
| Customer_id | foreign key of customer dimension | integer | Yes | Yes |
| Total_cost | Keeps the total amount spent by the company for the service | integer | No | No |
| Total_price | keeps the amount taken from the customer | integer | No | No |
| Gross_profit | Keeps the profit of a service | Integer | No | No |

# Data Mart 3 – Car Parts Supplier

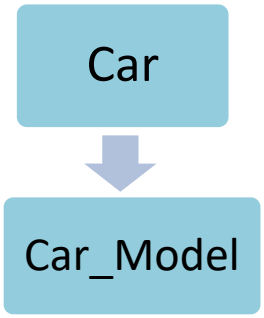
## Logical Model

## Supplier Dimension

| Attribute Name | Description | Sample Values |
|---|---|---|
| Supplier_id | Gives the id of car parts supplier | 35786 |
| Supplier_name | It provides the name of car parts supplier | Robert Bosch |
| Supplier_details | It gives the other details of car parts supplier | Country (Germany) etc |

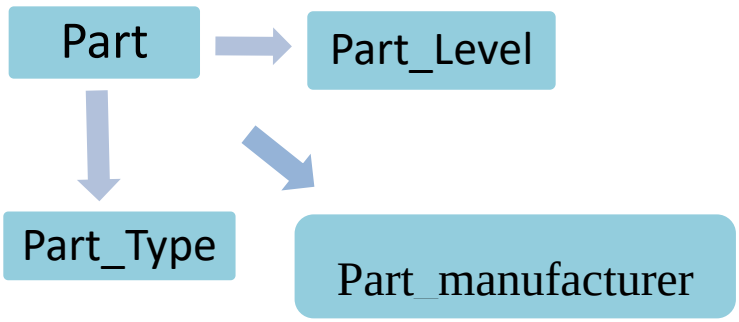
## Car Dimension

| Attribute Name | Description | Sample Values |
|---|---|---|
| Car_id | It's the id of a car | 45454 |
| Car_details | It provides the necessary details of car | Black(color), number plate(LEE 3422) etc |
| Car_manufacturer_id | It's the id of car manufacturer | 38264 |
| Car_manufacturer_name | Gives the name of car manufacturer | Honda |
| Year_of_manufacture | Gives the year when car was manufactured | 2017 |
| Model_key | Provides the model key of the car | 88475 |



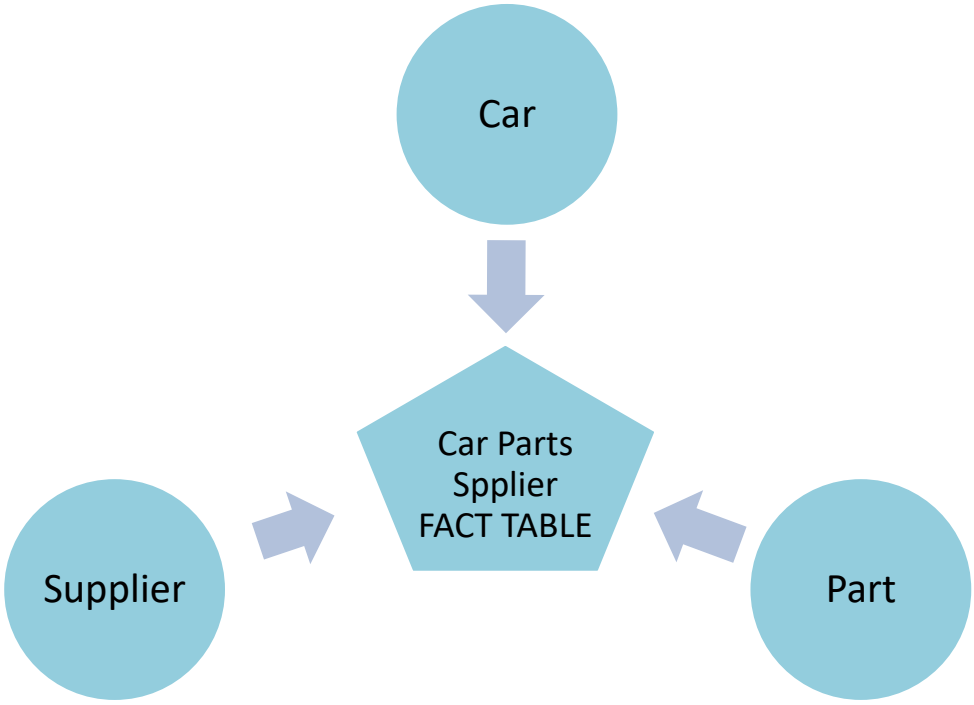
## Parts Dimension

| Attribute Name | Description | Sample Values |
|---|---|---|
| Part_id | Gives the id of car part | 35786 |
| Description | It gives the description of the part | Dimensions (10x10x1.5) etc |
| Part_level_code | It provides the id of the level of car part | 0001 |
| Part_level_description | Gives the description of part level | Component |
| Part_type_code | It provides the type code of car part | 24533 |
| Part_type_decription | Gives the description of part type | Engine |
| Part_maufacturer_code | It provides the code of car part manufacturer | 84942 |
| Part_maufacturer_name | It includes the name of car part Manufacturer | Nissan |
| Weight | It gives the weight of car part | 25 g |
| Condition | Provides the info of condition of car part | Brand new |
| Mileage_donor_vehicle | Gives the mileage of the car part | 1500 |



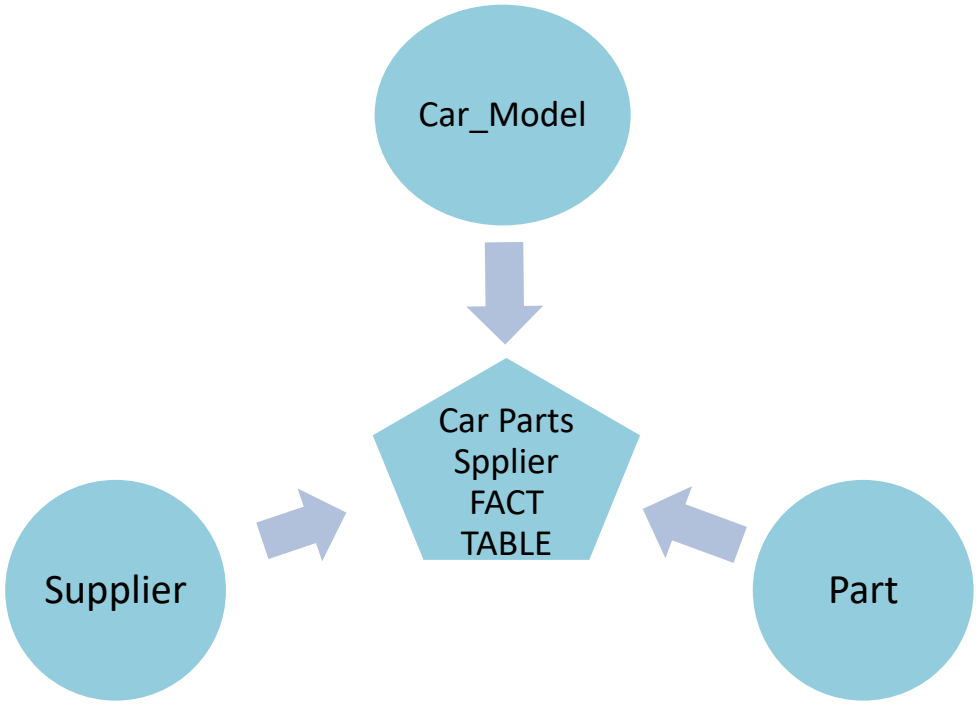
## Car Parts Supplier Fact Table:

| Fact Name | Description | Default Aggregation rule |
|---|---|---|
| Cost_price | The price at which the supplier bought a car part | One-way aggregate |
| Sale_price | The price at which supplier sold the car part | One-way aggregate |
| Margin | It gives the change in sold price and suppliers bought price | One-way aggregate |
| Profit | Gives the revenue remaining after all costs are paid | One-way aggregate |



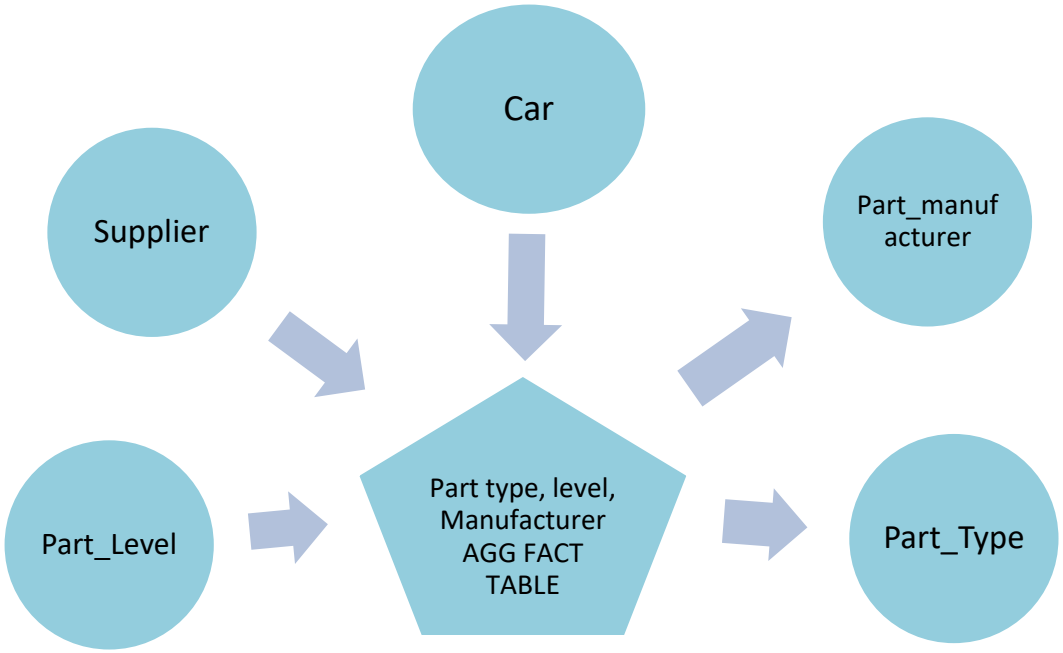
## Car Model Parts Supplier Aggregate Fact Table:

| Fact Name | Description | Default Aggregation rule |
|---|---|---|
| Net_sale | The total revenue of a car part | One way aggregate |
| Sale_price | The price at which supplier sold the car part | One-way aggregate |
| Margin | It gives the change in sold price and suppliers bought price | One-way aggregate |
| Profit | Gives the revenue remaining after all costs are paid | One-way aggregate |
| | | |

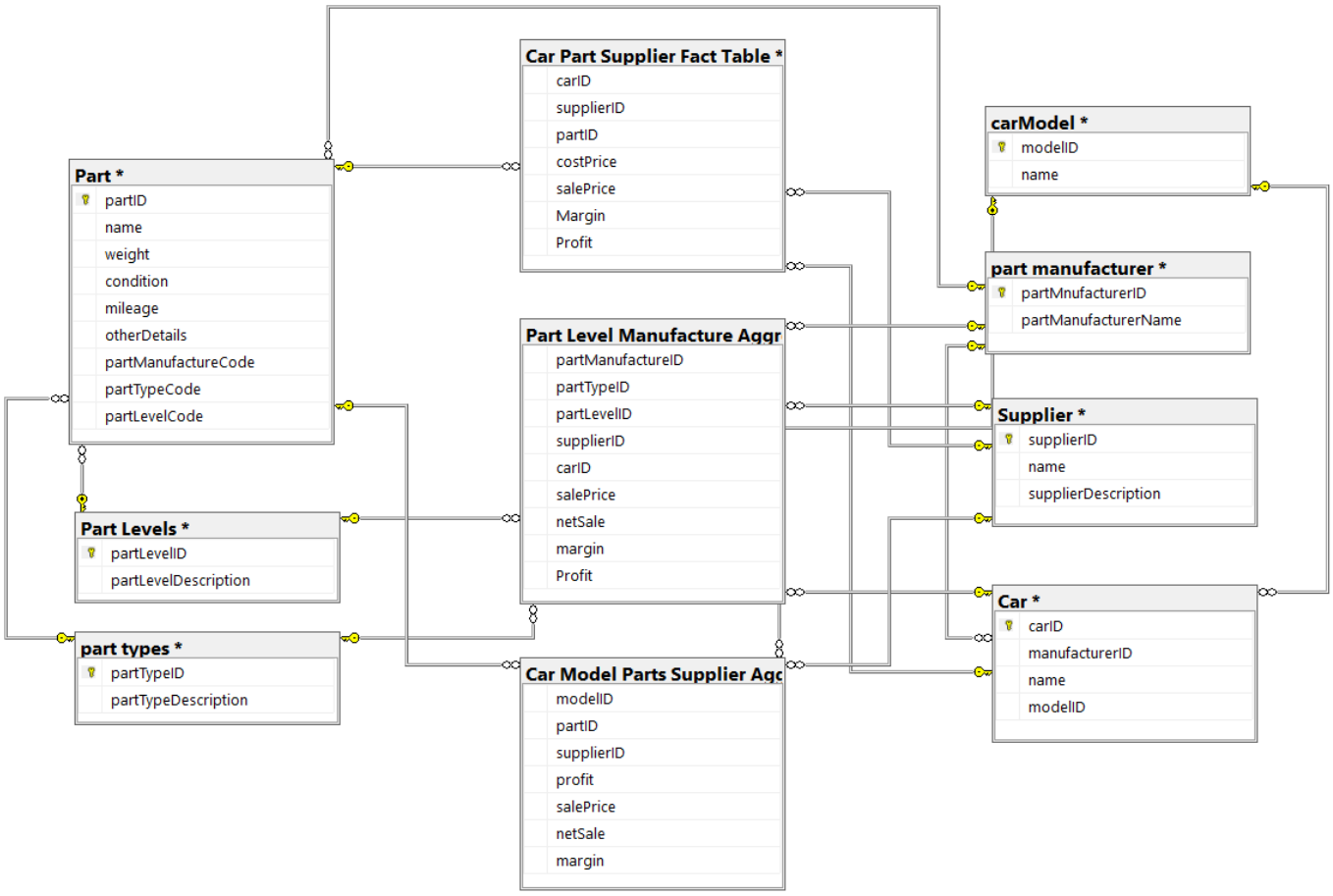


## Car Type, manufacturer, level Parts Aggregate Fact Table:

| Fact Name | Description | Default Aggregation rule |
|---|---|---|
| Sale_price | The price at which supplier sold the car part | One-way aggregate |
| Margin | It gives the change in sold price and suppliers bought price | One-way aggregate |
| Net_sale | The total revenue of a car part | One-way aggregate |
| Profit | Gives the revenue remaining after all costs are paid | One-way aggregate |



# Physical Model



# Data Dictionary

## Car Dimension Table

| **Dimension name** | Customer | **Model name** | CPS DM |
|---|---|---|---|
| **Description** | It will keep the cars description. | | |
| **Attributes** | Car_id, Car_details, manufacturer_id, manufacturer_name, year_of_manufacture, model_key | | |
| **Primary keys** | Car_id | | |
| **Foreign keys** | Model_id | | |
| **Associated Fact Tables** | Car Part Supplier Fact Table, Car Type-manufacturer-level Parts Aggregate Fact Table | | |

## Car Model Dimension Table

| **Dimension name** | Car_Model | **Model name** | CPS DM |
|---|---|---|---|
| **Description** | Model wise cars recorded | | |
| **Attributes** | Model_id, Model_description | | |
| **Primary keys** | Model_id | | |
| **Foreign keys** | None | | |
| **Associated Fact Tables** | Car Part Supplier Fact Table | | |

**Supplier Dimension Table**

| **Dimension name** | Supplier | **Model name** | CPS DM |
|---|---|---|---|
| **Description** | This table will keep the records related to Car Parts Suppliers. | | |
| **Attributes** | Supplier_id, Supplier_name, Supplier_description | | |
| **Primary keys** | Supplier _id | | |
| **Foreign keys** | None | | |
| **Associated Fact Tables** | Car Part Supplier Fact Table, Car Part Model Supplier Fact Table, Car Type-manufacturer-level Parts Aggregate Fact Table | | |

**Parts Dimension Table**

| **Dimension name** | Parts | **Model name** | CPS DM |
|---|---|---|---|
| **Description** | This table will keep the records of parent parts | | |
| **Attributes** | Parent_part_key, part_name, part_desc, weight, condition, mileage_donor_vehicle, | | |
| **Primary keys** | Parent_part_key | | |
| **Foreign keys** | None | | |
| **Associated Fact Tables** | Car Part Supplier Fact Table | | |

### Part Types Dimension Table

| **Dimension name** | Part Type | **Model name** | CPS DM |
|---|---|---|---|
| **Description** | Record part in terms of part type | | |
| **Attributes** | Part_type_code, part_type_description | | |
| **Primary keys** | Part_type_code | | |
| **Foreign keys** | None | | |
| **Associated Fact Tables** | Car Type-manufacturer-level Parts Aggregate Fact Table | | |

### Part Manufacturer Dimension Table

| **Dimension name** | Part Type | **Model name** | Sales DM |
|---|---|---|---|
| **Description** | Record part in terms of part type | | |
| **Attributes** | Part_manufacturer_code, part_manufacturer_name | | |
| **Primary keys** | Part_manufacturer_code | | |
| **Foreign keys** | None | | |
| **Associated Fact Tables** | Car Type-manufacturer-level Parts Aggregate Fact Table | | |

### Part Level Dimension Table

| **Dimension name** | Part Type | **Model name** | Sales DM |
|---|---|---|---|
| **Description** | Record part in terms of part levele | | |
| **Attributes** | Part_level_code, part_level_name | | |
| **Primary keys** | Part_level_code | | |
| **Foreign keys** | None | | |
| **Associated Fact Tables** | Car Type-manufacturer-level Parts Aggregate Fact Table | | |

| **Attribute(s) of "Car" Dimension** | | | | |
|---|---|---|---|---|
| ***Name*** | **Description** | ***Data Type*** | **(Domain Constraints) Is PK** | **Is FK** |
| car_id | primary key of Car | integer | Yes | No |
| Manufacturer_id | Car manufacturer id | integer | No | No |
| Manufacturer_name | Car manufacturer name | Char (18) | No | No |
| Year_of_manufacture | Car manufacturer year | Char (18) | No | No |
| Model_key | Car model_key | integer | No | Yes |

| **Attribute(s) of "Car_Model" Dimension** | | | | |
|---|---|---|---|---|
| ***Name*** | **Description** | ***Data Type*** | **(Domain Constraints) Is PK** | **Is FK** |
| Model_key | primary key of Car_Model | integer | Yes | No |
| Model | Model info | char (18) | No | No |

| **Attribute(s) of "Supplier" Dimension** | | | | |
|---|---|---|---|---|
| ***Name*** | **Description** | ***Data Type*** | **(Domain Constraints) Is PK** | **Is FK** |
| Supplier_id | Id of supplier | integer | Yes | No |
| Supplier_name | Supplier name info | char (18) | No | No |
| Supplier_details | Other Supplier detail | Char (18) | No | No |

| **Attribute(s) of "Parts" Dimension** | | | | |
|---|---|---|---|---|
| ***Name*** | **Description** | ***Data Type*** | **(Domain Constraints) Is PK** | **Is FK** |
| Part_id | Id of car part | integer | Yes | No |
| Description | Part name info | char (18) | No | No |
| Weight | Weight of part | integer | No | No |
| Condition | Current part condition | Char (18) | No | No |
| Mileage_donor_vehicle | Mileage of car part | integer | No | No |
| Part_manufact | Code of Part | integer | No | Yes |

| **Attribute(s) of "Parts" Dimension** | | | | |
|---|---|---|---|---|
| ***Name*** | **Description** | ***Data Type*** | **(Domain Constraints) Is PK** | **Is FK** |
| urer_code | manufacturer | | | |
| Part_type_code | Code of Part type | integer | No | Yes |
| Part_level_code | Code of Part level | integer | No | Yes |

| **Attribute(s) of "Part_manufacturer" Dimension** | | | | |
|---|---|---|---|---|
| ***Name*** | **Description** | ***Data Type*** | **(Domain Constraints) Is PK** | **Is FK** |
| Part_manufacturer_code | primary key of Part manufacturer | integer | Yes | No |
| Part_manufacturer_name | Part manufacturer name info | char (18) | No | No |

| **Attribute(s) of "Part_type" Dimension** | | | | |
|---|---|---|---|---|
| ***Name*** | **Description** | ***Data Type*** | **(Domain Constraints) Is PK** | **Is FK** |
| Part_type_code | primary key of Part type | integer | Yes | No |
| Part_type_desc | Part type info | char (18) | No | No |

| **Attribute(s) of "Part_level" Dimension** | | | | |
|---|---|---|---|---|
| ***Name*** | **Description** | ***Data Type*** | **(Domain Constraints) Is PK** | **Is FK** |
| Part_level_code | primary key of Part level | integer | Yes | No |
| Part_level_desc | Part level info | char (18) | No | No |

# Fact Tables

## Car Part Supplier Fact Table

| **Fact Table name** | Car Part Supplier Fact Table | **Model name** | CPS DM |
|---|---|---|---|
| **Description** | It calculates the Car part suppliers' facts like cost price or part profits margins | | |
| **Attributes** | Car_id, Supplier_id, Part_key, Cost_price, Sale_price, Margin, Profit | | |
| **Primary keys** | | | |
| **Foreign keys** | Car_id, Supplier_id, Part_key | | |
| **Facts / Measures** | Cost_price, Sale_price, Margin, Profit | | |
| **Associated Dimensions** | Car, Supplier, Parts | | |

## Car Model Parts Supplier Aggregate Fact Table:

| **Fact Table name** | Car Model Parts Supplier Aggregate Fact Table | **Model name** | CPS DM |
|---|---|---|---|
| **Description** | It calculates the Car model part suppliers' facts like net sale or part profits margins | | |
| **Attributes** | Car_model, Supplier_id, Part_key, net sale, Sale price, Margin, Profit | | |
| **Primary keys** | | | |
| **Foreign keys** | Car_model, Supplier_id, Part_key | | |
| **Facts / Measures** | Net sale, Sale price, Margin, Profit | | |
| **Associated Dimensions** | Car_Model, Supplier, Parts | | |

## Car Type, manufacturer, level Parts Aggregate Fact Table:

| **Fact Table name** | Car Type, manufacturer, level Parts Aggregate Fact Table | **Model name** | CPS DM |
|---|---|---|---|
| **Description** | It calculates the Car part suppliers' facts like net sale or part profits margins along part level, part type and part manufacturer | | |
| **Attributes** | Car_id, Supplier_id, Part_type_code, Part_level_code, Part_manufacturer_code, Net_sale, Sale_price, Margin, Profit | | |
| **Primary keys** | | | |
| **Foreign keys** | Car_id, Supplier_id, Part_type_code, Part_level_code, Part_manufacturer_code | | |
| **Facts / Measures** | Net_sale, Sale_price, Margin, Profit | | |
| **Associated Dimensions** | Car, Supplier, Part_level, Part_type, Part_manufacturer | | |

| **Attribute(s) of "Car Part Supplier Fact table"** | | | | |
|---|---|---|---|---|
| ***Name*** | **Description** | ***Data Type*** | **(Domain Constraints) Is PK** | **Is FK** |
| Car_id | foregin key of car dimension | integer | Yes | Yes |
| Supplier_id | It's the key of the Supplier dimesion | integer | Yes | Yes |
| part_id | foregin key of Part | integer | Yes | Yes |
| Cost_price | Cost price of car part | integer | No | No |
| Sale_price | Sale price of car part | integer | No | No |
| Margin | Margin of car part | integer | No | No |
| Profit | Profit of car part | integer | No | No |

| **Attribute(s) of "Car Model Part Supplier Aggregate Fact table"** | | | | |
|---|---|---|---|---|
| ***Name*** | **Description** | ***Data Type*** | **(Domain Constraints) Is PK** | **Is FK** |
| Model_id | foregin key of car_model dimension | integer | Yes | Yes |
| Supplier_id | It's the key of the Supplier dimesion | integer | Yes | Yes |
| part_id | foregin key of Part | integer | Yes | Yes |
| Net_sale | Net sale of car part | integer | No | No |
| Sale_price | Sale price of car part | integer | No | No |
| Margin | Margin of car part | integer | No | No |
| Profit | Profit of car part | integer | No | No |

| **Attribute(s) of " Car Type, manufacturer, level Parts Aggregate Fact Table "** | | | | |
|---|---|---|---|---|
| ***Name*** | **Description** | ***Data Type*** | **(Domain Constraints) Is PK** | **Is FK** |
| car_id | foregin key of car dimension | integer | Yes | Yes |
| Supplier_id | It's the key of the Supplier dimesion | integer | Yes | Yes |
| part_type_code | foregin key of Part_type | integer | No | Yes |
| part_level_code | foregin key of Part_level | integer | No | Yes |
| part_manufacturer_code | foregin key of Part_manufacturer | integer | No | Yes |
| Net_sale | Net sale of car part | integer | No | No |
| Sale_price | Sale price of car part | integer | No | No |
| Margin | Margin of car part | integer | No | No |
| Profit | Profit of car part | integer | No | No |