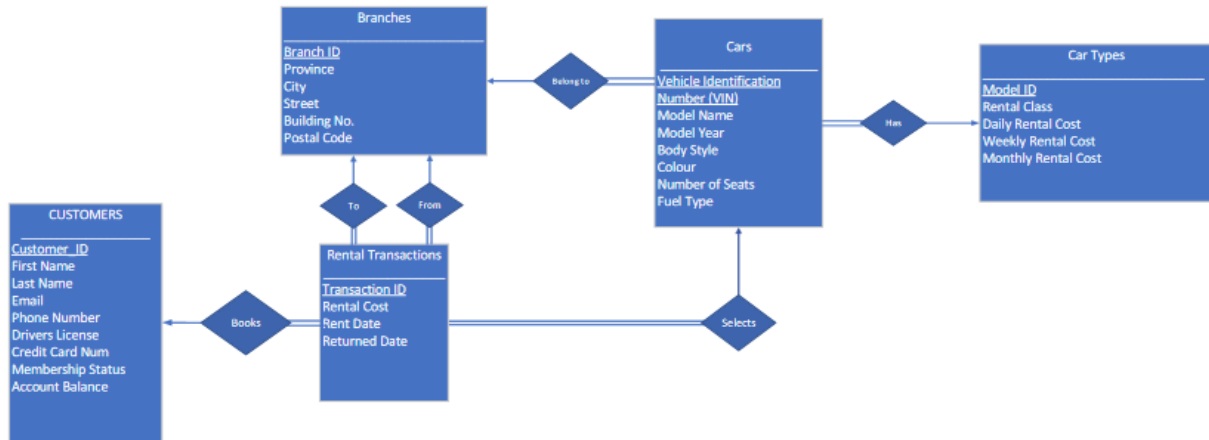


Car Rental System Documentation

ER Diagram



Database Scheme

A lucid description of the relational database scheme for your System, including discussing the reasoning behind your design decisions. Make clear how your design supports efficient query processing.

Our database utilizes five database tables: Branch, Car, Car_Type, Customer, and Rentals.

Branch

The branch table represents the different branches of the car rental company that a customer can rent from. Its primary key is BID (Branch ID). In addition, it contains the following columns: Description, which represents a description of the branch (for example, if a city has multiple branches, description can be used to identify the “west” branch from the “east” branch); Street_Address_1, which represents the street address of the branch; Street_Address_2, which is an optional component of the address; City, which represents the City the branch is located in; Province, which represents the province the branch is located in; Postal_Code, which represents the postal code of the branch; Phone_Number, which represents the phone number for the branch.

For the branch table, the only column allowed to be null is Street_Address_2. This is because this is the only optional component to the branch table, as not every address has an address 2 section.

We've given the Description and Street address columns ample character limits (100 for description, and 50 for the addresses). City and Province have character limits of 36 and 25 characters respectively. City having 36 characters accounts for the longest city name in Canada, that being Pekwachnamaykoskwawaypinwanik Lake. 25 characters for Province accounts for a user inputting Newfoundland and Labrador if using the full name for the province. Postal code is 7 characters long to account for a user inputting a space between the first and last 3 characters (ex. A1A1A1 vs A1A 1A1). Phone number is given 15 characters to work with, accounting for the user entering additional characters into their phone number (ex. For the phone number 1234567890, the user may enter (123) 456-7890).

The Rentals table depends on the Branch table, as well as the Car table.

Car

The Car table represents the various cars that are present at a given branch. Its primary key is VIN, with foreign keys Branch_ID and Car_Type_ID that reference the Branch table and Car_Type table respectively. In addition it contains the following columns: Make, which represents the car's make (ie. manufacturer); Model, which represents the model of the car; Year which represents the year of the car; No_of_Seats, which represents the number of seats in the car; Colour, which represents the colour of the car; Insurance_No, which represents the the number for the insurance plan the car is on; Odometer_No, which represents the number of kilometers on the odometer of the car.

No columns are allowed to be null in the Car table since all the information in the columns is required for any instance of a car.

Make and Model are both limited to 20 characters since it is unlikely that a car will have a make or model name that is longer than 20 characters. Year is limited to 4 characters since a year currently only has 4 characters. Colour is also limited to 20 characters, since most if not all colours can be generalized to a subset of a few colours (ex. A burgundy car will be Red according to most manufacturers and insurance companies). Most resources online describe a car insurance policy number being somewhere between 8 to 13 characters long, so Insurance_No is limited to 15 characters. Odometer_No is limited to 6 numbers because a car's odometer doesn't go beyond 6 digits.

The Rentals table depends on the Car table.

Car_Type

The Car_Type table represents the different car types that each car belongs to. Its primary key is Car_Type_ID. It also has the following columns: Description, which represents the label or name for the car type; Daily_Rate, which is the daily rental cost for renting the car; Weekly_Rate, which is the weekly rental cost for renting the car; Monthly_Rate, which is the monthly rental cost for renting the car.

No columns are allowed to be left null, as a Car_Type instance needs all these columns filled.

Car_Type_ID is a numeric type given a maximum of 3 digits to work with. We chose 3 digits since it would be unlikely that a rental company would be able to come up with more than 1000 different, unique car types. Description is given the nchar type and is limited to 20 characters, since the name of a car type (ex. SUV, hatchback, sedan, etc...) is unlikely to be greater than 20 characters long. Daily_Rate, Weekly_Rate, and Monthly_Rate are all decimal types, given 8 digits to work with, with 2 of those being 2 decimal places, leaving 6 digits available to use for the rental costs. This decision was made as it was highly unlikely that a car rental would cost more than \$999,999.99 a month.

The Car table depends on the Car_Type table.

Customer

The Customer table represents the individual/unique customers who have an account with the rental company. Its primary key is Customer_ID. It also has the following columns: First_Name, which has the type nchar and represents the customer's first name; Middle_Name, which has the type nchar and represents the customer's middle name(s); Last_Name, which has the type nchar and represents the customer's last name; Street_Address1 which has the type nchar and represents the first component of a customer's street address; Street_Address2 which has the type nchar and represents the second, optional component of a customer's street address; City, which has the type nchar and represents the customer's city; Province, which has the type nchar and represents the customer's province; Postal_Code, which has the type nchar and represents the customer's postal code; Date_of_Birth, which has the type date and represents the date of birth of the customer; Phone_Number, which has the type nchar and represents the phone number of the customer; Insurance, which has the type nchar

and represents the phone number that belongs to the customer; Insurance, which has the type nchar and represents the policy number of the car insurance that belongs to the customer; Drivers_Liscence, which has the type nchar and represents the Driver's license number that belongs to the customer; Membership_Status, which has the type numeric and represents whether or not the customer is a gold star member.

The only columns that are allowed to be null are Middle_Name, Last_Name, and Street_Address2. This is due to an individual may not have a middle name or a last name (the last one may be for cultural or special reasons), and that not all individuals live in a place that has a second street address component.

First_Name, Middle_Name, and Last_Name all are limited to 20 characters, as the average person's name does not exceed this limit. Street_Address1, Street_Address2, City, Province, Postal_Code, Phone_Number, and Insurance follow the same logic as their corresponding equivalents in the Branch table. Date_of_Birth is a date and its character limit is determined by the date type. Drivers_Licence has a character limit of 20 which factors in the length of Ontario's driver's license numbers (which are the largest driver's license numbers in Canada; length is 17 characters) and also gives some extra character room in case a province chooses to increase their driver's license number limit (ex. BC is changing their length from 7 to 8 in 2023). Membership status has a numeric limit of 1, since it will only ever be a 0 or a 1 to represent the lack of, or existence, of gold star membership. It also leaves the company extra room for more membership statuses if they decide to add more tiers later.

The Rentals table depends on the Customer table.

Rentals

The Rental table represents the rental transactions that are made by customers. Its primary key is TID (Transaction ID), and has the foreign keys: Customer_ID which references Customers, VIN which references Car, Pick_Up_BID which references Branch, and Return_BID which references Branch. In addition, it also has the following columns: Pick_Up_Date, which has the type date and represents the date the customer will/has pick(ed) the car up; Return_Date, which has the type date and represents the date the customer will return the car; Total_Rent_Value, which has a decimal type and represents the total amount owed for the transaction.

Pick_Up_Date and Return_Date are both type date and their character limits are determined by the date data type. Total_Rent_Value has a maximum of 8 digits that can be used, 2 of which are reserved for the decimal places, leaving 6 to be used by the

user. We chose this number because it is very unlikely for a customer to accrue a rental cost of over \$999,999.

The Rental table depends on the Car, Branch, and Customer tables.