**Sample Project Chapter 3 - Creating the E-R Diagram for The Art Gallery Project**

**Step 3.1 - Make a list of all entities and their associated attributes.**

By examining the data dictionary and asking ourselves what people are important in the Car Dealership, we would certainly identify buyer, customer, referralCustomer , salesperson, and seller. Thinking about what events are important, the sale of a vehicle is a central event, and the license, finance and insurance applications are events of some importance. The vehicle is an object of great importance to the car dealership, so it could be an entity.

The entities appear to be:

**a. Buyer**

**b. Customer**

**c. Referral customer**

**d. Salesperson**

**e. Seller**

**f. Sale**

**g. Finance**

**h. Vehicle**

In identifying the attributes for an entity, we try to find data items that tell a single fact about an entity instance.

* **Buyer**

Grouping the items from the data dictionary, the attributes that seem to describe the buyer are:

buyerAddress, buyerCity, buyerDateOfBirth, buyerDriversLicenseNum, buyerEmployerCity, buyerEmployerState, buyerEmployerStreet, buyerEmployerZip, buyerEmail, buyerFirstName, buyerLastName, buyerMonthlyIncome, buyerName, buyerPhoneAll, buyerPhoneArea, buyerPhoneNum, buyerPosition, buyerProfEmployer, buyerSex, buyerSocialSecurityNumber, buyerState, buyerStreet, buyerYearsThere, buyerZip, bankAddress, bankAccountNum, bankCity, bankManager, bankPhone, bankReference, bankStreet, bankZip.

Examining these more closely, we see that some of them form composite attributes, including:

buyerAddress, consisting of buyerStreet, buyerCity, buyerState, buyerZip

bankAddress consisting of buyerStreet, buyerCity, buyerState, buyerZip

buyerName, consisting of buyerFirstName, buyerLastName

buyerPhoneAll, consisting of buyerPhoneArea, buyerPhoneNum

We notice that some of the items are produced if they meet some condition, such as finance as form of payment. In that case some items should be stored, such as buyerEmployerCity, buyerEmployerState, buyerEmployerStreet, buyerEmployerZip, buyerMonthlyIncome, buyerPosition, buyerProfEmployer, buyerYearsThere, bankAddress, bankAccountNum, bankCity, bankManager, bankPhone, bankReference, bankStreet, bankZip. In that case, they should be considered temporary (ephemeral) data that will not be stored, since they are dependent on the case of financing a vehicle that the user chooses when running the sales report and have little meaning without that report. With these changes, our attribute list is shortened. Dropping the prefix buyer that we had listed in the data dictionary for some of the attributes, we now have:

* Buyer attributes are: address(street, city, state, zip), dateOfBirth, driversLicenseNum, email, name(firstName, lastName), phone(area, num), sex, and socialSecurityNum.

We choose socialSecurityNumber as the primary key, since it has unique values and everyone who buys a car needs to present the document.

* **Customer**

Customer is a person who has gone to the car dealership and filled out a form indicating an interest in a vehicle, but who has yet not bought any vehicle. Attributes to be considered are:

customerAddress, customerCity, customerDateFilledIn, customerDateOfBirth, customerEmail, customerFirstName, customerLastName, customerName, customerPhoneAll, customerPhoneArea, customerPhoneNum, customerReference, customerSalesperson, customerSex, customerState, customerStreet, customerZip, preferredCarMake, preferredCarModel, preferredCarColor, preferredCarNewOrUsed.

Grouping the composite attributes and dropping the prefix, we have:

* Customer attributes are: address(street, city, state, zip), dateFilledIn, dateOfBirth, email, name(firstName, lastName), phone(area, num), reference, salesperson, sex, preferredCarMake, preferredCarModel, preferredCarColor, preferredCarNewOrUsed.

We will use the phone number as the primary key.

* **Referral Customer**

Referral customer is a person who was referenced by a client of the car dealership. Attributes to be considered are:

referralCustomerAddress, referralCustomerCity, referralCustomerDateReceived, referralCustomerEmail, referralCustomerFirstName, referralCustomerLastName, referralCustomerName, referralCustomerPhoneAll, referralCustomerPhoneArea, referralCustomerPhoneNum, referralCustomerSalesperson, referralCustomerState, referralCustomerStreet, referralCustomerZip.

Grouping the composite attributes and dropping the prefix, we have:

* Referral customer attributes are: address(street, city, state, zip), dateReceived, email, name(firstName, lastName), phone(area, all), and salesperson.

This entity has no primary key and it is dependent from Customer entity.

* **Salesperson**

In choosing attributes for Salesperson we will not include information about the individual sales that a salesperson has made, since the sale data is already listed for that entity. Salesperson then has potential attributes:

salespersonAddress, salespersonCity, salespersonCommissionForMonth, salespersonCommissionForYear, salespersonDateofAdmission, salespersonDateOfBirth, salespersonEmail, salespersonFirstName, salespersonLastName, salespersonname, salespersonPhoneAll, salespersonPhoneArea, salespersonPhoneNum, salespersonSocialSecurityNumber, salespersonSex, salespersonState, salespersonStreet, salespersonTotalSalesForMonth, salespersonTotalSalesForYear, salespersonZip.

We can specify the individual components of the address and telephone number, and make a composite attribute for the name. We drop the sales and commission total for a period, because this is ephemeral data. This leaves our final entity as:

* Salesperson attributes are: address(street, city, state, zip), commissionForMonth, commissionForYear, dateOfAdmission, dateOfBirth, email, name(firstName, lastName), phone(area, num), socialSecurityNumber, sex, totalSalesForMonth, totalSalesForYear.

We will use name as the primary key, since we will always have that value for any employee of the gallery.

* **Seller**

Grouping the items from the data dictionary, the attributes that seem to describe the seller are:

sellerAddress, sellerCity, sellerDateOfBirth, sellerEmail, sellerFirstName, sellerLastName, sellerName, sellerPhoneAll, sellerPhoneArea, sellerPhoneNum, sellerSex, sellerSocialSecurityNumber, sellerState, sellerStreet, sellerZip.

Dropping the prefix buyer that we had listed in the data dictionary for some of the attributes, we now have:

* Seller attributes are: address(street, city, state, zip), dateOfBirth, email, name(firstName, lastName), phone(area, num), sex, and socialSecurityNum.

We choose socialSecurityNumber as the primary key, since it has unique values and everyone who buys a car needs to present the document.

* **Sale**

Potential attributes are:

saleDate, saleFinanceInform, saleInvoiceNumber, saleLicenseFee, salePaymentForm, salePrice, salePriceTotal, saleSalespersonCommission, saleSalespersonName, saleTax, saleTradeinPrice, saleVehicleInsuranceCompany, saleVehicleInsuranceExpDate, saleVehicleInsuranceIssDate, saleVehicleInsurancePolicy, saleVehicleLicensePlate, and saleVehicleWarranty.

We could have considered the vehicle, the buyer’s name, the seller’s name, the finance, and the salesperson’s name, but we note that these are separate entities for vehicle, buyer, seller, finance, salesperson, so we do not include these attributes here. We will keep the salesperson commission, since that attribute describes a single sale, and will have different amounts for different sales by the same salesperson.

Dropping the prefix we have:

* Sale attributes are: date, financeInform, invoiceNumber, licenseFee, paymentForm, price, priceTotal, salespersonCommission, tax, tradeinPrice, and warranty.

We will use the invoice number as the primary key. We also note that there would be no sale without a vehicle, a buyer, a salesperson, and perhaps finance since it depends on the payment method, so the Sale entity is existence dependent on all of them. Therefore, there is total participation of Sale in its relationships to Vehicle, Buyer¸ Seller, Salesperson, and Finance, if it applies. However, since it has its own primary key, it is not a weak entity.

* **Finance**

Grouping the items from the data dictionary, the attributes that seem to describe the buyer are:

buyerEmployerCity, buyerEmployerState, buyerEmployerStreet, buyerEmployerZip, buyerMonthlyIncome, buyerPosition, buyerProfEmployer, buyerYearsThere, bankAddress, bankAccountNum, bankCity, bankManager, bankPhoneAll, bankPhoneArea, bankPhoneNum, bankReference, bankStreet, bankZip, saleLoanAmount, saleLoanPayment, saleLoanRate, saleLoanTotalAmount.

We notice that some of the items are produced if they meet some condition, such as finance through a private bank or a car dealership. In that case some items should be stored or not, such as bankAddress, bankAccountNum, bankCity, bankManager, bankPhone, bankReference, bankStreet, bankZip. In that case, they should be considered temporary (ephemeral) data that will not be stored, since they are dependent on the case of financing a vehicle in a private bank. Dropping the prefix buyer that we had listed in the data dictionary for some of the attributes, we now have:

* Buyer attributes are: employerCity, employerState, employerStreet, employerZip, monthlyIncome, position, profEmployer, yearsThere, bankAddress(bankStreet, bankCity, bankState, bankZip), bankAccountNum, bankManager, bankPhone(area, num), bankReference, loanAmount, loanPayment, loanRate, loanTotalAmount.
* **Vehicle**

When we examine the data dictionary for items that describe the vehicle, we find the candidates for attributes are:

vehicleCapacity, vehicleColor, vehicleCostOfAcquisition, vehicleDateOfAcquisition, vehicleDateOfDelivery, vehicleDateOfManufacture, vehicleMake, vehicleMileage, vehicleMileageAtDelivery, vehicleModel, vehicleNewOrUsed, vehicleNumOfCylinders, vehicleNumOfDoors, vehicleOptional, vehiclePlaceOfManufacture, vehiclePrice, vehicleVIN, vehicleWeight, vehicleYear, saleVehicleInsuranceCompany, saleVehicleInsuranceExpDate, saleVehicleInsuranceIssDate, saleVehicleInsurancePolicy, saleVehicleLicensePlate.

Dropping the prefix buyer that we had listed in the data dictionary for some of the attributes, we now have:

* Vehicle attributes are: capacity, color, costOfAcquisition, dateOfAcquisition, dateOfDelivery, dateOfManufacture, insuranceCompany, insuranceExpDate, insuranceIssDate, insurancePolicy, licensePlate, make, mileage, mileageAtDelivery, model, newOrUsed, numOfCylinders, numOfDoors, optional, placeOfManufacture, price, vin, weight, and year.

The VIN of the vehicle is the primary key since it has unique values and all cars comes with that number fixed in their body.

Examining the data dictionary to see if there are any attributes unaccounted for, we see creditApplicationDate, inventoryReportByMonth, inventoryReportByYear, inventoryReportNewByMonth, inventoryReportNewByYear, inventoryReportUsedByMonth, inventoryReportUsedByYear, licenseApplicationDate, purchasesLastMonth, purchasesLastMonthByMake, purchasesLastMonthByNew, purchasesLastMonthByUsed, purchasesLastYear, purchasesLastYearByMake, purchasesLastYearByNew, purchasesLastYearByUsed, all of which appeared on reports. We note that all of these are either calculated or ephemeral data that does not have to be stored.

**Step 3.2 - Make a list of relationships to be represented, and any descriptive attributes for them.**

Our entities are Buyer, Customer, Referral customer, Salesperson, Seller, Sale, Finance and Vehicle. Looking for relationships among them, we find the following.

**IsSold** Vehicle is related to Sale. Vehicle has total participation in this relationship.

**SoldBy** Sale is related to Salesperson. Sale has total participation in this relationship as well.

**SoldTo** Sale is related to Buyer.

**SoldFrom** Sale is related to Seller.

**OwnedBy** Vehicle is related to Seller.

**PreferredBy** Customer does not appear to be strongly related to any other entity. However, a customer can identify a vehicle as a preference, so we could relate Customer to Vehicle. Having this relationship means that we no longer need preferredCarMake, preferredCarModel, preferredCarColor and preferredCarNewOrUsed as attributes of Customer in the E-R diagram.

**MightBecome** Customer is related to Referral Customer.

**ReferencedBy** Customer is related to Referral customer.

**PaidThrough** Sale is related to Finance.

**AppliedBy** Buyer is related to Finance.

**GreetedBy** Customer is related to Salesperson, which means we no longer need salesperson as attributes of Customer.

Since there were no remaining attributes on the data dictionary, there are no attributes that depend on relationships in this example.

**Step 3.3 - Draw an E-R diagram to represent the enterprise**. Be sure to identify relationship participation and cardinality constraints, any weak entity sets, and role names, if needed.



Figure S.3.1 - E-R Diagram for The Car Dealership

**Note: Entities attributes were not included in the image for space issues, yet they are listed below:**

**Buyer**: address(street, city, state, zip), dateOfBirth, driversLicenseNum, email, name(firstName, lastName), phone(area, num), sex, and socialSecurityNum.

**Customer**: address(street, city, state, zip), dateFilledIn, dateOfBirth, email, name(firstName, lastName), phone(area, num), reference, sex, preferredCarMake, preferredCarModel, preferredCarColor, preferredCarNewOrUsed.

**Referral customer**: address(street, city, state, zip), dateReceived, email, name(firstName, lastName), phone(area, num), and salesperson.

**Salesperson**: address(street, city, state, zip), commissionForMonth, commissionForYear, dateOfAdmission, dateOfBirth, email, name(firstName, lastName), phone(area, num), socialSecurityNumber, sex, totalSalesForMonth, totalSalesForYear.

**Seller**: address(street, city, state, zip), dateOfBirth, email, name(firstName, lastName), phone(area, num), sex, and socialSecurityNum.

**Sale**: date, financeInform, invoiceNumber, licenseFee, paymentForm, price, priceTotal, salespersonCommission, tax, tradeinPrice, and warranty.

**Finance**: employerCity, employerState, employerStreet, employerZip, monthlyIncome, position, profEmployer, yearsThere, bankAddress(bankStreet, bankCity, bankState, bankZip), bankAccountNum, bankManager, bankPhone(area, num), bankReference, loanAmount, loanPayment, loanRate, loanTotalAmount.

**Vehicle**: capacity, color, costOfAcquisition, dateOfAcquisition, dateOfDelivery, dateOfManufacture, insuranceCompany, insuranceExpDate, insuranceIssDate, insurancePolicy, licensePlate, make, mileage, mileageAtDelivery, model, newOrUsed, numOfCylinders, numOfDoors, optional, placeOfManufacture, price, VIN, weight, and year.

An E-R diagram drawn using Visio is shown in *ERDiagram-FigS.3.1*. To construct it, we used the steps described next.

We start the diagram with the Referral Customer entity. We concluded that Referral Customer is a weak entity with reference to Customer, so we draw a double rectangle for Referral Customer, and a double diamond for the ReferencedBy relationship. Each Referral Customer may have been referrenced by one or many Customer. Each Customer have to reference one Referral Customer, so Referral Customer has total participation in the relationship. An Referral Customer can be referenced by many Customer, and a Customer can reference many other customers. This is a M:N relationship.

Next we add the Buyer entity. The Owns relationship between Buyer and Customer is 1:M. A customer may or may not become a buyer (partial participation), but a buyer must be a customer.

Now we add the Vehicle entity. The relationship between Customer and Vehicle is that a Customer has a preference of some models and makes of vehicle, and a vehicle can be preferred by a Customer. So the Customer may or may not preferred a vehicle (partial participation) and this relationship is M:1, because a vehicle can be preferred by many customers.

Now we add the Sale entity. IsSold, the Vehicle to Sale relationship is 1:1. A vehicle may or may not be sold (partial participation), but a sale must have a vehicle (total participation). SoldTo, also the Sale entity has total participation with Buyer and Buyer has total participation in Sale since each sale must have a buyer and each buyer must have a sale. This relationship is M:1 since a lot of sales can have the same buyer but each sale must have one buyer.

Next we add the Finance entity. The Finance to Sale relationship, PaidThrough, is 1:1, since a sale can have one type of financing, and a financing can be conceded to pay one sale. It is partial participation. Finance is a weak entity since it depends on Sale attribute payment form, so we have double-line in Finance entity and PaidThrough relationship. Also, Finance has a total participation in Sale. Between Finance and Buyer, which have a M:1 relationship, the same buyer can have a lot of different transactions and different finances of different sales.

The Vehicle to Seller relationship, OwnedBy, is M:1, since seller can have various vehicles, but a vehicle can’t be owned by more than one seller. The participation is partial on both sides.

SoldFrom, the Sale entity has total participation with Seller and Seller has partial participation in Sale since each sale must have a seller and each seller may or may not sale a vehicle. This relationship is 1:M since only one seller can participate in a sale of a vehicle, but a lot of sales can have the same seller.

We add the Salesperson entity. Sale to Salesperson, SoldBy, is M:1. Each sale is made by just one salesperson, but a salesperson can make many sales. A sale requires a salesperson (total participation) but a new salesperson may not have made any sales yet (partial participation).

GreetedBy is a M:N relationship between Salesperson and Customer which means a salesperson can greets many different customers and a customer can buy a vehicle in the dealership after being greeted by different salesperson.

**Step 3.4 - Update the data dictionary and list of assumptions as needed.**

* Revised Data Dictionary. Changes are in *italics*.

**bankAddress** The mailing address of a bank listed for credit application in order to finance a vehicle of the car dealership.

**bankAccountNum** The customer account number of a bank listed for credit application in order to finance a vehicle of the car dealership.

**bankCity** The city of a bank listed for credit application in order to finance a vehicle of the car dealership.

**bankManager** The manager of customer account number of a bank listed for credit application in order to finance a vehicle of the car dealership.

***bankPhoneAll*** *The complete telephone number of a bank listed for credit application in order to finance a vehicle of the car dealership.*

***bankPhoneArea*** *The area of the telephone number of the bank.*

***bankPhoneNum*** *The telephone number of the bank without the area code .*

**bankReference** The name of a bank listed for credit application in order to finance a vehicle of the car dealership.

**bankStreet** The street and number of a bank listed for credit application in order to finance a vehicle of the car dealership.

**bankZip** The postal zip code of a bank listed for credit application in order to finance a vehicle of the car dealership.

**buyerAddress** The mailing address of a buyer of a vehicle of the car dealership.

**buyerCity** The city of the mailing address of a buyer of a vehicle of the car dealership.

**buyerDateOfBirth** The date of birth of a buyer of a vehicle of the car dealership.

**buyerDriversLicenseNum** The driver’s license number of a buyer of a vehicle of the car dealership.

**buyerEmail** The email of a buyer of a vehicle of the car dealership.

**buyerEmployerCity** The city of the mailing address of the employer of a buyer of a vehicle of the car dealership.

**buyerEmployerState** The state of the mailing address of the employer of a buyer of a vehicle of the car dealership.

**buyerEmployerStreet** The street and number of the mailing address of the employer of a buyer of a vehicle of the car dealership.

**buyerEmployerZip** The postal zip code of the mailing address of the employer of a buyer of a vehicle of the car dealership.

**buyerFirstName** The first name of a buyer of a vehicle of the car dealership.

**buyerLastName** The last name of a buyer of a vehicle of the car dealership.

**buyerMonthlyIncome** The monthly income of a buyer of a vehicle of the car dealership who wants financing.

***buyerName*** *The complete name of a buyer, including firstname and lastname.*

***buyerPhoneAll*** *The complete telephone number of a buyer of a vehicle of the car dealership.*

***buyerPhoneArea*** *The area of the telephone number of the buyer.*

***buyerPhoneNum*** *The telephone number of the buyer without the area code .*

**buyerPosition** The position of a buyer of a vehicle of the car dealership who wants financing.

**buyerProfEmployer** The name of employer of a buyer of a vehicle of the car dealership who wants financing.

**buyerSex** The sex of a buyer of a vehicle of the car dealership.

**buyerSocialSecurityNumber** The social security number of a buyer of a vehicle of the car dealership.

**buyerState** The state of the mailing address of a buyer of a vehicle of the car dealership.

**buyerStreet** The house number and street of the mailing address of a buyer of a vehicle of the car dealership.

**buyerYearsThere** The number of year in the company name of a buyer of a vehicle of the car dealership who wants financing.

**buyerZip** The postal zip code of the buyer of a vehicle of the car dealership.

**creditApplicationDate** The date of a credit application form was filled up by a customer.

**customerAddress** The mailing address of a potential customer of the car dealership.

**customerCity** The city of the mailing address of a potential customer of the car dealership.

**customerDateFilledIn** The date a customer information form was filled in.

**customerDateOfBirth** The date of birth of a potential customer of the car dealership.

**customerEmail** The email of a potential customer of the car dealership.

**customerFirstName** The first name of a potential customer of the car dealership.

**customerLastName** The last name of a potential customer of the car dealership.

***customerName*** *The complete name of a customer, including firstname and lastname.*

***customerPhone*** *The complete telephone number of a potential customer of the car dealership.*

***customerPhoneArea*** *The area of the telephone number of the customer.*

***customerPhoneNum*** *The telephone number of the customer without the area code .*

**customerReference** The name of a customer that referenced a potential customer of the car dealership.

**customerSalesperson** The name of a salesperson who greeted a potential customer of the car dealership.

**customerSex** The sex of a potential customer of the car dealership.

**customerState** The state of the mailing address of a potential customer of the car dealership.

**customerStreet** The house number and street of the mailing address of a potential customer of the car dealership.

**customerZip** The postal zip code of the mailing address of a potential customer of the car dealership.

**inventoryReportByMonth** The inventory of the car dealership for a period of month.

**inventoryReportByYear** The inventory of car dealership for a period of year.

**inventoryReportNewByMonth** The inventory of new cars of the car dealership for a period of month.

**inventoryReportNewByYear** The inventory of new cars car dealership for a period of year.

**inventoryReportUsedByMonth** The inventory of used cars of the car dealership for a period of month.

**inventoryReportUsedByYear** The inventory of used cars of car dealership for a period of year.

**licenseApplicationDate** The date of application for a license plate to a vehicle sold by car dealership.

**preferredCarMake** The preferred car make chosen as a preference by a potential customer of the car dealership.

**preferredCarModel** The preferred car model chosen as a preference by a potential customer of the car dealership.

**preferredCarColor** The preferred car color chosen as a preference by a potential customer of the car dealership.

**preferredCarNewOrUsed** The preferred car status of new or used chosen as a preference by a potential customer of the car dealership.

**purchasesLastMonth** The total dollar amount of vehicles sales during the entire previous month.

**purchasesLastMonthByMake** The total dollar amount of vehicles sales by make during the entire previous month.

**purchasesLastMonthByNew** The total dollar amount of new vehicles sales by make during the entire previous month.

**purchasesLastMonthByUsed** The total dollar amount of used vehicles sales by make during the entire previous month.

**purchasesLastYear** The total dollar amount of vehicles sales during the entire previous year.

**purchasesLastYearByMake** The total dollar amount of vehicles sales by make during the entire previous year.

**purchasesLastYearByNew** The total dollar amount of new vehicles sales by make during the entire previous year.

**purchasesLastYearByUsed** The total dollar amount of used vehicles sales by make during the entire previous year.

**referralCustomerAddress** The mailing address of a referral customer of the car dealership.

**referralCustomerCity** The city of the mailing address of a referral customer of the car dealership.

**referralCustomerDateReceived** The date a customer referral form was received.

**referralCustomerEmail** The email of a referral customer of the car dealership.

**referralCustomerFirstName** The first name of a referral customer of the car dealership.

**referralCustomerLastName** The last name of a referral customer of the car dealership.

***referralCustomerName*** *The complete name of a referral customer, including firstname and lastname.*

***referralCustomerPhone*** *The complete telephone number of a referral customer of the car dealership.*

***referralCustomerPhoneArea*** *The area of the telephone number of the customer.*

***referralCustomerPhoneNum*** *The telephone number of the customer without the area code .*

**referralCustomerSalesperson** The name of a salesperson who received a customer referral form of the car dealership.

**referralCustomerState** The state of the mailing address of a referral customer of the car dealership.

**referralCustomerStreet** The house number and street of the mailing address of a referral customer of the car dealership.

**referralCustomerZip** The postal zip code of the mailing address of a referral customer of the car dealership.

***reportDate*** *The date of a report.*

**saleDate** The date a vehicle was sold by the car dealership.

**saleFinanceInform** The information of financing payment for a sale of a vehicle.

**saleInvoiceNumber** The number printed on the invoice for a sale of a vehicle.

**saleLicenseFee** The dollar amount of sales license fee for the sale of a vehicle.

**saleLoanAmount** The dollar amount of loan conceded to a finance for the sale of a vehicle.

**saleLoanPayment** The method of payment for a loan conceded to a finance for the sale of a vehicle.

**saleLoanRate** The rate of a loan conceded to a finance for the sale of a vehicle.

**saleLoanTotalAmount** The total dollar amount to be paid to a finance for the sale of a vehicle.

**salePaymentForm** The form of payment for a sale of a vehicle.

**salePrice** The price at which a vehicle was sold by the car dealership.

**salePriceTotal** The total dollar amount of a sale of a vehicle, including price, tax and license fee.

**saleSalespersonCommission** The dollar amount of commission for a salesperson for the sale of a vehicle.

**saleSalespersonName** The first and last name of the salesperson who sold a vehicle.

**saleTax** The dollar amount of sales tax for the sale of a vehicle.

**saleTradeinPrice** The dollar amount of a trade-in used vehicle for the sale of a new vehicle.

**saleVehicleInsuranceCompany** The company of insurance of a vehicle sold by car dealership.

**saleVehicleInsuranceExpDate** The expiration date if a policy of a vehicle sold by car dealership.

**saleVehicleInsuranceIssDate** The issue date if a policy of a vehicle sold by car dealership.

**saleVehicleInsurancePolicy** The number of insurance policy of a vehicle sold by car dealership.

**saleVehicleLicensePlate** The license plate of a vehicle sold by car dealership.

**saleVehicleWarranty** The warranty of a vehicle sold by car dealership.

**salespersonAddress** The mailing address of a salesperson of the car dealership.

**salespersonCity** The city of the mailing address of a salesperson of the car dealership.

**salespersonCommissionForMonth** The total dollar amount of commission earned by a salesperson for a specific month.

**salespersonCommissionForYear** The total dollar amount of commission earned by a salesperson for a specific year.

**salespersonDateofAdmission** The date of admission of a salesperson of the car dealership.

**salespersonDateOfBirth** The date of birth of a salesperson of the car dealership.

**salespersonEmail** The email of a salesperson of the car dealership.

**salespersonFirstName** The first name of a salesperson of the car dealership.

**salespersonLastName** The last name of a salesperson of the car dealership.

***salespersonName*** *The complete name of a salesperson, including firstname and lastname.*

***salespersonPhone*** *The complete telephone number of a salesperson of the car dealership.*

***salespersonPhoneArea*** *The area of the telephone number of the salesperson.*

***salespersonPhoneNum*** *The telephone number of the salesperson without the area code .*

**salespersonSocialSecurityNumber** The social security number of a salesperson of the car dealership.

**salespersonSex** The sex of a salesperson of the car dealership.

**salespersonState** The state of the mailing address of a salesperson of the car dealership.

**salespersonStreet** The house number and street of the mailing address of a salesperson of the car dealership.

**salespersonTotalSalesForMonth** The total dollar amount of sales, not including tax, made by a salesperson during a specific month.

**salespersonTotalSalesForYear** The total dollar amount of sales, not including tax, made by a salesperson during a specific year.

**salespersonZip** The postal zip code of the mailing address of a salesperson of the car dealership.

**sellerAddress** The mailing address of the seller of a vehicle of the car dealership.

**sellerCity** The city of the mailing address of the seller of a vehicle of the car dealership.

**sellerDateOfBirth** The date of birth of a seller of a vehicle of the car dealership.

**sellerEmail** The email of a seller of a vehicle of the car dealership.

**sellerFirstName** The given first name that the seller of a vehicle of the car dealership.

**sellerLastName** The last (family) name of the seller of a vehicle of the car dealership.

***sellerName*** *The complete name of a seller, including firstname and lastname.*

***sellerPhone*** *The complete telephone number of the seller of a vehicle of the car dealership.*

***sellerPhoneArea*** *The area of the telephone number of the seller.*

***sellerPhoneNum*** *The telephone number of the seller without the area code .*

**sellerSex** The sex of a buyer of a vehicle of the car dealership.

**sellerSocialSecurityNumber** The social security number of the seller of a vehicle of the car dealership.

**sellerState** The state of the mailing address of the seller of a vehicle of the car dealership.

**sellerStreet** The house number and street of the mailing address of the seller of a vehicle of the car dealership.

**sellerZip** The postal zip code of the mailing address of the seller of a vehicle of the car dealership.

**vehicleCapacity** The capacity of a vehicle of the car dealership.

**vehicleColor** The color of a vehicle of the car dealership.

**vehicleCostOfAcquisition** The cost of acquisition of a vehicle of the car dealership.

**vehicleDateOfAcquisition** The date of acquisition of a vehicle of the car dealership.

**vehicleDateOfDelivery** The date of delivery of a vehicle of the car dealership.

**vehicleDateOfManufacture** The date of manufacture of a vehicle of the car dealership.

**vehicleMake** The make of a vehicle of the car dealership.

**vehicleMileage** The mileage of a vehicle of the car dealership.

**vehicleMileageAtDelivery** The mileage at delivery of a vehicle of the car dealership.

**vehicleModel** The model of a vehicle of the car dealership.

**vehicleNewOrUsed** The status of new or used of a vehicle of the car dealership.

**vehicleNumOfCylinders** The number of cylinders of a vehicle of the car dealership.

**vehicleNumOfDoors** The number of doors of a vehicle of the car dealership.

**vehicleOptional** The optional of a vehicle of the car dealership.

**vehiclePlaceOfManufacture** The place of manufacture of a vehicle of the car dealership.

**vehiclePrice** The sales price of a vehicle of the car dealership.

**vehicleVIN** The VIN of a vehicle of the car dealership.

**vehicleWeight** The weight of a vehicle of the car dealership.

**vehicleYear** The year of a vehicle of the car dealership.

* The list of assumptions in the Friendly’s Car Dealership database is mentioned below. It’s the same as in Step 1.4 and 2.2.

***CORRECT LIST and ER Diagram:***

*a) Customer*

*b) Ad*

*c) New Car*

*d) Salesperson*

*e) Sale*

*f) Insurance*

*g) Financing*

*h) Warrantee*

*i) Customization*

*j) Survey*

*k) Registration*

*l) Used Car*

