Car Dealership – Specifications

Functionality and Users

The Dealership will have a public-facing interface for searching vehicles, and additional features that

can be accessed by logging in as a user. These features will be described in further detail later,

but it is important to remember to distinguish between public users and logged-in users and

what they may/may not access. Furthermore, there are distinct categories of users that will

login, with various permissions:

• Inventory clerks, who buy vehicles and add them to inventory, along with information

about the car’s previous owner (also considered customer information), and enter parts

orders

• Salespeople, who will only have access to searching available inventory, entering

customer information, and entering sales transactions

• Managers, who can view inventory, purchase history, sales transactions, parts order

history, and reports

• And the owner, who has access to everything and can perform any activity in the system

(a combination of all permissions)

Since this is a prototype system, it will not be necessary to have an interface for

adding/registering users and granting them appropriate permissions. The database

administrator will manually add users and set permissions as needed. All users will be

identified using a unique username determined by the database administrator and will login

with their username and a password assigned by the DBA. (It is acceptable to store passwords

in the database as plaintext in the initial version of this system.) You should also store the first

and last name of the user to further identify them in other areas of the system.

Operational Details

There are a variety of people and things involved in the day-to-day operations of The Dealership.

Unless otherwise specified, any properties mentioned here are required. You should build a

database schema that facilitates storing the information needed for these processes.

Vehicles

Vehicles are tracked on a variety of characteristics. First, each vehicle has a unique

alphanumeric Vehicle Identification Number (VIN). Next, the type of vehicle is stored. The list

of vehicle types is in the appendix and should be updatable by the database administrator in

case new types of vehicles are invented. The manufacturer name is also stored, and a list of

valid manufacturer names is provided in the appendix of this specification. This list of

manufacturers may change, so you should ensure the list can be updated within the database

by the database administrator. The model name and model year must also be stored, and

these will be free-form entered by the user, with the restriction that model years cannot

exceed the current year plus one. (Someone might sell The Dealership a 2020 model year vehicle in

2019, but it’s impossible to sell a 2021 model year car in 2019 since that year’s models don’t

exist yet.) The year entered must include century digits. (So “1999” is acceptable, but “15” is

not.). The fuel type of the vehicle is also tracked, which can be one of the following: Gas, Diesel,

Natural Gas, Hybrid, Plugin Hybrid, Battery, or Fuel Cell. Of course, the color of the car is also

an important detail, and a list of generic color names that can be chosen for a vehicle is also in

the appendix. A car may have multiple colors, for example, silver and red. The list of colors is

not expected to change. The mileage (odometer reading) is also stored for each vehicle.

Finally, an optional description can be entered that contains additional information such as

what accessories or equipment the car has or any other information.

Customers

Sellers and buyers (combined, referred to as “customers”, because they are capable of buying

and selling) can be either an individual person or a business. For all customers, their address

(street/city/state/postal code) and their phone number are collected. Customers also have the

option of providing an email address so that The Dealership can stay in touch with them

electronically. If the customer is an individual, their first and last names, along with their

driver’s license number (which can be assumed to be unique), will be recorded. If the customer

is a business, the business’ tax identification number (similar to a Social Security number) and

business name, along with the name of a primary contact and their title (such as owner, fleet

manager, etc.), are recorded.

Sellers

Vehicles are sold to The Dealership by sellers, and the vehicle should link back to the seller that sold

the vehicle. It is safe to assume that a car will only be sold to The Dealership once, but sellers may

sell multiple vehicles. Purchase prices are entered for each sale manually by the inventory clerk

handling the transaction, who will determine the condition of the vehicle (Excellent, Very Good,

Good, Fair) which corresponds to a certain value determined by the inventory clerk. The

purchase date should be tracked to determine how long the car is in inventory.

Parts

Some cars are purchased and need new parts before they can be sold. An inventory clerk will

determine what parts are necessary, lookup where to purchase them (and for how much) and

input the order information into the system. Clerks may order one or more parts in a parts

order. Each part order is associated with a certain vendor, so you will need to keep track of the

name of the vendor, their address (street/city/state/postal code) and phone number, in

addition to The Dealership’ purchase order number (which is generated by combining the VIN with

the ordinal of the order – so the first parts order for a vehicle with VIN 123 would be 123-01,

the second 123-02, etc., regardless of any parts orders for any other vehicles.) For each part in

a parts order, you will need to track the status (ordered/received/installed), a description of the

part, the part number (which may be alphanumeric), and the cost of the part. If multiple

quantities of a part are needed, the quantity will be tracked as part of the parts order. The

total cost of a parts order is the sum of all parts’ costs. Parts status will be manually updated by

clerks; however, they cannot revert a part to a previous status (such as installed to ordered).

The status for each part must be tracked individually as all parts on an order are rarely received

altogether. It’s also possible for a vehicle to have multiple parts orders from the same vendor

for a vehicle. Because part prices may change, you should not worry about maintaining a static

list of part numbers and prices. A vehicle cannot be returned for any public search results or be

sold if it has any parts pending or not installed (in other words, all parts must be installed).

Buyers

Vehicles are bought by buyers in a sale transaction with a salesperson. The sales price is

calculated as 125% of the original purchase price (the price The Dealership paid to buy the car)

combined with 110% of any parts costs also associated with the vehicle. Just as with selling, the

vehicle should have a link to the customer who purchased it, and it’s possible (and good for

business) that a buyer can purchase several vehicles. Should a buyer purchase several vehicles

at the same time, they would still be handled as separate sales transactions. The purchase date

should be tracked in order to determine when a car leaves inventory.

Application Functionality

Public Access

The only feature accessible to the public is searching for vehicles. Because of this the initial

state of the application should be to open the “public” search page, with an option to login

provided somewhere on that page.

The public search page should initially display somewhere prominent, the total number of cars

available for purchase in the system, that is, cars without any pending parts orders. Searching

can be done on the following criteria:

• Vehicle type

• Manufacturer

• Model year

• Fuel type

• Color

• Keyword, which searches the manufacturer, model year, model name and description

fields. Anything that matches the entered keyword (either entirely or as a substring) for

any of those fields, case insensitive, should be returned.

For fields other than keyword, it may be appropriate to use drop-downs to provide choices to

the user. You do not need to allow making multiple selections for these fields, selecting a single

value is acceptable. Results must match all search options that are entered.

If no vehicles meet the search criteria, a message should be displayed: “Sorry, it looks like we

don’t have that in stock!”

If there are vehicles that match the search criteria, you should return the following attributes

for each vehicle in the search results:

• VIN

• Vehicle type

• Model Year

• Manufacturer

• Model

• Fuel type

• Color(s) – be sure if a car has multiple colors, that it only returns a single result row and

that all colors are listed

• Mileage

• Sales Price

These results should be sorted by VIN in ascending order, no other sorting options are

necessary. Users can select an individual result, which will open a detail page that includes the

VIN, vehicle type, Model Year, Model Name, Manufacturer, fuel type, color(s), mileage, sales

price, and the description of the car.

Privileged Access

As noted previously, users who are employees of The Dealership will have access to additional

features to perform their job duties. Remember that you do not need to provide any interface

for creating or registering users and granting them privileges, as this will be done manually in

the database for now. Privileged users will login using their username and password. Ideally,

all users will start on the public-facing search screen, which provides a login option, and after

logging in, will update to include access to the appropriate functionality.

One area of common functionality is the ability to look up and add customers to the system.

However, this is only available when performing a purchase or sales transaction and is not

something that needs to be independently accessible. Looking up a customer can be done

using either the driver’s license or tax ID. If no result is found, then the option to add a

customer is provided, and based on the customer type, the appropriate fields (as described

earlier in this specification) should be input into the system.

In addition, all privileged users will have an additional search option added to the search page

which allows for searching by VIN.

Inventory Clerks

After an inventory clerk logs in, he/she will be given access to an “Add Vehicle” button or link,

that will allow them to add new vehicles that have been purchased. On the add vehicle form,

the clerk will need to search or add a customer to link the purchase to a seller. After selecting a

seller for the car, the new vehicle form will gather all the relevant details such as VIN, vehicle

type, condition, purchase price, etc., along with the date of purchase. After submitting the data

and successfully adding the vehicle to the database, the clerk will be taken to the detail page

for the vehicle. (What the detail page looks like for clerks will be described further on.)

Inventory clerks will need to also pull up previously purchased vehicles and will do that using

the search screen, which should show them somewhere on the search screen the number of

vehicles currently with parts pending along with the number of vehicles available for purchase.

Clerks can search on the same criteria as public users, along with the option to search by VIN.

Unlike public search, however, the results for a clerk should include any vehicle that has not

been sold even those with parts pending. Selecting a result will load that vehicle’s detail page.

The clerk’s view of the detail page is similar to the detail page shown to public users and should

show the same information but include fields for the original purchase price and the total of all

parts costs. A newly added car will show $0 total for parts because it has no parts ordered yet.

There should also be a section for parts, which will list each part that was ordered for the car.

This list should include all relevant details for each part: part number, description, vendor,

purchase order, cost, and status. There should also be a mechanism for updating the status of

an individual part from ordered, to received, to installed. A part’s status cannot be changed to

a previous status, and once it is installed, its status can no longer be updated. An “add part

order” link or button should also be provided to access the add parts order form.

If a part needs to be entered, the clerk will access the parts order form and enter the

information for that part (these elements were described previously in the “part” section).

Similar to how customers are handled, you should have a mechanism on the parts order form

for searching and adding vendors to link them to a parts order. Since multiple parts may be

part of the same order, you will need to provide a mechanism for entering multiple parts into

an order.

Salespeople

Salespeople will start, after logging in, on the search page, with the same layout as a public

search, with the added option to search by VIN, and like public users, with the results only

including vehicles with no pending parts on order. Upon loading the detail page for a vehicle,

the sales person will see the same detail page that customers do, with an added button or link

to sell the car. This will load the sales order form.

On the sales order form, salespeople can look up a customer (or add them if a customer is not

found) and confirm the sale by entering the sales date. The sales price of the car cannot be

changed – The Dealership’ philosophy doesn’t believe in bargaining over car prices and customers will

enjoy knowing that the price listed for a car is the price they will pay without any added hassle.

Managers

Managers have view-only access to all information along with reports (which will be described

in their own section). Like inventory clerks and salespeople, after logging in, managers start on

the search screen, which will display somewhere the number of vehicles currently with parts

orders pending, along with the number of vehicles available for purchase, with the same search

options as a public search, and can also search by VIN. They additionally have the option to

filter by sold vehicles, unsold vehicles, or all vehicles. When filtering by unsold or all vehicles,

all unsold vehicles will be returned regardless of parts status.

When viewing a vehicle detail page, managers will see all information for the car – including all

of the seller’s contact information (everything except their driver’s license or tax ID number),

the name (first and last) of the inventory clerk that purchased the car, the original purchase

price, the purchase date, the total cost of parts, and a parts section listing details for all parts

just like would be shown on an inventory clerk’s view. In addition, if the car has been sold, the

buyer’s contact information (everything except their driver’s license or tax ID number), sales

date, and the salesperson’s name (first and last) will be displayed.

Owner

As stated previously, the owner has access to the complete functionality of the system, must be

able to view all information and reports, and should be able to do any activity described

previously in this specification. Essentially, the owner’s login will allow her to do anything a

manager, inventory clerk, or salesperson can do, keeping in mind any context for business

processes. (For example, the vehicle detail page will show all information like it does for

managers, and the owner will also be able to sell a car or add parts to it, but the system should

not allow her to add parts to or sell a car that has been sold. This is just an example of one

natural limitation – you may need to determine if there are others!)

Reports

Reports will be visible to the owner and managers. Access to these reports should be via a link,

button, or dropdown menu that can be displayed on the initial search page for users that are

allowed access to reports.

Seller History

This report will show detail about all vehicles purchased by The Dealership and their sellers. It will

include the following elements: the name of the seller (either first name and last name or

company name, which should be displayed as a single column, not two different columns for

each seller type), the total number of vehicles they have sold to The Dealership, the average purchase

price for the vehicles they have sold to The Dealership, the average number of parts ordered per

vehicle, and the average cost of parts per vehicle. The report should be sorted by total number

of vehicles sold descending, followed by average purchase price ascending. In addition, any

seller who has sold vehicles and shows an average of five or more parts on this report, or where

the average cost of parts is $500 or more, should have their resulting row highlighted with a red

background to indicate that they may be selling lower quality vehicles and that The Dealership may

want to avoid buying from them in the future.

Average Time In Inventory

This report, based on the difference between vehicle sales dates and the vehicle purchase

dates, will display, by vehicle type, the average amount of time a vehicle remains in inventory,

in days. When counting days spent in the inventory, the first and last day should be counted as

a day, and if a vehicle was added and sold on the same day, it will be counted as one day. If a

vehicle type has no sales history, the report should display “N/A” for that vehicle type.

Price Per Condition

This report will display, by vehicle type, and for each condition (Excellent, Very Good, Good,

Fair), the average price paid for cars that The Dealership has purchased. If a vehicle type or condition

has never been purchased, the report should display “$0” for that result. This should be a

pivoted report (there should not be a row for each combination of vehicle type and condition),

so vehicle type could be displayed as rows, with condition for the columns, or vice versa – your

team can decide which form “looks” better.

Parts Statistics

This report will be used to negotiate better prices with parts vendors. In this report, you should

list: the vendor name, the number of parts supplied by that vendor, and the total dollar amount

spent on parts.

Monthly Sales

This report will be the most frequently used report and has two parts. First, a summary page,

which lists for all sales transactions, by year and month, the total number of vehicles sold, the

total sales income, and the total net income (which is sales price less purchase price and any

parts costs). If a year or month does not have sales data, it can be excluded from this report.

The results will be ordered by year and month descending, with the most recent year and

month as the first result.

From each year/month result, a drilldown report for that year and month must be accessible.

Based on the sales data for that year and month, the drilldown will display the top performing

salespeople, by showing the salesperson’s first and last name, the number of vehicles they sold

in that year and month and their total sales for that year and month. To determine who is the

top sales person for the month, the drilldown will be sorted by total vehicles descending

followed by total sales descending. (In other words, in the event of a tie where two or more

salespeople have sold the same number of vehicles, the salesperson who has sold the highest

dollar value will be considered the top salesperson.)

Appendix

Manufacturers

Acura FIAT Lamborghini Nio

Alfa Romeo Ford Land Rover Porsche

Aston Martin Geeley Lexus Ram

Audi Genesis Lincoln Rivian

Bentley GMC Lotus Rolls-Royce

BMW Honda Maserati smart

Buick Hyundai MAZDA Subaru

Cadillac INFINITI McLaren Tesla

Chevrolet Jaguar Mercedes-Benz Toyota

Chrysler Jeep MINI Volkswagen

Dodge Karma Mitsubishi Volvo

Ferrari Kia Nissan XPeng

Colors

Aluminum Beige Black Blue Brown Bronze Claret

Copper Cream Gold Gray Green Maroon Metallic

Navy Orange Pink Purple Red Rose Rust

Silver Tan Turquoise White Yellow

Vehicle Types

Sedan

Coupe

Convertible

Truck

Van

Minivan

SUV

Other

Change History

**Version Date Description**

**1.0** 8/21/2023 Initial version of specification