

# Introduction to Database Systems

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## Introduction

In this report we will review all parts of our development process in creating this database and website. We will show what we've done in this project, our ER diagram, and some assumptions that we have made during development.

## Development Stages:

### Stage 1- Overall Design

The main focus of this stage of development was to identify the goals of the project. We wanted to create a system that could be easily used by the employees of Westside Auto to manage their business activities. This system will only be used by employees of Westside Auto. During this stage we created the initial design of the website and some general forms that we assumed would be useful later on. The rest of the forms were added once we created our ER diagram. This gave us some ground work to create some goals of the system.

There are some main business activities that we knew employees of Westside Auto were currently completing manually. We knew that they need to store customers, vehicles, invoices, payment information of the customer, and whether a car is under warranty. This lead us to create these forms, which were updated later to include missing information and to improve the functionality of the interface.

Since we weren't able to talk to the a representative of Westside Auto we had to make some assumptions about the database. We assumed that the salesman would not want to type in a new type of warranty every time that they were to sell in a car. To make up for this we put in default warranty types that allows them to easily pick from a list of available options.

## Stage 2- ER Diagram Design

In the second stage of the project we used the information provided in the project description and our initial assumptions about the business logic of Westside Auto to begin developing the ER Diagram. You can find the ER Diagram under the appendix (figure 1.0).

## Stage 3- Forms and Reports

At the end of the database creation process we came up with some of the following forms and reports:

### Forms

- **Purchasing Form:** This form is used when an employee is purchasing a new car to add to Westside Auto's inventory. This form includes things such as where the vehicle was purchased, how much it was purchased for and when it was purchased. It also includes all the vehicle information.
- **Add Customer Form:** This form is used to add new customer to Westside Auto's database. The form includes standard information about a customer (name, address, driver's license number etc.).
- **Add Employee Form:** This form is used to add a new employee to the database. The DB will auto increment and auto assign employee IDs to new employees. An employee ID is required to make a sale.
- **Sell a Vehicle Form:** This is a set of forms used to make a sale. The flow is as follows: the first page prompts the employee to enter a customer drivers license number, if the customer exists in the system it moves on the the next page, if not it first redirects to adding a new customer form. The second page prompts about the vehicle to be sold, it shows a list of all the cars on the lot and requests the employee to provide the corresponding VIN. The last page deals with the information about the sale, price, financing, warranty, etc.

### Reports

- **Lookup Vehicle Report:** This report is used to show the employee information about vehicles. The first page has a couple search fields, these fields are: make, model, and year. There are also two options: vehicles on lot, vehicle sold. Vehicle sold option also has a checkmark to look up cars under warranty only. If the employee leaves all the fields blank then it will return all vehicles on the lot or sold. The employee can narrow down the search by adding information in the search fields as needed.

- **Lookup Customer Report:** This report is used to show information about the customers in the system. As with vehicle lookup, it offers a few search options including customers who have bought a vehicle before and ones who have never bought a vehicle from Westside Autos.
- **Lookup Sale Report:** This report provides information about vehicles sold. The user can search sales by Employee ID as well as by a date range to narrow the search. If the dates fields are left blank then it will search all vehicles sold until the search date (current date of search).

Some examples of these reports can be found in the appendix section under figures 2.1 and 2.2.

## Stage 4- Query Design

See below a list of ten queries pulled from our project files, note that there are many more queries in the project files. Also note that we showed queries using actual data for simplicity.

```
INSERT INTO purchased (date_of_purchase, seller, isAuction, location)
VALUES ("2018-01-01", "Honda", 0, "Lethbridge")
```

-This query is used to insert a new purchase of a vehicle into the purchased table.

```
INSERT INTO vehicle (VIN, make, model, trim, year, color, current_condition, km, style,
interior_color, book_price, price)
VALUES ("DSW32234FD3G42C56", "BMW", "M3", "GTX", 2006, "Black", "Good", 120000,
"Convertible", "Black", "35000", "38400")
```

-This query is used to insert a new vehicle inside the vehicle table.

```
SELECT cost
FROM warranty
WHERE warranty_name = "WestSide Auto Exterior"
```

```
SELECT cost
FROM warranty
WHERE warranty_name = "Gold Package"
```

-These two queries are used when a customer is choosing a warranty package, it is used to identify which package is chosen in order to add it to a sell.

```
SELECT drivers_license_no, first_name, last_name
FROM customer
WHERE drivers_license_no = "279081-013"
```

-This query is used to return the buyers name and driver's license number to be used in future forms when making a sell.

```
SELECT vin, make, model, year, price
FROM Vehicle
WHERE vin = "124VNJDM34MXS32"
```

-This query is used to return the car being purchased by the customer to be used in future forms when making a sell.

```
SELECT *
FROM vehicle
WHERE vin not in (SELECT vin
                  FROM r_vehicleSold)
```

-This query is used to return all attributes of a vehicle. It searches for all vehicles on the lot.

```
SELECT *
FROM vehicle
WHERE vin in (SELECT vin
              FROM r_vehicleSold)
```

-This query is used to return all attributes of a vehicle. It searches for all vehicles sold and no longer on the lot.

```
SELECT *
FROM vehicle
WHERE make = "Audi" AND
model = "RS5" AND
year = "2018" AND
vin in (SELECT vin FROM r_vehicleSold) AND
vin in (SELECT vin FROM r_vehicleunderwarranty)
```

-This query is a specific search for a vehicle. A query like this is used inside the vehicle lookup with specific fields entered.

```
SELECT employee.empid, employee.first_name, employee.last_name, invoice.invoice_no,
invoice.date_purchased, invoice.price_sold
FROM invoice, r_soldBy, employee
WHERE (date_purchased between "2017-01-01" and "2018-03-20") and
(invoice.invoice_no = r_soldBy.invoice_no) and (r_soldBy.empid = employee.empid)and
employee.empid = 1
```

-This query is used to search sales based on a specific date range and employee id.

```
SELECT *  
FROM customer  
WHERE last_name = "Cote" and drivers_license_no in (SELECT drivers_license_no FROM  
r_soldTo)
```

-This query used to search a specific customer.

## Linking the Database Using PHP

With the main concept of the website complete and the database implemented according to the ER Diagram we were able to connect the website to the database. This stage was the most difficult to complete and required the largest time commitment. None of us had any experience with PHP before this point so a lot of this stage was learning PHP. This led to a great learning experience. Every time that we made an error with PHP our website would display a blank page, making it hard to debug. The main problem that we experienced was with subtly misspelled words. With some troubleshooting to address these PHP errors we managed to hook up the website to our database and it behaved as we expected.

## Project Reflection

### What We Have Gained from This Project

The process of developing a project from inception to the creation of a functional database system has taught us a great deal about frontend and backend development. Generating an ER Diagram from scratch was immensely beneficial to help visualize the structure of a database system. Using the project description to develop the tables and their relationships was a beneficial learning process. This project gave us exposure to multiple tools such as PHP, PHPMyAdmin, and Apache. None of us had previous experience working with PHP before this project. New knowledge of how to use it will be helpful in future database or web-based projects. An indirect benefit of this project was we became more familiar with HTML from the expertise that Vincent brought to this project.

### What We Could Improve on in the Future

Completing a database project from start to finish showed us some serious flaws in our initial development process that cost us a lot of time in the long term. When we initially designed our ER Diagram we didn't fully understand what the finished product was going to look like. We had

to go back and make additional forms that we didn't fully account for in the ER Diagram. In developing the ER Diagram we decided that if anything was missing we could go back later and add it. Although this seemed like an effective strategy, it cost us time having to switch between database management and PHP implementation. It was ineffective to constantly make updates to the database while designing the website. This will be something that we will account for in later projects. One of the biggest challenges we encountered was not having a representative from the company to consult with regarding their actual business practices. We had to make some assumptions and it left us with unanswered questions. Given these uncertainties we decided to not implement some aspects of the project, such as employee commissions and financing. Our system is developed to a point where after consultation with a company representative we could add their remaining requirements quite easily to complete the project.

## Appendix

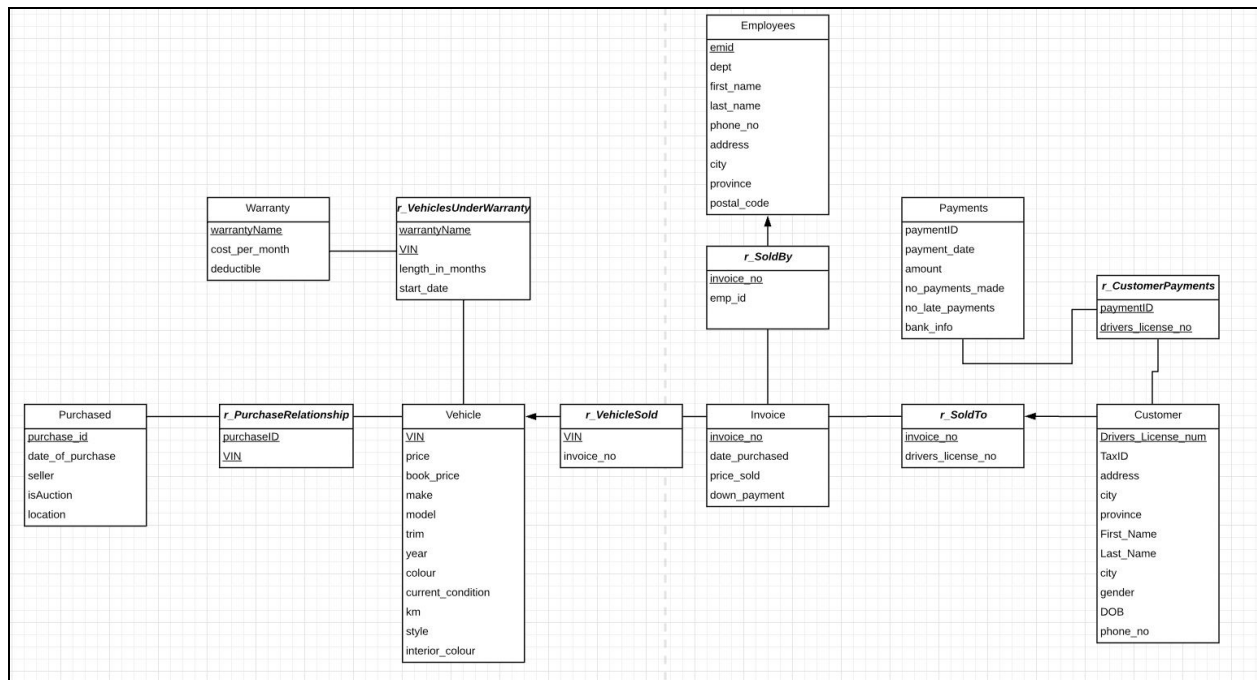


Figure 1.0

Westside Autos

Lookup Vehicles

Make

Enter make of the vehicle

Model

Enter model of the vehicle

Year

Enter year of the vehicle

☒ Vehicles on lot

☐ Vehicles sold

☐ With warranty

Search

Reset

\*leave fields blank for all vehicle

Figure 2.1

Westside Autos

Lookup Vehicles

<b>Make:</b> BMW <b>KM's:</b> 12000	<b>Model:</b> M3 <b>Style:</b> Coupe	<b>Year:</b> 2006 <b>Interior:</b> Black	<b>Trim:</b> SS <b>Price:</b> \$0	<b>Colour:</b> White <b>VIN:</b> 109283FD31SC	<b>Condition:</b> Excellent
<b>Make:</b> Subaru <b>KM's:</b> 120000	<b>Model:</b> WRX <b>Style:</b> Coupe	<b>Year:</b> 2006 <b>Interior:</b> Black	<b>Trim:</b> STI <b>Price:</b> \$24000	<b>Colour:</b> Blue <b>VIN:</b> 123124342324	<b>Condition:</b> Good
<b>Make:</b> Audi <b>KM's:</b> 1200	<b>Model:</b> RS5 <b>Style:</b> Coupe	<b>Year:</b> 2018 <b>Interior:</b> Black	<b>Trim:</b> R <b>Price:</b> \$90000	<b>Colour:</b> Gun Metal <b>VIN:</b> 124VNJDM34MXS32	<b>Condition:</b> Excellent
<b>Make:</b> Porsche <b>KM's:</b> 10	<b>Model:</b> Carrera 911 <b>Style:</b> Coupe	<b>Year:</b> 2018 <b>Interior:</b> Black	<b>Trim:</b> S4 <b>Price:</b> \$174000	<b>Colour:</b> Black <b>VIN:</b> 234HJN87NH7H21	<b>Condition:</b> Excellent
<b>Make:</b> Cadillac <b>KM's:</b> 320000	<b>Model:</b> Escalade <b>Style:</b> SUV	<b>Year:</b> 2003 <b>Interior:</b> Beige	<b>Trim:</b> XT <b>Price:</b> \$1200	<b>Colour:</b> Gold <b>VIN:</b> 23FDC3123VD3D4	<b>Condition:</b> Poor
<b>Make:</b> Hyundai <b>KM's:</b> 100912	<b>Model:</b> Elantra <b>Style:</b> Sedan	<b>Year:</b> 2012 <b>Interior:</b> Black	<b>Trim:</b> None <b>Price:</b> \$9800	<b>Colour:</b> Red <b>VIN:</b> 85FG3W6Y89CA9023B	<b>Condition:</b> Great

Figure 2.2