AMP Automotive Group

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Abstract

A car dealership is an entity that requires a robust search function for the vehicles themselves. Searches are regularly performed by customers with a whole range of desirable attributes. This database will track services performed on each vehicle, as well as sales of the vehicles. To support those functions, information on warranties and the banks that finance those sales will be maintained as well.

Mission Statement

Mission Statement: The purpose of the ARP Automotive Group database is to maintain the data that is used and generated to support vehicle sales and service at our multiple locations in Houston and surrounding areas.

Mission Objectives

To maintain (enter, update, delete) data on Locations
To maintain (enter, update, delete) data on Staff
To maintain (enter, update, delete) data on Customers
To maintain (enter, update, delete) data on Vehicles
To maintain (enter, update, delete) data on Services
To maintain (enter, update, delete) data on Service Codes
To maintain (enter, update, delete) data on Sale Transactions
To maintain (enter, update, delete) data on Banks
To maintain (enter, update, delete) data on Warranties

To perform searches on Locations
To perform searches on Staff
To perform searches on Customers
To perform searches on Vehicles
To perform searches on Services
To perform searches on Service Codes
To perform searches on Sale Transactions
To perform searches on Banks
To perform searches on Warranties

To report on Locations
To report on Staff
To report on Customers
To report on Vehicles
To report on Services
To report on Service Codes
To report on Sale Transactions
To report on Banks
To report on Warranties

Major User Views					
		GM	Dept Mgr	Staff	Customer
Location	Maintain	x			
	Query	x	x	x	
	Report	x			
Staff	Maintain		x		
	Query	x	x		
	Report	x	x		
Customer	Maintain		x	x	x
	Query	x	x	x	
	Report	x	x		
Vehicle	Maintain		x	x	
	Query	x	x	x	x
	Report	x	x	x	x
Service	Maintain		x	x	
	Query	x	x	x	
	Report	x	x	x	
ServiceCode	Maintain		x		
	Query	x	x	x	
	Report	x	x	x	
Sale Transaction	Maintain		x	x	
	Query	x	x		
	Report	x	x		
Warranty	Maintain		x		
	Query	x	x	x	
	Report	x	x	x	
Bank	Maintain		x		
	Query	x	x	x	
	Report	x	x	x	

USE CASES

Actors

- General Manager
- Department Manager
- Staff
- Customer

1 Entering new STAFF
Actor/User: Dept Manager
Steps:

User clicks "New Staff" button
New Staff ID is auto generated and displayed
Prompt user to enter the following:
- Last Name
- First Name
- Address
- Phone
- Location

Display information for confirmation
User clicks "Confirm" button

SQL

```
INSERT into Staff( LastName, FirstName, Address, Phone, Location, Department, Job Title)
VALUES ('Smith',' Mike', '3 Park Avenue Houston 77001', 8322434233, 'Main', 'Operations, 'Manager');
```

2 Modifying STAFF
Actor/User: Dept Manager
Steps:

User clicks "Modify Staff" button
Prompt user to enter Staff ID or Last Name
DB search using user entered search criteria
Display Staff that match search criteria
Prompt user to choose the correct employee
User clicks the correct employee
Display staff record for selected employee.
User clicks "Edit" button
User modifies necessary attribute
User clicks "Save" button

SQL

```
UPDATE Staff
SET JobTitle = 'Manager'
WHERE StaffID = 1;
```

3 **Deleting STAFF:**

Actor/User: Dept Manager

Steps:

```
User clicks "Delete Staff" button
Prompt user to enter Staff ID
Display record for selected employee.
Prompt to user: "Do you want to delete this Staff record?"
IF
    User clicks "Confirm" button
THEN
    Prompt to user: "Are you sure you want to delete this Staff record?"
    User clicks "Confirm" button
ELSE
    User clicks "Cancel" button
```

SQL

```
DELETE from Staff WHERE Staff ID = 1;
```

4 **Searching STAFF:**

Actor/User: General Manager/Dept Manager

Steps:

```
User clicks "Search Staff" button
Prompt user to enter search criteria
Display new view
```

SQL

```
SELECT LastName, FirstName, Email
FROM Staff
WHERE Job Title = 'Manager';
```

5 **Entering new LOCATION**

Actor/User: General Manager

Steps:

```
User clicks "New Location" button
New Location ID is auto generated and displayed
Prompt user to enter the following:
    Location Name
    Phone
    Address
    Manager
Display information for confirmation
User clicks "Confirm" button
```

SQL

```
INSERT into Location (Location Name, Phone, Address, Manager)
VALUES ('MAIN', 7135551000, '100 Main Street Houston 77001', 1);
```

6 **Modifying LOCATION**

Actor/User: General Manager

Steps:

```
User clicks "Modify Location" button
Prompt user to enter Location ID
Display record for selected Location.
User clicks "Edit" button
User modifies necessary attribute
User clicks "Save" button
```

SQL

```
UPDATE Location
SET Manager = 2
WHERE LocationID = 1;
```

7 Deleting LOCATION
Actor/User: General Manager
Steps:

```
User clicks "Delete Location" button
Prompt user to enter Location ID
Display record for selected Location
Prompt to user: "Do you want to delete this Location record?"
IF
    User clicks "Confirm" button
THEN
    Prompt to user: "Are you sure you want to delete this Location record?"
    User clicks "Confirm" button
ELSE
    User clicks "Cancel" button
```

SQL

```
DELETE from Location WHERE LocationID = 1;
```

8 Searching LOCATION:
Actor/User: General Manager/Dept Manager/Staff
Steps:

```
User clicks "Search Locations" button
Prompt user to enter search criteria
Display new view
```

SQL

```
SELECT LocName, Address, Phone, Manager
FROM Location
WHERE city != 'Houston'
```

9 Entering new BANK
Actor/User: Dept Manager
Steps:

```
User clicks "New Bank" button
New BankNumber is auto generated and displayed
Prompt user to enter the following:
    Bank Name
    Email
    Phone
Display information for confirmation
User clicks "Confirm" button
```

SQL

```
INSERT into Bank(BankName, Email, Phone)
VALUES ('Bank of Banking', 'admin@bank.com', 8885551212) ;
```

10 Modifying BANK
Actor/User: Dept Manager
Steps:

```
User clicks "Modify Bank" button
Prompt user to enter Bank Number
Display record for selected Bank
User clicks "Edit" button
User modifies necessary attribute
User clicks "Save" button
```

SQL

```
UPDATE Bank
SET Email = jsmith@bank.com
WHERE BankCode = 1;
```

11 **Deleting BANK**
Actor/User:Dept Manager
Steps:

```
User clicks "Delete Bank" button
Prompt user to enter BankNumber
Display record for selected Bank.
Prompt to user: "Do you want to delete this Bankrecord?"
IF
User clicks "Confirm" button
THEN
Prompt to user: "Are you sure you want to delete this Bankrecord?"
User clicks "Confirm" button
ELSE
User clicks "Cancel" button
```

SQL

```
DELETE from Bank WHERE BankCode = 7;
```

12 **Searching BANK**
Actor/User: Genera Manager/Dept Manager/Staff
Steps:

```
User clicks "Search Banks" button
Prompt user to enter search criteria
Display new view
```

SQL

```
SELECT BankName, Email, Phone
FROM Bank;
```

13 **Entering new VEHICLE**
Actor/User: Dept Manager/Staff
Steps:

```
User clicks "New Vehicle" button
New Stock Number is auto generated and displayed
Prompt user to enter the following:
    Year
    Make
    Model
    Color
    Mileage
    Price
    Location
    VIN
    New/Used
Display information for confirmation
User clicks "Confirm" button
```

SQL

```
INSERT into Vehicle( Year, Make, Model, Color, Mileage, Price, Location, VIN, New/Used)
VALUES(2022, 'Honda', 'Odyssey', 'Maroon', 51000, 31999, 'MAIN',  '59JALB45IT987', 'New');
```

14 Modifying VEHICLE

Actor/User: Dept Manager/Staff

Steps:

```
User clicks "Modify Vehicle" button
Prompt user to enter Stock Number
Display record for selected vehicle
User clicks "Edit" button
User modifies necessary attribute
User clicks "Save" button
```

SQL

```
UPDATE Vehicle
SET Price = 30999
WHERE StockNum = 124521;
```

15 Deleting VEHICLE

Actor/User: Dept Manager/Staff

Steps:

```
User clicks "Delete Vehicle" button
Prompt user to enter Stock Number
Display record for selected vehicle.
Prompt to user: "Do you want to delete this Vehicle?"
IF
    User clicks "Confirm" button
THEN
    Prompt to user: "Are you sure you want to delete this Vehicle?"
    User clicks "Confirm" button
ELSE
    User clicks "Cancel" button
```

SQL

```
DELETE from Vehicle WHERE StockNum = 124521;
```

16 Searching VEHICLE

Actor/User: General Manager/Dept Manager/Staff/Customer

Steps:

```
User clicks "Search Vehicles" button
Prompt user to enter search criteria
Display new view
```

SQL

```
SELECT Year, Make, Model, Mileage, Price, New/Used
FROM Vehicles
WHERE Price < 22000;
```

17 Entering new SERVICE

Actor/User: Dept Manager/Staff

Steps:

```
User clicks "New Service Record" button
SvcDate is auto-generated
Prompt user to enter the following:
    Stock Number
    Service Code
    Customer ID
    Technician
Display information for confirmation
User clicks "Confirm" button
```

SQL

```
INSERT into Service( StockNum, SvcCode, CustID, EmpNum)
VALUES(124564, 105, 16, 4);
```

18 Modifying SERVICE

Actor/User: Dept Manager/Staff

Steps:

```
User clicks "Modify Service Record"  button
Prompt user to enter Invoice Number
Display selected invoice
User clicks "Edit" button
User modifies necessary attribute
User clicks "Save" button
```

SQL

```
UPDATE Service
SET EmpNum = 6
WHERE StockNum = 124564 AND SvcCode = 105;
```

19 Deleting SERVICE

Actor/User: Dept Manager

Steps:

```
User clicks "Delete Service Record" button
Prompt user to enter Invoice Number
Display selected invoice
Prompt to user: "Do you want to delete this Invoice?"
IF
    User clicks "Confirm" button
THEN
    Prompt to user: "Are you sure you want to delete this Invoice?"
    User clicks "Confirm" button
ELSE
    User clicks "Cancel" button
```

SQL

```
DELETE from Service WHERE StockNum = 124564 AND SvcCode = 105;
```

20 Searching SERVICE

Actor/User: General Manager/Dept Manager/Staff

Steps:

```
User clicks "Search Service Records" button
Prompt user to enter search criteria
Display new view
```

SQL

```
SELECT SvcDate, CustNum,
FROM Service
WHERE Tech = 10;
```

21 Entering new SERVICE CODE

Actor/User: Dept Manager

Steps:

```
User clicks "New Service Code" button
New Service Code is auto generated and displayed
Prompt user to enter the following:
    Service Description
    List Price
Display information for confirmation
User clicks "Confirm" button
```

SQL

```
INSERT into Service Code(SvcDesc, Price )
VALUES('Oil Change', 49.95)
```

22 Modifying SERVICE CODE

Actor/User: Dept Manager

Steps:

```
User clicks "Modify Service Code" button
Prompt user to enter Service Code
Display record for selected Service Code
User clicks "Edit" button
User modifies necessary attribute
User clicks "Save" button
```

SQL

```
UPDATE ServiceCode
SET Price = 59.95
WHERE SvcCode = 101;
```

23 Deleting SERVICE CODE

Actor/User: Dept Manager

Steps:

```
User clicks "Delete Service Code" button
Prompt user to enter Service Code
Display record for selected Service Code
Prompt to user: "Do you want to delete this Service Code record?"
IF
    User clicks "Confirm" button
THEN
    Prompt to user: "Are you sure you want to delete this Service Code record?"
    User clicks "Confirm" button
ELSE
    User clicks "Cancel" button
```

SQL

```
DELETE from ServiceCode WHERE SvcCode = 108;
```

24 Searching SERVICE CODE

Actor/User: General Manager/Dept Manager/Staff

Steps:

```
User clicks "Search Service Codes" button
Prompt user to enter search criteria
Display new view
```

SQL

```
SELECT SvcCode, SvcDescription, Price
FROM SvcCode;
```

25 Entering new SALES TRANSACTION

Actor/User: Dept Manager/Staff

Steps:

```
User clicks "New Transaction" button
New Transaction ID and Transaction Date are auto generated and displayed
Prompt user to enter the following:
    Stock Number
    Customer ID
    Sale Price
    Salesperson
    Bank
    Warranty
Display information for confirmation
User clicks "Confirm" button
```

SQL

```
INSERT into SaleTrans (StockNum, CustID, SalePrice, Salesperson, BankID, WarrID)
VALUES( 111234, 5678, 35000, 2, 601, 801) ;
```

26 Modifying SALES TRANSACTION

Actor/User: Dept Manager/Staff

Steps:

```
User clicks "Modify Transaction" button
Prompt user to enter Transaction ID
Display record for selected Transaction.
User clicks "Edit" button
User modifies necessary attribute
User clicks "Save" button
```

SQL

```
UPDATE SaleTrans
SET SalePrice = 34500
WHERE TransID = 2424756;
```

27 Deleting SALES TRANSACTION

Actor/User: Dept Manager

Steps:

```
User clicks "Delete Transaction" button
Prompt user to enter Transaction Number
Display staff record for selected Transaction.
Prompt to user: "Do you want to delete this Transaction record?"
IF
    User clicks "Confirm" button
THEN
    Prompt to user: "Are you sure you want to delete this Transaction record?"
    User clicks "Confirm" button
ELSE
    User clicks "Cancel" button
```

SQL

```
DELETE from SaleTrans WHERE TransID = 2424756;
```

28 Searching SALES TRANSACTION

Actor/User: General Manager/Dept Manager

Steps:

```
User clicks "Search Customers" button
Prompt user to enter search criteria
Display new view
```

SQL

```
SELECT TransID
FROM SaleTrans
WHERE Price >= 30000;
```

29 Entering new CUSTOMER

Actor/User: Dept Manager/Staff/Customer

Steps:

```
User clicks "New Customer" button
New Customer ID is auto generated and displayed
Prompt user to enter the following:
    Last Name
    First Name
    Phone
    Email
    Salesperson
Display information for confirmation
User clicks "Confirm" button
```

SQL

```
INSERT into Customer (LastName, FirstName, Phone, Email, Salesperson)
VALUES(Harris, Emily, 2814482555, 3) ;
```

30 Modifying CUSTOMER

Actor/User: Dept Manager/Staff/Customer

Steps:

```
User clicks "Modify Customer" button
Prompt user to enter Customer ID
Display record for selected Customer
User clicks "Edit" button
User modifies necessary attribute(s)
User clicks "Save" button
```

SQL

```
UPDATE Customer
SET EmpID = 6
WHERE Customer = 23;
```

31 Deleting CUSTOMER

Actor/User: Dept Manager/Staff

Steps:

```
User clicks "Delete Customer" button
Prompt user to enter Customer ID
Display record for selected Customer
Prompt to user: "Do you want to delete this Customer record?"
IF
    User clicks "Confirm" button
THEN
    Prompt to user: "Are you sure you want to delete this Customer record?"
    User clicks "Confirm" button
ELSE
    User clicks "Cancel" button
```

SQL

```
DELETE from Customer WHERE CustID = 23;
```

32 Searching CUSTOMER

Actor/User: General Manager/Dept Manager/Staff

Steps:

```
User clicks "Search Customers" button
Prompt user to enter search criteria
Display new view
```

SQL

```
SELECT *
FROM Customer
WHERE city = 'Houston';
```

33 Entering new WARRANTY

Actor/User: Dept Manager

Steps:

```
User clicks "New Warranty" button
New Warranty Code is auto-generated and displayed
Prompt user to enter the following:
    Warranty Type
    Term
    Price
Display information for confirmation
User clicks "Confirm" button
```

SQL

```
INSERT into Warranty (WarrType, Term, Price)
VALUES (Basic, 12, 1000) ;
```

34 Modifying WARRANTY
Actor/User: Dept Manager
Steps:

User clicks "Modify Warranty" button
Prompt user to enter WarrantyCode
Display record for selected Warranty
User clicks "Edit" button
User modifies necessary attribute(s)
User clicks "Save" button

SQL

```
UPDATE Warranty
SET Price = 1500
WHERE WarrID = 804;
```

35 Deleting WARRANTY
Actor/User: Dept Manager
Steps:

```
User clicks "Delete Warranty" button
Prompt user to enter WarrantyCode
Display record for selected Warranty
Prompt to user: "Do you want to delete this Warranty?"
IF
User clicks "Confirm" button
THEN
Prompt to user: "Are you sure you want to delete this Warranty?"
User clicks "Confirm" button
ELSE
User clicks "Cancel" button
```

SQL

```
DELETE from Warranty WHERE WarrID = 803;
```

36 Searching WARRANTY
Actor/User: General Manager/Dept Manager/Staff
Steps:

User clicks "Search Warranties" button
Prompt user to enter search criteria
Display new view

SQL

```
SELECT WarrID
FROM Warranty
WHERE Price >= 3000;
```

37 View Transactions by Customer
Actor/User: General Manager/Dept Manager/Staff
Steps:

SQL

```
SELECT
    c.LastName,
    c.FirstName,
    t.StockNum,
    t.SalePrice
FROM Transaction t
JOIN Customer c
ON c.CustID = t.Customer
ORDER BY c.LastName;
```

38 **View Transactions by Salesperson**
Actor/User: General Manager/Dept Manager/Staff
Steps:

SQL

```
SELECT
      s.LastName,
      s.FirstName,
      t.SalePrice
      t.WarrID
FROM Transaction t
JOIN Staff s
ON t.Salesperson = s.EmpID
ORDER BY s.LastName;
```

39 **View Service by Technician**
Actor/User: General Manager/Dept Manager/Staff
Steps:

SQL

```
SELECT
      s.LastName,
      s.FirstName,
      v.SvcCode
FROM Service v
JOIN Staff s
ON v.Technician =  s.EmpID
ORDER BY s.LastName;
```

40 **View Service by Vehicle Year**
Actor/User: General Manager/Dept Manager/Staff
Steps:

SQL

```
SELECT
      s.InvoiceNum
      s.SvcCode
      v.Make
      v.Model
      v.Year
FROM Vehicle v
JOIN Service s
ON v.StockNum =  s.StockNum
ORDER BY v.Year;
```

41 **View Vehicles by Location**
Actor/User: General Manager/Dept Manager/Staff
Steps:

SQL

```
SELECT
      l.LocID,
      l.LocName,
      v.StockNum
      v.Price
FROM Vehicle v
JOIN Location l
ON v.Location =  l.LocID
ORDER BY l.LocID;
```

42 **View Transactions by Warranty**
Actor/User: General Manager/Dept Manager/Staff
Steps:

SQL

```
SELECT
       t.TransID,
       t.Price,
       w.WarrID,
       w.WarrType,
       w.Price,
FROM Transaction t
JOIN Warranty w
ON t.Warranty = w.WarrID
ORDER BY s.LastName;
```

43 **View Transactions by Bank**
Actor/User: General Manager/Dept Manager/Staff
Steps:

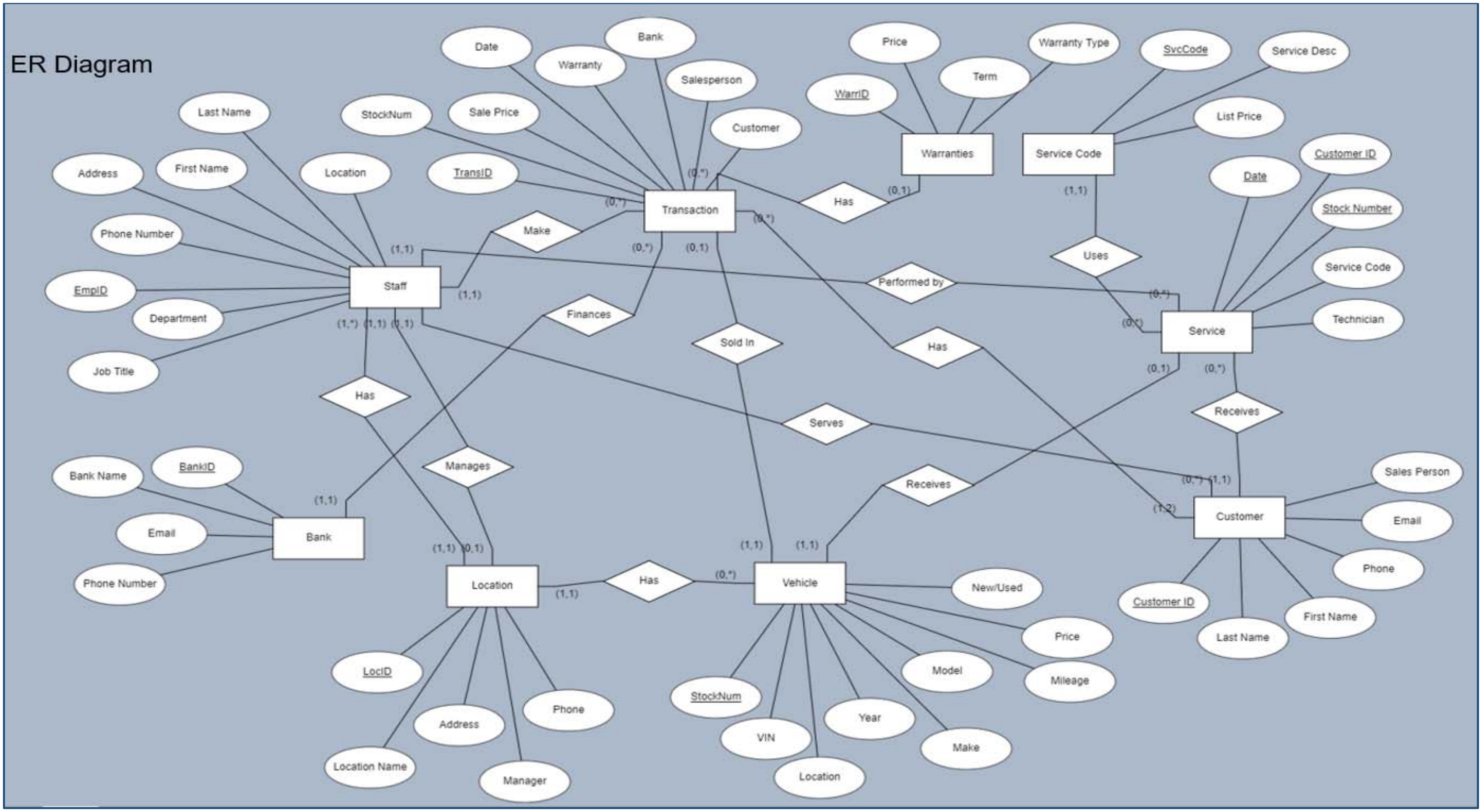
SQL

```
SELECT
       b.BankID,
       b.BankName,
       t.SalePrice,
FROM Transaction t
JOIN Bank b
ON  b.BankID =  t.Bank
ORDER BY b.BankName;
```

44 **View Service by Service Code**
Actor/User: General Manager/Dept Manager/Staff
Steps:

SQL

```
SELECT
       s.SvcDate
       s.SvcCode
       v.Price
FROM Service s
JOIN ServiceCode v
ON  s.SvcCode =  v.SvcCode
ORDER BY v.SvcCode;
```


ER Diagram
Date
Warranty
Bank
Salesperson
Customer
StockNum
Sale Price
TransID
Transaction
(0,*)
(0,*)
(0,*)
(0,1)
(0,*)
Price
Term
Warranty Type
WarrID
Warranties
Has
(0,1)
SvcCode
Service Desc
List Price
Service Code
(1,1)
Uses
Customer ID
Date
Stock Number
Service Code
Technician
Service
(0,*)
(0,*)
(0,1)
(0,*)
Receives
Last Name
First Name
Address
Location
Phone Number
EmpID
Department
Job Title
Staff
(1,1)
(1,1)
(1,*)
(1,1)
(1,1)
Make
Finances
Performed by
Sold In
Has
Has
Serves
Manages
Receives
Bank Name
BankID
Email
Phone Number
Bank
(1,1)
(1,1)
(0,1)
Location
Has
(1,1)
(0,*)
(1,1)
(1,1)
Vehicle
LocID
Address
Phone
Location Name
Manager
StockNum
VIN
Location
Year
Make
Model
Price
Mileage
New/Used
(0,*)
(1,1)
(1,2)
Customer
Sales Person
Email
Phone
First Name
Last Name
Customer ID

RELATIONAL MODELS AND NORMALIZATION

SERVICE CODE

```
CREATE TABLE ServiceCode (
        SvcCode INT (3),
        SvcDesc VARCHAR (15),
        Price DOUBLE PRECISION (6,2),
        PRIMARY KEY (SvcCode)
);
```

The primary key is SvcCode.

Functional Dependency:

SvcCode -> SvcDesc

SvcCode -> Price

This table is 1NF because each cell only has one data from the attribute domain.

This table is 2NF because SvcDesc and Price both fully depend on the primary key.

This table is 3 NF because Price does not depend on SvcDesc and SvcDesc does not depend on Price, so there is no transitive dependency.

This table is BCNF because it is 3NF and the primary key is a super key.

WARRANTY

```
CREATE TABLE Warranty (
        WarrID INT (3),
        WarrType VARCHAR (15),
        Term INT (2),
        Price INT (5),
        PRIMARY KEY (WarrID)
);
```

The primary key is WarrID.

Functional Dependency:

WarrID -> WarrType

WarrID -> Term

WarrID -> Price

This table is 1NF because each cell only has one data from the attribute domain.

This table is 2NF because WarrType, Term and Price all fully depend on the primary key.

This table is 3 NF because WarrType, Term and Price depend only on the primary key therefore there is no transitive dependency.

This table is BCNF because it is 3NF and the primary key is a super key.

RELATIONAL MODELS AND NORMALIZATION

BANK

```
CREATE TABLE Bank (
        BankID INT(3),
        BankName VARCHAR (15),
        Email VARCHAR (25),
        Phone DOUBLE (10,0),
        PRIMARY KEY (BankID)
);
```

The primary key is BankID.

Functional Dependency:

BankID -> BankName

BankID -> Email

BankID -> Phone

This table is 1NF because each cell only has one data from the attribute domain.

This table is 2NF because BankName, Email and Phone all fully depend on the primary key.

This table is 3 NF because BankName, Email and Phone depend only on the primary key therefore there is no transitive dependency.

This table is BCNF because it is 3NF and the primary key is a super key.

LOCATION

```
CREATE TABLE Location (
        LocID INT (2),
        LocName VARCHAR (10),
        StreetAddress VARCHAR (20),
        City VARCHAR (12),
        State VARCHAR (2),
        Zip INT (5),
        Phone DOUBLE (10,0),
        Manager INT (3),
        PRIMARY KEY (LocID)
);
```

The primary key is LocID.

Functional Dependency:

LocID -> LocName

LocID -> Address

LocID -> Phone

LocID -> Manager

This table is 1NF because each cell only has one data from the attribute domain.

This table is 2NF because LocName, Address, Phone and Manager all fully depend on the primary key.

This table is 3 NF because LocName, Address, Phone and Manager depend only on the primary key therefore there is no transitive dependency.

RELATIONAL MODELS AND NORMALIZATION

VEHICLE

```
CREATE TABLE Vehicle (
          StockNum INT(6),
          ManufYear INT(4),
          Make VARCHAR(10),
          Model VARCHAR(10),
          Color VARCHAR(10),
          Mileage INT(6),
          Price INT(6),
          Location INT(2),
          VIN VARCHAR(17),
          New_Used VARCHAR(4),
          PRIMARY KEY (StockNum),
          FOREIGN KEY (Location) REFERENCES Location (LocID)
);
```

The primary key is StockNum.

Functional Dependency:

StockNum -> ManufYear

StockNum -> Make

StockNum -> Model

StockNum -> Mileage

StockNum -> Location

StockNum -> VIN

StockNum -> New_Used

This table is 1NF because each cell only has one data from the attribute domain.

This table is 2NF because ManufYear, Make, Model, Mileage, Location, VIN and New_Used all fully depend on the primary key.

This table is 3NF because ManufYear, Make, Model, Mileage, Location, VIN and New_Used depend only on the primary key therefore there is no transitive dependency.

This table is BCNF because it is 3NF and the primary key is a super key.

RELATIONAL MODELS AND NORMALIZATION

STAFF

```
CREATE TABLE Staff (
        EmpID INT (4),
        LastName VARCHAR (15),
        FirstName VARCHAR (15),
        StreetAddress VARCHAR (20),
        City VARCHAR (12),
        State VARCHAR (2),
        Zip INT (5),
        Phone DOUBLE (10),
        Location INT (2),
        Department VARCHAR (12),
        JobTitle VARCHAR (12),
        PRIMARY KEY (EmpID),
        FOREIGN KEY (Location) REFERENCES Location (LocID)
);
```

The primary key is EmpID.

Functional Dependency:

EmpID -> LastName

EmpID -> FirstName

EmpID -> Address

EmpID -> Phone

EmpID -> Location

EmpID -> JobTitle

This table is 1NF because each cell only has one data from the attribute domain.

This table is 2NF because all non-primary key attributes are fully depend on the primary key.

This table is 3 NF because all non-primary attributes depend only on the primary key therefore there is no transitive dependency.

This table is BCNF because it is 3NF and the primary key is a super key.

CUSTOMER

```
CREATE TABLE Customer (
        CustID INT (7),
        LastName VARCHAR (15),
        FirstName VARCHAR (10),
        Phone DOUBLE (10),
        Email VARCHAR (25),
        Salesperson INT (4),
        PRIMARY KEY (CustID),
        FOREIGN KEY (Salesperson) REFERENCES Staff (EmpID)
);
```

The primary key is CustID.

Functional Dependency:

CustID -> FirstName

CustID -> LastName

CustID -> Email

CustID -> Phone

This table is 1NF because each cell only has one data from the attribute domain.

This table is 2NF because FirstName, LastName, Email and Phone all fully depend on the primary key.

This table is 3 NF because FirstName, LastName, Email and Phone depend only on the primary key therefore there is no transitive dependency.

This table is BCNF because it is 3NF and the primary key is a super key.

RELATIONAL MODELS AND NORMALIZATION

SALE TRANSACTION

```
CREATE TABLE SaleTrans (
        TransID INT (9),
        TransDate DATE,
        StockNum INT (6),
        Customer INT (7),
        SalePrice DOUBLE PRECISION (8,2),
        Salesperson INT (4),
        Bank INT (3),
        Warranty INT (3),
        PRIMARY KEY (TransID),
        FOREIGN KEY (StockNum) REFERENCES Vehicle (StockNum),
        FOREIGN KEY (Customer) REFERENCES Customer (CustID),
        FOREIGN KEY (Salesperson) REFERENCES Staff (EmpID),
        FOREIGN KEY (Bank) REFERENCES Bank (BankID),
        FOREIGN KEY (Warranty) REFERENCES Warranty (WarrID)
);
```

The primary key is TransID.

Functional Dependency:

TransID -> TransDate
TransID -> StockNum
TransID -> Customer
TransID -> Salesperson
TransID -> Bank
TransID -> Warranty

This table is 1NF because each cell only has one data from the attribute domain.

This table is 2NF because all non-primary keys attributes are fully dependent on the primary key.

This table is 3 NF because all non-primary attributes depend only on the primary key therefore there is no transitive dependency.

This table is BCNF because it is 3NF and the primary key is a super key.

RELATIONAL MODELS AND NORMALIZATION

SERVICE RECORD

```
CREATE TABLE Service (
        SvcDate DATE,
        StockNum INT (6),
        ServiceCode INT (3),
        Customer INT (7),
        Technician INT (4),
        PRIMARY KEY (SvcDate, StockNum, ServiceCode),
        FOREIGN KEY (ServiceCode) REFERENCES ServiceCode (SvcCode),
        FOREIGN KEY (Customer) REFERENCES Customer (CustID),
        FOREIGN KEY (StockNum) REFERENCES Vehicle (StockNum),
        FOREIGN KEY (Technician) REFERENCES Staff (EmpID)
);
```

This table has a composite primary key of Date + StockNum + SvcCode.

Functional Dependency:

Date + StockNum + SvcCode -> Customer

Date + StockNum + SvcCode -> Technician

100101 in StockNum is associated with Customers 0 2, therefore Customer does not depend on StockNum.

100102 in StockNum is associated with Technicians 1003 and 1004, therefore Technician does not depend on StockNum.

105 in ServiceCode is associated with Customers 1 and 0, therefore Customer does not depend on ServiceCode.

105 in ServiceCode is associated with Technicians 1003 and 1004, therefore Technician does not depend on ServiceCode.

3-2-2020 in SvcDate is associated with Customers 1 and 3, therefore Customer does not depend on SvcCode.

3-a2-2020 in SvcDate is associated with Technicians 1003 and 1004, therefore Technician does not depend on ServiceCode.

This table is 2NF because Customer and Technician depend on the full primary key.

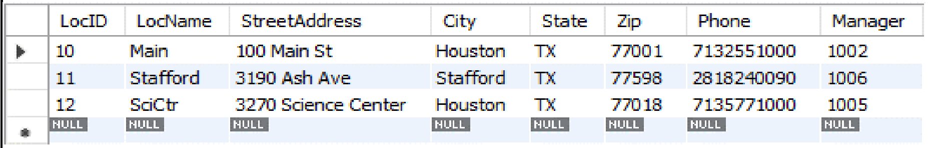
This table is 3NF because Customer and Technician depend only on the full primary key therefore there is no transitive dependency.

This table is BCNF because it is 3NF and the primary key of Date + StockNum + SvcCode is a super key.

TABLE DATA

AGGREGATE QUERIES

Location



	LocID	LocName	StreetAddress	City	State	Zip	Phone	Manager
▶	10	Main	100 Main St	Houston	TX	77001	7132551000	1002
	11	Stafford	3190 Ash Ave	Stafford	TX	77598	2818240090	1006
	12	SciCtr	3270 Science Center	Houston	TX	77018	7135771000	1005
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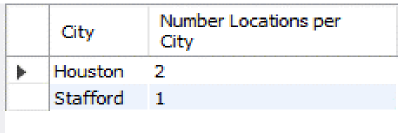
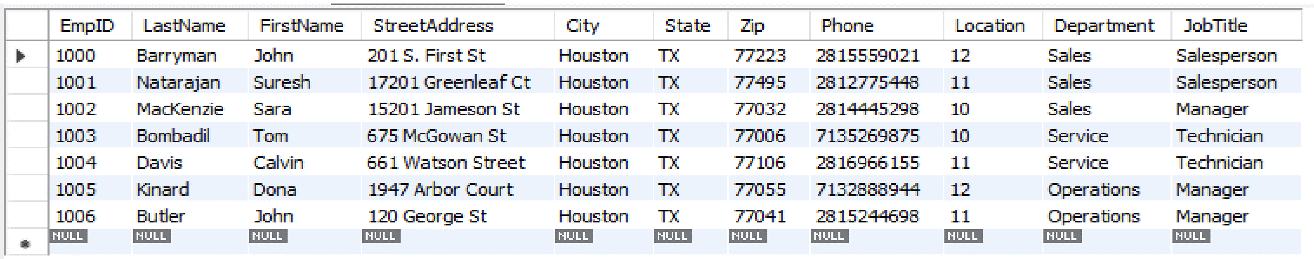
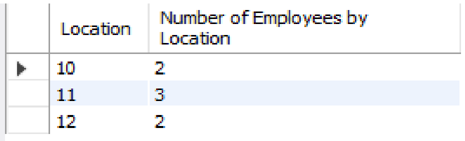


	City	Number Locations per City
▶	Houston	2
	Stafford	1

Staff

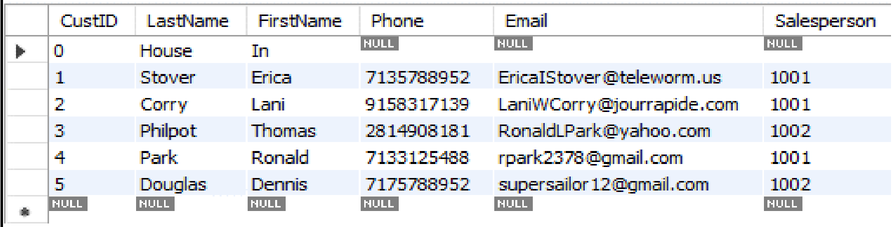


	EmpID	LastName	FirstName	StreetAddress	City	State	Zip	Phone	Location	Department	JobTitle
▶	1000	Barryman	John	201 S. First St	Houston	TX	77223	2815559021	12	Sales	Salesperson
	1001	Natarajan	Suresh	17201 Greenleaf Ct	Houston	TX	77495	2812775448	11	Sales	Salesperson
	1002	MacKenzie	Sara	15201 Jameson St	Houston	TX	77032	2814445298	10	Sales	Manager
	1003	Bombadil	Tom	675 McGowan St	Houston	TX	77006	7135269875	10	Service	Technician
	1004	Davis	Calvin	661 Watson Street	Houston	TX	77106	2816966155	11	Service	Technician
	1005	Kinard	Dona	1947 Arbor Court	Houston	TX	77055	7132888944	12	Operations	Manager
	1006	Butler	John	120 George St	Houston	TX	77041	2815244698	11	Operations	Manager
*	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL

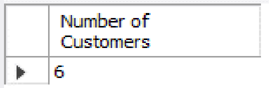


	Location	Number of Employees by Location
▶	10	2
	11	3
	12	2

Customer

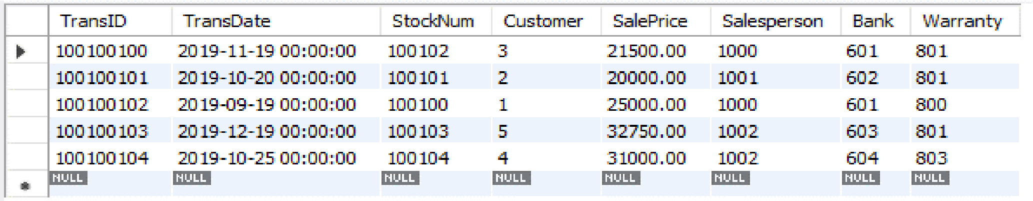


	CustID	LastName	FirstName	Phone	Email	Salesperson
▶	0	House	In	NULL	NULL	NULL
	1	Stover	Erica	7135788952	EricaIStover@teleworm.us	1001
	2	Corry	Lani	9158317139	LaniWCorry@jourrapide.com	1001
	3	Philpot	Thomas	2814908181	RonaldLPark@yahoo.com	1002
	4	Park	Ronald	7133125488	rpark2378@gmail.com	1001
	5	Douglas	Dennis	7175788952	supersailor12@gmail.com	1002
*	NULL	NULL	NULL	NULL	NULL	NULL

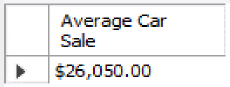


	Number of Customers
▶	6

SaleTrans



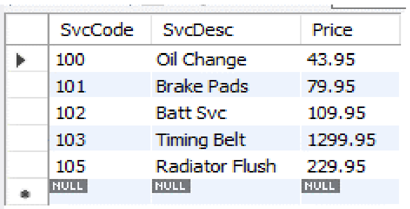
	TransID	TransDate	StockNum	Customer	SalePrice	Salesperson	Bank	Warranty
▶	100100100	2019-11-19 00:00:00	100102	3	21500.00	1000	601	801
	100100101	2019-10-20 00:00:00	100101	2	20000.00	1001	602	801
	100100102	2019-09-19 00:00:00	100100	1	25000.00	1000	601	800
	100100103	2019-12-19 00:00:00	100103	5	32750.00	1002	603	801
	100100104	2019-10-25 00:00:00	100104	4	31000.00	1002	604	803
*	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL



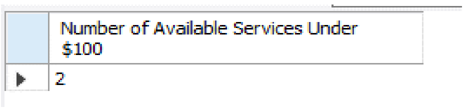
	Average Car Sale
▶	$26,050.00

TABLE DATA	AGGREGATE QUERIES

ServiceCode

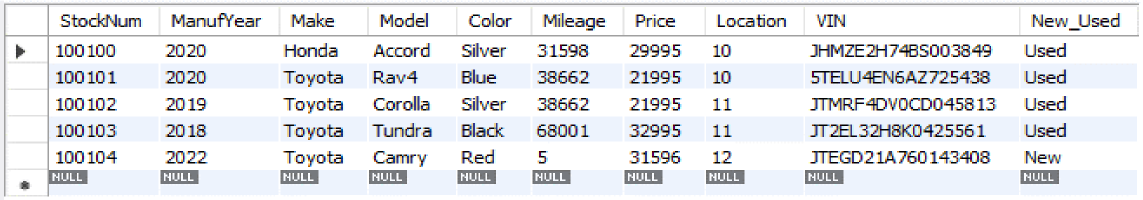


SvcCode	SvcDesc	Price
100	Oil Change	43.95
101	Brake Pads	79.95
102	Batt Svc	109.95
103	Timing Belt	1299.95
105	Radiator Flush	229.95
NULL	NULL	NULL

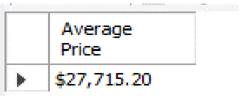


Number of Available Services Under $100
2

Vehicle

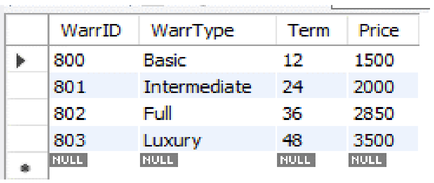


StockNum	ManufYear	Make	Model	Color	Mileage	Price	Location	VIN	New_Used
100100	2020	Honda	Accord	Silver	31598	29995	10	JHMZE2H74BS003849	Used
100101	2020	Toyota	Rav4	Blue	38662	21995	10	5TELU4EN6AZ725438	Used
100102	2019	Toyota	Corolla	Silver	38662	21995	11	JTMRF4DV0CD045813	Used
100103	2018	Toyota	Tundra	Black	68001	32995	11	JT2EL32H8K0425561	Used
100104	2022	Toyota	Camry	Red	5	31596	12	JTEGD21A760143408	New
NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL

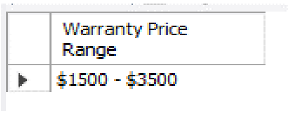


Average Price
$27,715.20

Warranty

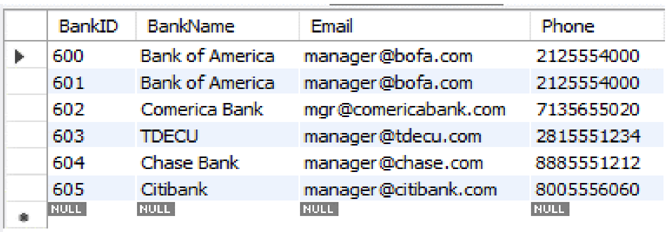


WarrID	WarrType	Term	Price
800	Basic	12	1500
801	Intermediate	24	2000
802	Full	36	2850
803	Luxury	48	3500
NULL	NULL	NULL	NULL

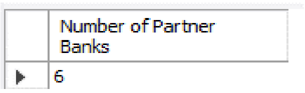


Warranty Price Range
$1500 - $3500

Bank

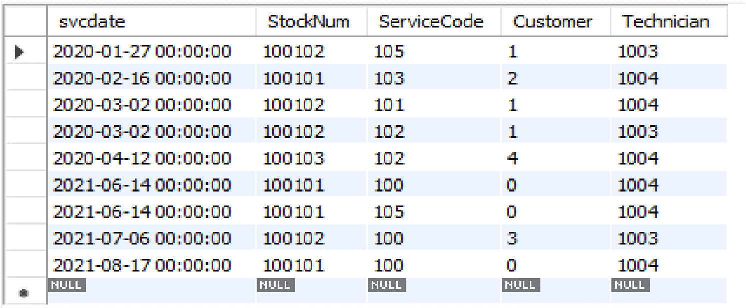


BankID	BankName	Email	Phone
600	Bank of America	manager@bofa.com	2125554000
601	Bank of America	manager@bofa.com	2125554000
602	Comerica Bank	mgr@comericabank.com	7135655020
603	TDECU	manager@tdecu.com	2815551234
604	Chase Bank	manager@chase.com	8885551212
605	Citibank	manager@citibank.com	8005556060
NULL	NULL	NULL	NULL

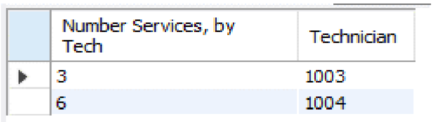


Number of Partner Banks
6

TABLE DATA	AGGREGATE QUERIES
Service	



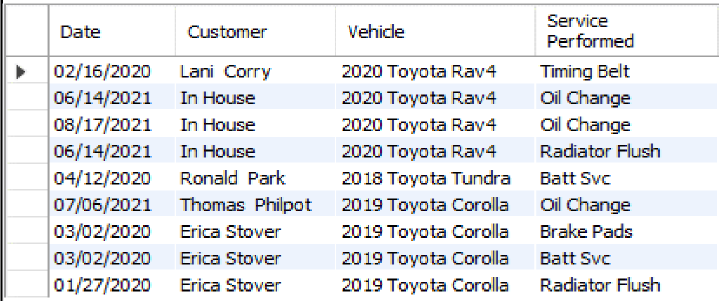
	svcdate	StockNum	ServiceCode	Customer	Technician
▶	2020-01-27 00:00:00	100102	105	1	1003
	2020-02-16 00:00:00	100101	103	2	1004
	2020-03-02 00:00:00	100102	101	1	1004
	2020-03-02 00:00:00	100102	102	1	1003
	2020-04-12 00:00:00	100103	102	4	1004
	2021-06-14 00:00:00	100101	100	0	1004
	2021-06-14 00:00:00	100101	105	0	1004
	2021-07-06 00:00:00	100102	100	3	1003
	2021-08-17 00:00:00	100101	100	0	1004
*	NULL	NULL	NULL	NULL	NULL



	Number Services, by Tech	Technician
▶	3	1003
	6	1004

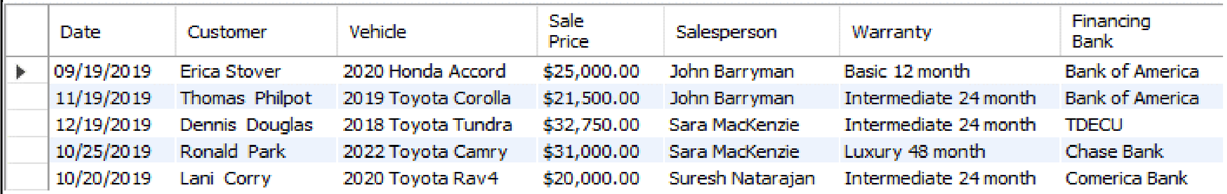
JOINT QUERIES

Service, Customer, Vehicle, ServiceCode



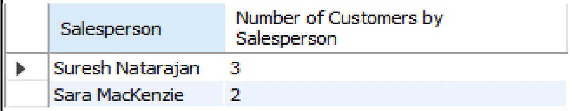
Date	Customer	Vehicle	Service Performed
02/16/2020	Lani Corry	2020 Toyota Rav4	Timing Belt
06/14/2021	In House	2020 Toyota Rav4	Oil Change
08/17/2021	In House	2020 Toyota Rav4	Oil Change
06/14/2021	In House	2020 Toyota Rav4	Radiator Flush
04/12/2020	Ronald Park	2018 Toyota Tundra	Batt Svc
07/06/2021	Thomas Philpot	2019 Toyota Corolla	Oil Change
03/02/2020	Erica Stover	2019 Toyota Corolla	Brake Pads
03/02/2020	Erica Stover	2019 Toyota Corolla	Batt Svc
01/27/2020	Erica Stover	2019 Toyota Corolla	Radiator Flush

SaleTrans, Customer, Vehicle, Staff, Waranty, Bank



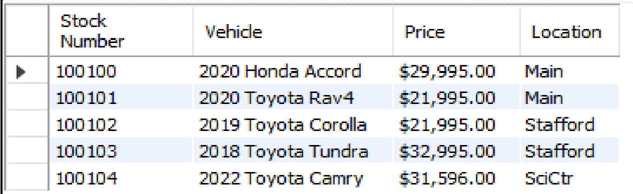
Date	Customer	Vehicle	Sale Price	Salesperson	Warranty	Financing Bank
09/19/2019	Erica Stover	2020 Honda Accord	$25,000.00	John Barryman	Basic 12 month	Bank of America
11/19/2019	Thomas Philpot	2019 Toyota Corolla	$21,500.00	John Barryman	Intermediate 24 month	Bank of America
12/19/2019	Dennis Douglas	2018 Toyota Tundra	$32,750.00	Sara MacKenzie	Intermediate 24 month	TDECU
10/25/2019	Ronald Park	2022 Toyota Camry	$31,000.00	Sara MacKenzie	Luxury 48 month	Chase Bank
10/20/2019	Lani Corry	2020 Toyota Rav4	$20,000.00	Suresh Natarajan	Intermediate 24 month	Comerica Bank

Customer, Staff



Salesperson	Number of Customers by Salesperson
Suresh Natarajan	3
Sara MacKenzie	2

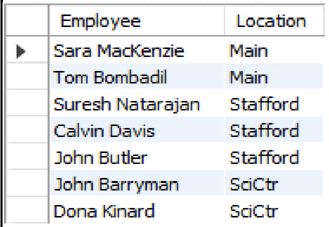
Vehicle, Location



Stock Number	Vehicle	Price	Location
100100	2020 Honda Accord	$29,995.00	Main
100101	2020 Toyota Rav4	$21,995.00	Main
100102	2019 Toyota Corolla	$21,995.00	Stafford
100103	2018 Toyota Tundra	$32,995.00	Stafford
100104	2022 Toyota Camry	$31,596.00	SciCtr

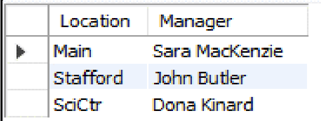
JOINT QUERIES

Staff, Location

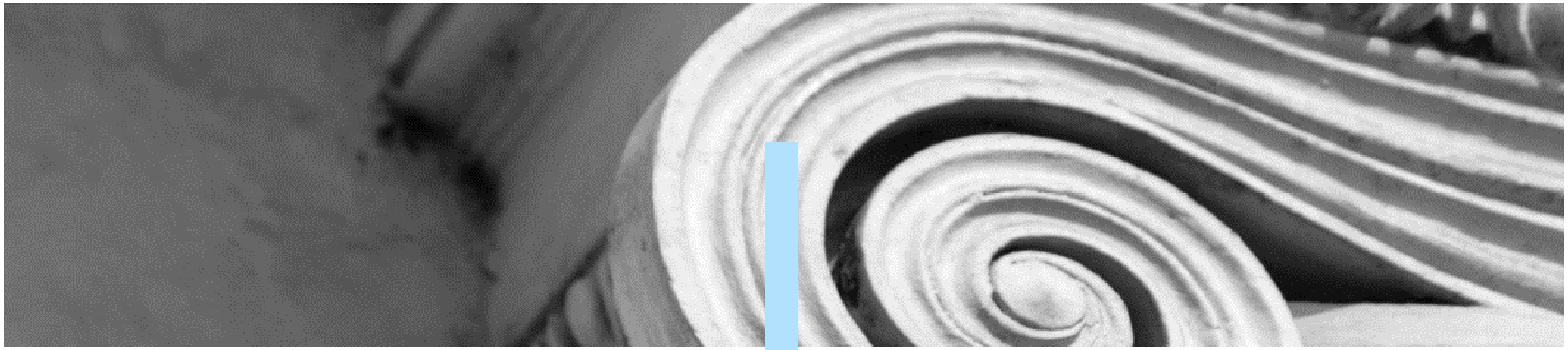


Employee	Location
Sara MacKenzie	Main
Tom Bombadil	Main
Suresh Natarajan	Stafford
Calvin Davis	Stafford
John Butler	Stafford
John Barryman	SciCtr
Dona Kinard	SciCtr

Location, Staff (Manager)



Location	Manager
Main	Sara MacKenzie
Stafford	John Butler
SciCtr	Dona Kinard



The database works as designed and is scalable to be able to add entities as needed for other departments, such as human resources and vehicle acquisitions. This would support the entire company, as opposed to merely sales and service.

CONCLUSION

*No references since data was made up, not sourced.