



American University of Sharjah (AUS)
Department of Computer Science and Engineering
CMP320 – Database Systems
Fall 2023 Semester

Course Project: Motor Vehicle Dealership Management System

System Description

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1. Project Information

1.1 Project Objective

The following Database System project aims to demonstrate the comprehensive knowledge accumulated throughout the semester by designing and implementing a small-scale database system while acknowledging the appropriate requirements.

1.2 Project Requirements

- a. The database should have a minimum of three entities and at least one many-to-many relationship.
- b. The application program should allow the user to insert/delete/update each of table in the database.
- c. The application program should provide the user with a suitable interface to query the database and display the results. The supported queries will depend on your application. However, at least one of the queries must use joins (i.e., retrieve data from table X based on data specified from table Y), and another one should provide statistics using aggregate functions.
- d. Data validation: for insert/update operations, validate user input in the application, e.g., validate date format, numbers, and string values in the application before sending data to the database tables.
- e. Application access is controlled through user login. There are two types of users: Administrator and Users (Normal)
- f. (Optional) Log user activity: Add a log table to track what logged-in users are doing with the application.

2. Project Description

2.1 Brief Introduction

The following project aims to implement a Motor Vehicle Dealership Management System, meaning, we will manage the stock, purchase, and distribution of Motor Vehicles. We assume that the dealership is indiscriminate to all manufacturers currently available and, as such will contain multiple makes and manufacturers. As a result, the system must be able to manage all relationships and information, as well as data manipulation based on inserting, deleting, or refactoring information and data stored within the system.

2.2 Equipment and Software

The following project will be developed using a multifaceted set of software tools. Firstly, the project's backend is developed using the **Oracle Database**, which is interfaced using **SQL Developer** for development handling. Further, the project's front end is designed using the programming language **Java**, which is interfaced using the IDE known as **Apache Netbeans IDE 18**. Moreover, the project uses the implemented Window Builder package for effective and efficient development. No explicit hardware equipment is required for this project.

2.3 Client and Stakeholders

The system's clients are customers who arrive at the dealership and want to browse or purchase a car. On the other hand, the Stakeholders consist of the managerial sector of our company which is developing and funding the project.

2.4 Project Scope

The system does not account for first or second-handed motor vehicles. Also, the system does not account for details regarding the parts for each car. Moreover, the project only aims at the database systems, hence the purchase details and procedures are beyond the scope of the project.

3. Enhanced Entity-Relationship (EER) Model Diagram

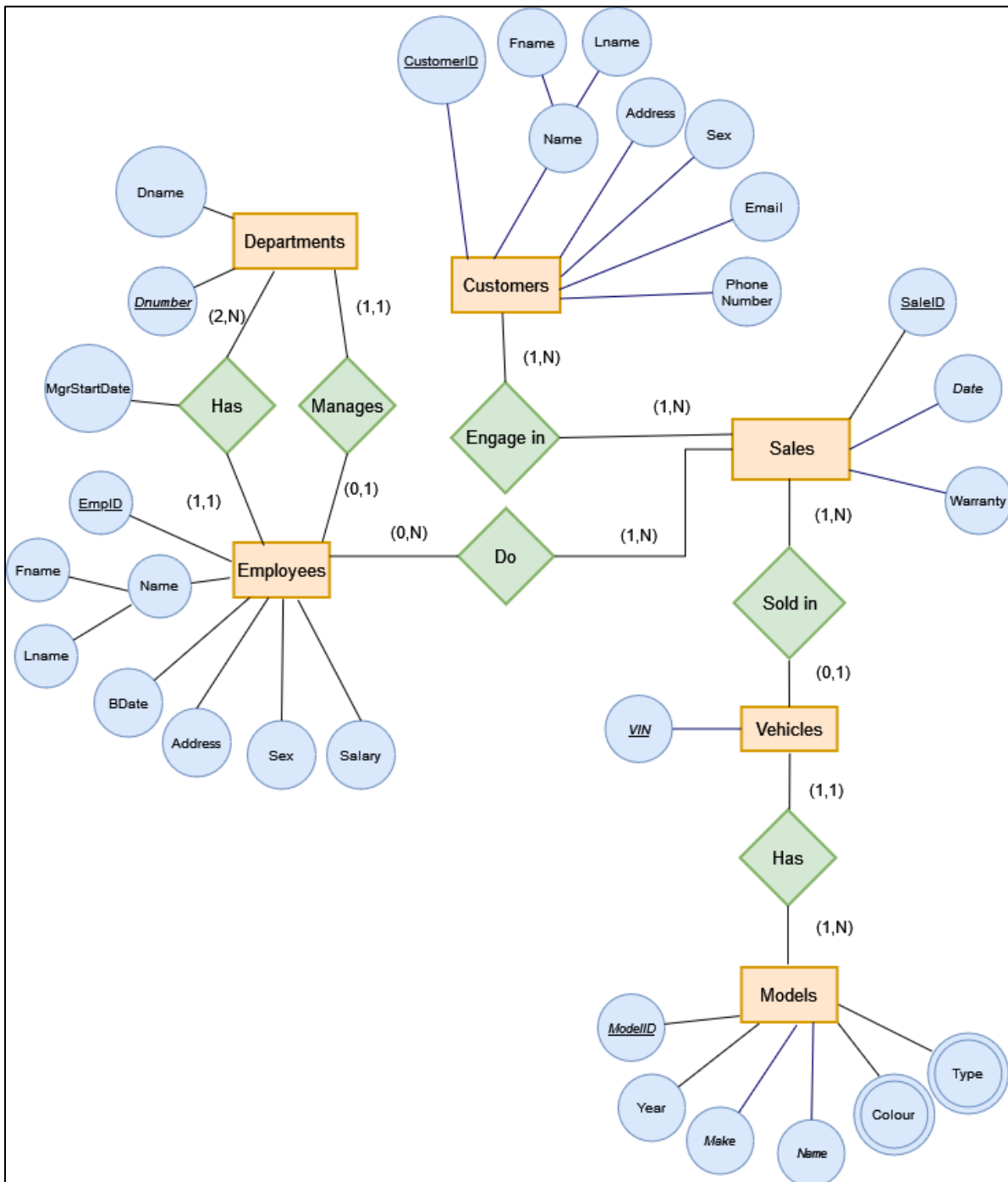
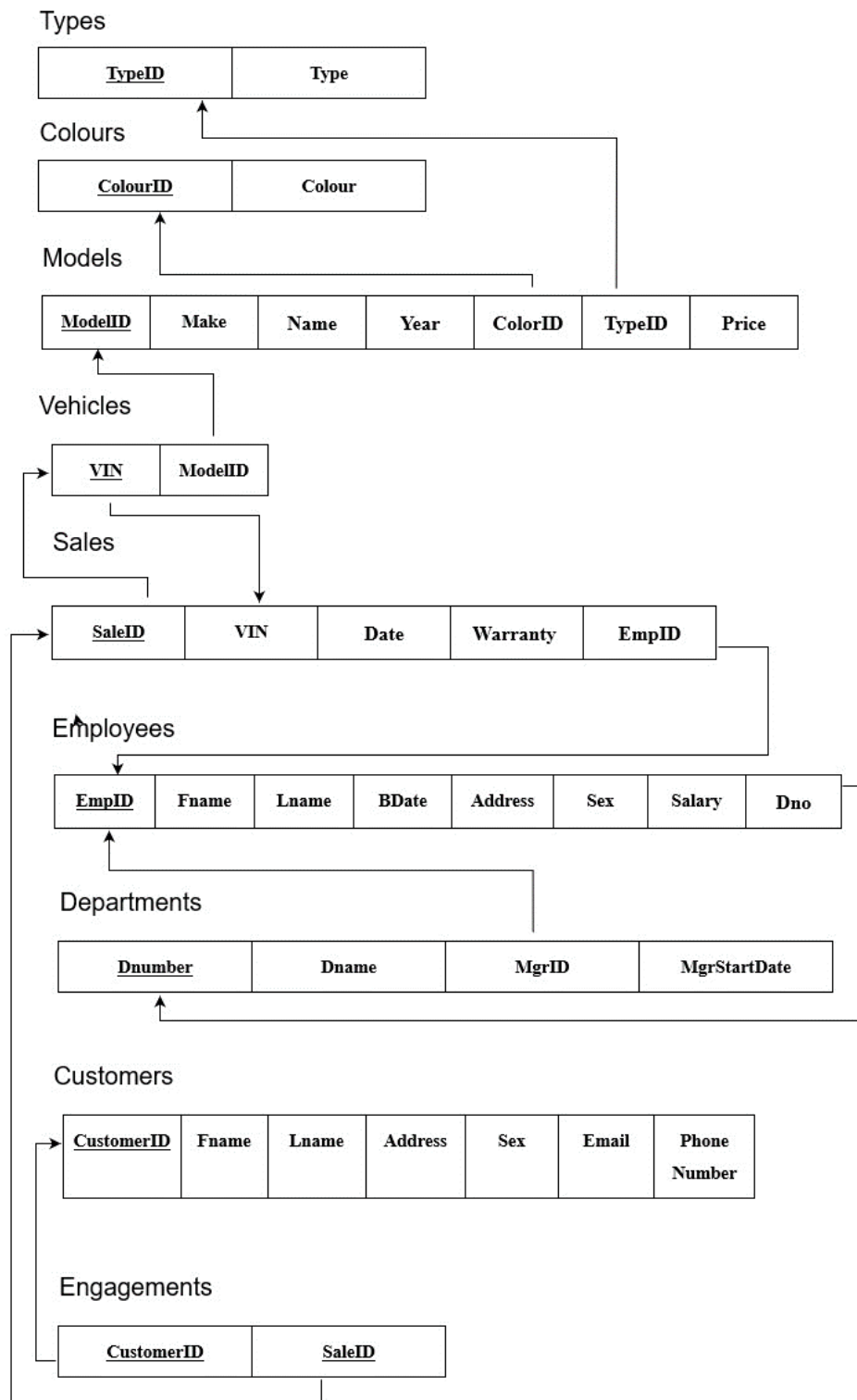


Figure #1: The EER Diagram modeling the Car Dealership Management System

4. Database Schema



5. Keys and Constraints

5.1 Primary Keys

1. Departments(Dnumber)
2. Employees(EmpID)
3. Customers(CustomerID)
4. Sales(SaleID)
5. Vehicle(VIN)
6. Models(ModelID)
7. Colours(ColourID)
8. Type(TypeID)
9. Engagements(CustomerID, SaleID)

5.2 Foreign Keys

1. Models(ColourID) REFERENCES Colours(ColourID)
2. Models(TypeID) REFERENCES Types(TypeID)
3. Vehicle(ModelID) REFERENCES Model(ModelID)
4. Sales(VIN) REFERENCES Vehicles(VIN)
5. Engagements(SaleID) REFERENCES Sales(SaleID)
6. Sales(EmpID) REFERENCES Employees(EmpID)
7. Employees(Dno) REFERENCES Departments(Dnumber)
8. Departments(MgrID) REFERENCES Employees(EmpID)
9. Engagements(CustomerID) REFERENCES Customers(CustomerID)

5.3 Data Types, Schema-Based and Semantic Constraints

Note: All the attributes within our relational database are not null to withhold the integrity of the table

<u>Table</u>	<u>Attribute</u>	<u>Data Type</u>	<u>Unique</u>	<u>Semantic Constraints</u>
Types	TypeID	INTEGER	Unique (Primary Key)	N/A
	Type	VARCHAR(20)	Not Unique	N/A
Colors	ColourID	INTEGER	Unique (Primary Key)	N/A
	Colour	VARCHAR(20)	Not Unique	N/A
Models	ModelID	INTEGER	Unique (Primary Key)	N/A
	Make	VARCHAR(20)	Not Unique	N/A
	Name	VARCHAR(20)	Not Unique	N/A
	Year	INTEGER	Not Unique	N/A
	ColourID	INTEGER	Unique	N/A
	TypeID	INTEGER	Unique	N/A
	Price	FLOAT	Not Unique	N/A
Vehicles	VIN	INTEGER	Unique (Primary Key)	N/A
	ModelID	INTEGER	Unique	N/A
Sales	SaleID	INTEGER	Unique (Primary Key)	N/A
	VIN	INTEGER	Unique	N/A
	SDate	DATE	Not Unique	N/A
	WarrantyYears	INTEGER	Not Unique	N/A
	EmpID	INTEGER	Unique	N/A

Employees	EmpID	INTEGER	Unique (Primary Key)	N/A
	Fname	VARCHAR(15)	Not Unique	N/A
	Lname	VARCHAR(15)	Not Unique	N/A
	Bdate	DATE	Not Unique	N/A
	Address	VARCHAR(100)	Not Unique	N/A
	Sex	CHAR	Not Unique	N/A
	Salary	FLOAT	Not Unique	N/A
	Dno	INTEGER	Not Unique	N/A
Departments	Number	INTEGER	Unique (Primary Key)	N/A
	Dname	VARCHAR(20)	Not Unique	N/A
	MgrID	INTEGER	Unique	N/A
	MgrStartDate	DATE	Not Unique	N/A
Customer	CustomerID	INTEGER	Unique (Primary Key)	N/A
	CFname	VARCHAR(15)	Not Unique	N/A
	CLname	VARCHAR(15)	Not Unique	N/A
	Address	VARCHAR(100)	Not Unique	N/A
	Sex	CHAR	Not Unique	N/A
	Email	VARCHAR(50)	Unique	CEmail Like “%@%.%”
	PhoneNo	VARCHAR(15)	Unique	iPhone No Like“+%%”
Engagements	CustomerID	INTEGER	Unique (Primary Composite Key)	N/A
	SaleID	INTEGER	Unique (Primary Composite Key)	N/A

Table #1: The Data Type, Schema-Based and Semantic Constraint of each Attribute in the Table

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