Conceptual Design

1. Develop a conceptual data model reflecting the following requirements:

- Identification of the relations (entity types).
    - RepairOrder: tracks the repair of a vehicle
    - Vehicle: represents the car brought in for repair
    - Customer: represents the vehicle owner who brings in their car for repair
    - Employee: represents a staff member who works at the repair shop
    - ProcedureDefinition: represents the available procedures
    - LineItem: represents the components and services needed for a repair
    - Invoice: represents the estimate/bill for repair
    - Notes: describes the complaints and documents the repair
- Identification of relationship types and their participation and cardinality constraints.
    - Customer Owns Vehicle: A customer must own at least 1 vehicle (1..*), and each vehicle is owned by exactly one customer (1..1).
    - Vehicle Requires RepairOrder: A vehicle must have at least one repair order and can have multiple repair orders (1..*). Each repair order must be associated with a vehicle (1..1).
    - Employee Records Invoice: An employee must record at least 1 invoice (1..*), and each invoice must be recorded by an employee (1..1).
    - RepairOrder Has Notes: A repair order can have multiple notes (0..*), and each note must belong to a repair order (1..1).

- RepairOrder Includes ProcedureDefinitions: A repair order must include at least one procedure definition (1..*), and a procedure definition can be included in multiple repair orders (1..*).
- ProcedureDefinition Utilizes LineItem: A procedure definition must have at least one line item (1..*), and certain line items can be associated with a procedure definition (1…*)
- RepairOrder Generates Invoice: A repair order must generate at least one invoice (1..*), and each invoice must be linked to a repair order (1..1)
- Invoice Contains LineItem: An invoice can contain multiple line items (1..*), and a line item can appear in multiple invoices (1..*)
- Customer Receives invoice: A customer can receive multiple invoices (1..*), and each invoice must be associated with a customer (1..1).

- Identification of attributes and association of attributes with entity or relationship types.
  - RepairOrder (repairOrderID, originationDate, completionDate, vehicleID, employeeID) refers to Vehicle and Employee
  - Vehicle (vehicleID, make, model, year, customerID) refers to Customer
  - Customer (customerID, firstName, lastName, phoneNumber, email, address)
  - Employee (employeeID, firstName, lastName, position)
  - ProcedureDefinition (procedureID, definition, lineItemID) refers to LineItem
  - LineItem (lineItemID, description, quantity, price)
  - Invoice (invoiceID, mileageIn, mileageOut, originationDate, completionDate, datePrinted, datePaid, type, repairOrderID, employeeID) refers to RepairOrder and Employee

    - Notes (noteID, complaint, documentation, repairOrderID) refers to RepairOrder

- Determination of candidate and primary key attributes of entity types.
    - RepairOrder (repairOrderID, originationDate, completionDate, vehicleID, employeeID)
        - Candidate Key: repairOrderID
        - Primary Key: repairID
    - Vehicle (vehicleID, make, model, year, customerID)
        - Candidate Key: vehicleID
        - Primary Key: vehicleID
    - Customer (customerID, firstName, lastName, phoneNumber, email, address)
        - Candidate Key: customerID, phoneNumber, email
        - Primary Key: customerID
    - Employee (employeeID, firstName, lastName, position)
        - Candidate Key: employeeID
        - Primary Key:employeeID
    - ProcedureDefinition (procedureID, definition, lineItemID)
        - Candidate Key: procedureID, definition
        - Primary Key: procedureID
    - LineItem (lineItemID, description, quantity, price)
        - Candidate Key: lineItemID, description
        - Primary Key: lineItemID
    - Invoice (invoiceID, mileageIn, mileageOut, datePrinted, datePaid, type, repairOrderID, employeeID)

        - Candidate Key: invoiceID
        - Primary Key: invoiceID
    - Notes (noteID, complaint, documentation, repairOrderID)
        - Candidate Key: noteID
        - Primary Key: noteID
- Determination of specialization/generalization and categorization relationships, whenever it is appropriate.
    - Specialization for Employee like mechanic

- Enhanced Entity-Relationship (EER) diagram to reflect the requirements