**SAVEETHA SCHOOL OF ENGINEERING**

**SIMATS, CHENNAI-602105**

**ACTIVITY 4**

| Course Code | **CSA0554** | Course title | **Database Management Systems for Procedural Languages** |
|---|---|---|---|
| Course Type | **Core** | Branch | **CSE** |
| Faculty | **Dr Devi T** | Dept | **AR & VR, CSE** |

**Developing a complete ERD using Supertype/Subtypes and Arcs for the following information requirements:**

**The Right-Way Rental Truck Company rents small moving trucks and trailers for local and one-way usage. There are 347 rental offices across the western United States. The rental inventory includes a total of 5,750 vehicles, including various types of trucks and trailers. The data that needs to be tracked is rental agreements and vehicle assignments. Each rental office rents vehicles that they have in inventory, to customers ready to take possession of the vehicle. Reservations are not taken, and speculation on when the customer will return the rented vehicles is not tracked. The central office oversees the vehicle distribution, and directs transfers of vehicles from one rental office to another.**

**Each rental office has an office name like "Madison Right-Way" and address. Each office also has a unique three-digit office number. Each office is a home office for some vehicles, and each vehicle is based out of a single home office.**

**Each vehicle has a vehicle ID, state of registration, and a license plate registration number. There are five different types of vehicles: 36-foot trucks, 24-foot trucks, 10-foot trucks, 8-foot covered trailers, and 6-foot open trailers, each with a type code. For all vehicles, a last maintenance date and expiration date of its registration needs to be tracked. In addition, for trucks, the current odometer reading, the gas tank capacity, and whether or not it has a working radio needs to be stored. For long moves, customers really prefer a radio. The current mileage is logged before the truck is rented, and then again when it returns. Additionally for trailers the maximum weight capacity must be logged.**

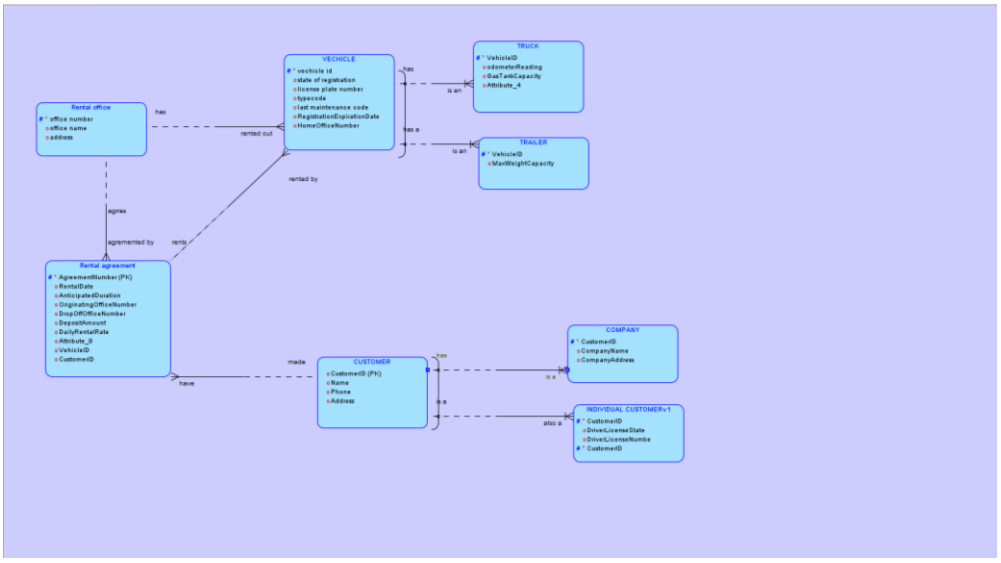
**Most rental agreements are for individual customers, but a rental agreement can be for either an individual or a company. A small percentage of trucks are rented to companies.**

**Each company is assigned a company number and the name and address of the company are tracked. The corporate sales group handles all the information separately.**

**For each individual customer, the following information is tracked: name, home phone, address, and driver's license state, number and expiration date. If a customer damaged a vehicle, abandoned it, or did not fully pay the bill, the customer is tagged as a poor risk, and the customer may not rent again.**

**Only a single individual or company can obtain a rental agreement, and a separate rental agreement is written for each vehicle. Customers can rent two or more vehicles at the same time. Each rental agreement is identified by the originating rental office number and a rental agreement number. In addition, the rental date, anticipated duration of the rental, the originating rental office, the drop-off rental office, the amount of the deposit paid, the quoted daily rental rate, and the quoted rate per mile are tracked. For trailers, there is no mileage charge.**

## SOLUTION:




**Entities and Attributes:**

1. **RentalOffice**
    - OfficeNumber (PK)
    - OfficeName
    - Address
2. **Vehicle** (Supertype)
    - VehicleID (PK)
    - StateOfRegistration
    - LicensePlateNumber
    - TypeCode (FK)
    - LastMaintenanceDate
    - RegistrationExpirationDate
    - HomeOfficeNumber (FK)
3. **Truck** (Subtype of Vehicle)

- VehicleID (PK, FK)
- OdometerReading
- GasTankCapacity
- HasRadio

4. **Trailer** (Subtype of Vehicle)
    - VehicleID (PK, FK)
    - MaxWeightCapacity
5. **Customer** (Supertype)
    - CustomerID (PK)
    - Name
    - Phone
    - Address
    - IsPoorRisk
6. **Individual** (Subtype of Customer)
    - CustomerID (PK, FK)
    - DriverLicenseState
    - DriverLicenseNumber
    - DriverLicenseExpirationDate
7. **Company** (Subtype of Customer)
    - CustomerID (PK, FK)
    - CompanyNumber
    - CompanyName
    - CompanyAddress
8. **RentalAgreement**
    - AgreementNumber (PK)
    - RentalDate
    - AnticipatedDuration
    - OriginatingOfficeNumber (FK)
    - DropOffOfficeNumber (FK)
    - DepositAmount
    - DailyRentalRate
    - MileageRate
    - VehicleID (FK)
    - CustomerID (FK)

**Relationships:**

1. **RentalOffice - Vehicle**
    - Each RentalOffice has many Vehicles.
    - Each Vehicle is based out of a single RentalOffice.
    - Relationship: HomeOfficeNumber in Vehicle is a foreign key referencing OfficeNumber in RentalOffice.
2. **RentalOffice - RentalAgreement**
    - Each RentalOffice originates many RentalAgreements.
    - Each RentalAgreement originates from one RentalOffice.
    - Relationship: OriginatingOfficeNumber in RentalAgreement is a foreign key referencing OfficeNumber in RentalOffice.
    - Each RentalOffice can be a drop-off location for many RentalAgreements.
    - Each RentalAgreement can have one drop-off RentalOffice.
    - Relationship: DropOffOfficeNumber in RentalAgreement is a foreign key referencing OfficeNumber in RentalOffice.
3. **Vehicle - RentalAgreement**
    - Each Vehicle can be part of many RentalAgreements.
    - Each RentalAgreement involves one Vehicle.

- Relationship: VehicleID in RentalAgreement is a foreign key referencing VehicleID in Vehicle.

4. **Customer - RentalAgreement**
    - Each Customer can have many RentalAgreements.
    - Each RentalAgreement is made by one Customer.
    - Relationship: CustomerID in RentalAgreement is a foreign key referencing CustomerID in Customer.

**Arcs and Constraints:**

- **Vehicle Supertype/Subtype**:
    - The **Vehicle** entity is a supertype with subtypes **Truck** and **Trailer**. Each **Vehicle** instance must be either a **Truck** or a **Trailer**.
- **Customer Supertype/Subtype**:
    - The **Customer** entity is a supertype with subtypes **Individual** and **Company**. Each **Customer** instance must be either an Individual or a Company.