# In-class Exercises: Entity/Relationship Model

(a) Translate this Entity-Relationship diagram into a relational schema. For each relation, provide its name, attributes and keys. To indicate a key, underline all attributes that are part of the key using a single line. Also include all referential integrity constraints. To answer this question, use relational notation, not SQL notation.
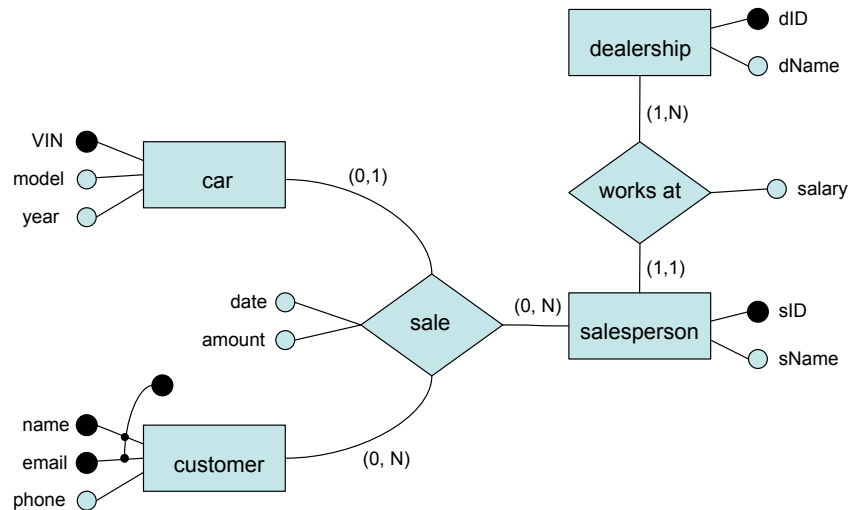
Solution:

Car(<u>VIN</u>, model, year)

Customer(<u>name, email</u>, phone)

Salesperson(<u>sID</u>, sName, dID, salary)

Dealership(<u>dID</u>, dname)

Sale(<u>VIN</u>, name, email, sID, date, amount)

Sale[VIN] ⊆ Car[VIN]

Sale[name] ⊆ Customer[name]

Sale[email] ⊆ Customer[email]

Sale[sID] ⊆ Salesperson[sID]

Salesperson[dID] ⊆ Dealership[dID]

Notice that the (1,1) cardinality for the car relation, which indicates that a car can participate in a sale relationship only once, is the reason why the car's key attribtue VIN is the only key attribute for relation sale.

(b) How would the relational schema change if the customer's phone attribute had (1,N) cardinality?

Solution: To avoid having multi-valued attributes (since our end goal is to transform this ER diagram to a relational schema), we would create a new entity 'Phone' that has an attribute 'phoneNumber'. Then, we would create a new relationship 'Has' that links the Customer entity to the Phone entity, with a cardinality of (1,N) on the Customer's end, (1,1) on the Phone's end; i.e. a customer can have multiple phone numbers, and a phone number can belong to one customer only.