# CSCI 330 Database Systems: Homework 4
# Total Point: 20 (5% of course grade)

## Goal
To design databases (E-R diagram and schemas) discussed in chapter 7.

## Q1 (10 points)

Suppose an automobile company (e.g., Toyota) hired you to design a database to assist
- Its dealers for maintaining customer records and dealer inventory
- Sales staff in ordering cars.

The database needs to store information about
- Brands (e.g., Toyota, Lexus)
- Models (e.g., Camry, Rav4)
- Options (e.g., Basic, premium, Prestige)
- Individual dealers (e.g., Wilson Motors)
- Customers
- Vehicles/Cars

You need to remember the following information:
- Each brand is identified by brand name (e.g., Toyota, Lexus).
- Each model has model_id and name. Each model is identified by the model_id.
- Each model **must be** associated with a brand. i.e., there is no model without a brand.
- Each vehicle is identified by VIN (vehicle identification number).
- Each vehicle **must be** associated with a model, i.e., there is no vehicle without a model.
- Each model may have many options. For instance, the Rav4 model has three options (e.g., LE, XLE, LE Hybrid).
- Each option can have option_id and specification. Each option is identified by option_id.
- Each dealer has dealer_id, name, and address. Each dealer is identified by dealer_id.
- Each customer has customer_id, name, and address. Each customer is identified by customer_id.
- Each vehicle may be associated with a dealer.
- Each vehicle may be associated with a customer.

**(7 points)** Draw an E-R diagram to represent the database mentioned above. You must keep the following in mind.
- There are **6 strong entity sets** and **NO weak** entity sets. Some entity sets might have a single attribute.
- There are **12 attributes** and all of them are simple and single-valued attributes.
- There are **5 binary relationship sets**. There are no other types of relationship sets (e.g., ternary).

- NO relationship set has any **descriptive attributes**.
- There are **2 total participation.**
- In your ER diagram, you will also have to do the following:
    - Identify the attributes for each entity set. Please underline the primary key.
    - Specify the cardinality (one to one, one to many, many to one, or many-many) of the diagram.

**(3 points)** Determine the Relation Schemas from the E-R diagram. No optimization is required.

## Q2 (10 points)

Suppose a worldwide packet delivery company (e.g., FedEx) hired you to design their database. The database needs to store information about

- customer
- packet
- place

You need to remember the following information:

- Each customer has a unique customer_id. Each customer also contains their name and address.
- Each packet has packet_id and weight. Each packet is identified by its packet_id.
- Each place or location has place_id, city, country, and address. Each place can be identified by place_id.
- Each packet must be associated with a place, i.e., there is no packet without a place.
- Each packet **must be associated** with a customer, i.e., there is no packet without a customer. The association between customers and packets can be in one of the following ways:
    - Customer who sends packets. In this case, the customer provides the time_sent information, i.e., when the packet was sent.
    - Customer who receives packets. In this case, the customer provides the time_recieved information, i.e., when the packet was received).
    - Some customers may play the role of both sender and receiver.

**(7 points)** Draw an E-R diagram to represent the database mentioned above. You must keep the following in mind:

- There are **3 strong entity sets** and **NO weak** entity sets.
- There are **9 attributes** for the entity sets and all of them are simple and single-valued attributes.
- There are **3 binary relationship sets**. There are no other types of relationship sets (e.g., ternary).
- Two relationship has two descriptive attributes
- Two entity sets may be related by two **separate** relationship sets.
- There are **3 total participation.**
- In your ER diagram, you will also have to do the following:

- Identify the attributes for each entity set. Please underline the primary key.
- Specify the cardinality (one to one, one to many, many to one, or many-many) of the diagram.

**(3 points)** Determine the Relation Schemas from the E-R diagram. No optimization is required.

## What to submit

All E-R diagrams and Relation schemas.

## Submission Instructions

• Put all E-R diagrams and Relation schemas in one single doc/docx file.
• Convert the file to a pdf file. The file name should be **YourLastName-330-HW4.pdf**.
• Upload the pdf file on canvas.

## Late Policy

• No late work will be accepted