Rhea Mae V. Edwards
CS 340, Fall 2017
Assignment 3

RELATIONAL ALGEBRA

In this assignment you will be writing **_relational algebra_** (not SQL) queries to select various sets of data. Below is a schema of a auto dealership database.

Vehicle - The base class for types of vehicles to be sold.

Make - The brand of vehicle. (e.g. BMW, Ford etc)

Model - The specific model (2 Series, Focus etc). First production year is the first year that model was ever made.

Vehicle_ Incentive - A relationship table between Vehicles and Incentives. Keeps track of when the incentive for that vehicle expires.

Incentive - Discounts and other deals. Type includes things like Factory or Dealer depending who is offering the incentive.

Inventory - The actual stock of vehicles in the lot. The price is the MSRP for that specific vehicle.

Color The potential colors cars can come in. The name is the name given by the factory (Taffeta white). The code is the hex representation of that color (e.g. # FFFAFA)
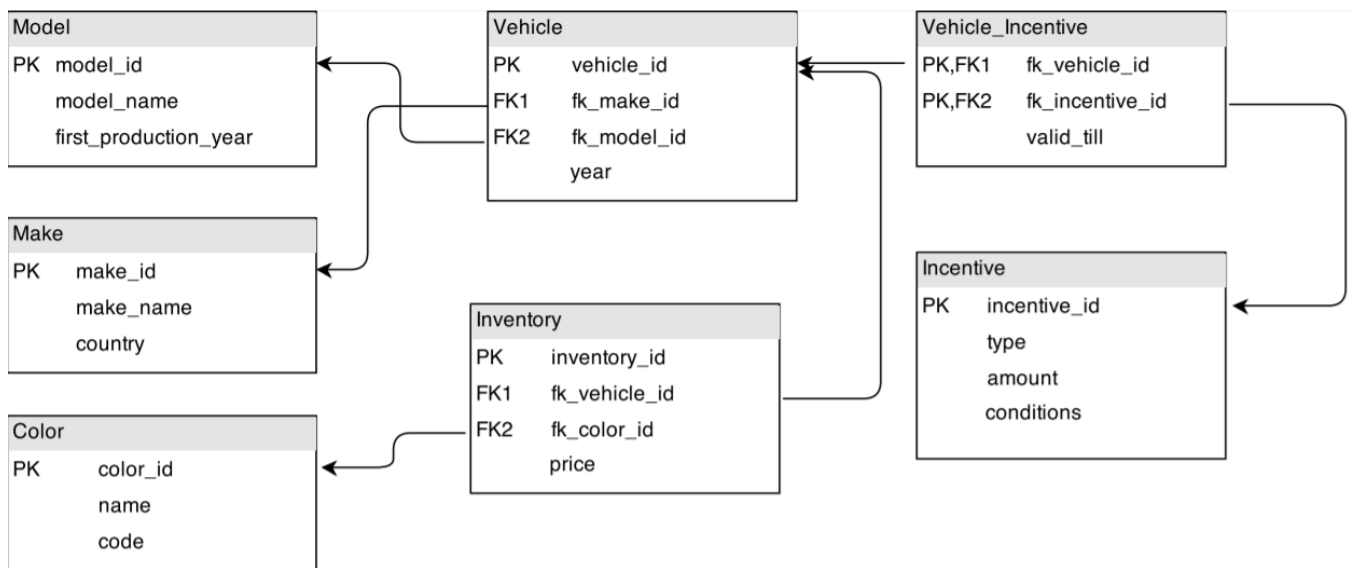
QUESTIONS

1) Select the make_ name and model_ name of all vehicles which have a first production year of 1976

$$\Pi_{Make.make\_name,Model.model\_name}(\sigma_{Model.first\_production\_year=1976}$$

$$((Model \bowtie_{Model.model\_id=Vehicle.fk\_model\_id} Vehicle) \bowtie_{Vehicle.fk\_make\_id=Make.make\_id} Make))$$

2) Select the make_ name and model_ name of all vehicles with the color name Blue

$$\Pi_{Make.make\_name,Model.model\_name}(\sigma_{Color.name="Blue"}$$

$$((((Model \bowtie_{Model.model\_id=Vehicle.fk\_model\_id} Vehicle) \bowtie_{Vehicle.fk\_make\_id=Make.make\_id} Make)$$

$$\bowtie_{Vehicle.vehicle\_id=Inventory.fk\_vehicle\_id} Inventory) \bowtie_{Inventory.fk\_color\_id=Color.color\_id} Color))$$

3) Select the make_ name, model_ name and incentive amount for all vehicles with a dealer type incentive

$$\Pi_{Make.make\_name,Model.model\_name,Incentive.amount}(\sigma_{Incentive.type="dealer"}$$

$$((((Model \bowtie_{Model.model\_id=Vehicle.fk\_model\_id} Vehicle) \bowtie_{Vehicle.fk\_make\_id=Make.make\_id} Make)$$

$$\bowtie_{Vehicle.vehicle\_id=Vehicle\_Incentive.fk\_vehicle\_id} Vehicle\_Incentive)$$

$$\bowtie_{Vehicle\_Incentive.fk\_incentive\_id=Incentive.incentive\_id} Incentive))$$

4) Convert the following query to relational algebra

SELECT Player.id, Team.name, City.name FROM Player
INNER JOIN Team ON Player.team_ id = Team.id
INNER JOIN City ON Team.city_ id = City.id
WHERE Player.score = 100;

$$\Pi_{Player.id,Team.name,City.name}(\sigma_{Player.score=100}((Player \bowtie_{Player.team\_id=Team.id} Team) \bowtie_{Team.city\_id=City.id} City))$$

5) For problem 3 above, convert your relational algebra query into a SQL query.

SELECT Make.make_ name, Model.model_ name, Incentive.amount FROM Incentive
INNER JOIN Vehicle ON Model.model_ id = Vehicle.fk_ model_ id
INNER JOIN Make ON Vehicle.fk_ make_ id = Make.make_ id
INNER JOIN Vehicle_ Incentive ON Vehicle.vehicle_ id = Vehicle_ Incentive.fk_ vehicle_ id
INNER JOIN Incentive ON Vehicle_ Incentive.fk_ incentive_ id = Incentive.incentive_ id
WHERE Incentive.type = "dealer"