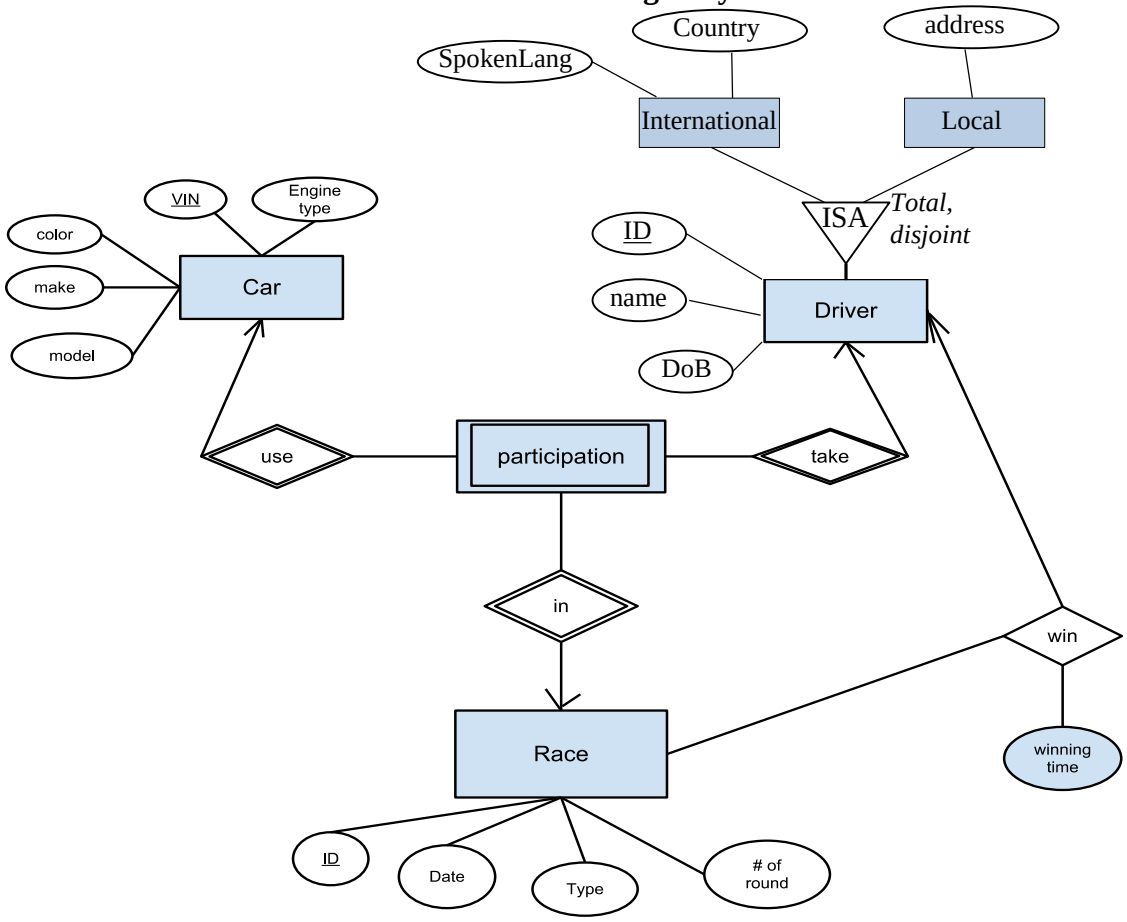
Quiz 2

Student Name:

[**50 Points**] Given the following **Car-Race** ER diagram, map this ERD to the relational model.

If one relation, say R , has attributes, say A1, A2, A3,…, An, and (A1, A2) form the primary key, then write it as: R (A1, A2, A3, …, An)

*** No Create Table statements are needed. No Foreign key definitions are needed**



Car(VIN, EngineType, Make, Model, Color)

Driver(ID, Name, DoB, Country, SpokenLang, address)

Race(ID, Date, Type, RoundNum, WinerId, WinningTime)

Participation(RaceId, DriverId, CarVIN)

**Notes:

1- In "Driver" relation, you may optionally add one column "Type" that identifies whether a driver is local or international, e.g., this column takes "I" or "L".

2- You can make the "Driver" relation as 3 relations:
Driver (ID, Name, DoB), InterDriver(ID, Spoken Lang, Country), and
LocalDriver(ID, State)

Database describing "ships" that participate in wars. Each ship belongs to a specific "class". For each ShipClass, we maintain some basic information. Then, there are many "missions" stored in the database. We store in "Results", which ship participated in which mission, and what was the ship's status, i.e., OK, Damaged, or Sunk.

ShipClass(<u>name</u>, type, country, numGuns, designYear, weight) → ShortName "C"

Ships(<u>shipName</u>, className, builtYear) → ShortName "S"

Missions(<u>missionName</u>, date) → ShortName "M"

Results(<u>shipName, missionName</u>, status) → ShortName "R"

Primary keys are underlined

Write the relational algebra expression for the following queries (Use the short Names):

<u>Q1:</u> [15 Points] Report the class names for which no ships participated in missions.

$$R_1 \leftarrow \pi_{\text{className}}(S \bowtie R)$$
$$\text{Result} \leftarrow \pi_{\text{name} \rightarrow \text{className}}(C) - R_1$$

<u>Q2:</u> [15 Points] Report the name of each mission took place after Jan-2010 along with the number of ships participated in that mission (do not include missions with count of 0)**.**

$$R_1 \leftarrow R \bowtie \sigma_{\text{date>Jan-2010}}(M)$$
$$\text{Result} \leftarrow \gamma_{\text{missionName, count(shipName)} \rightarrow \text{CNT}}(R_1)$$

<u>Q3:</u> [20 Points] Select the class name of the ship named 'Blue Shark"

$$\pi_{\text{className}}(\sigma_{\text{shipName='Blue Shark'}}(S))$$