BDDAD - Databases - ISEP 2022/23

The organizers of the ISEP-Dakar Rally decided to build a database to store information about the races carried out over the years, each race being identified by the year. Let us consider the following requirements.

Several teams participate in ISEP-Dakar, each having a unique identification code , a name and a nationality . Each team can be one (and only one) of three types, types that in practice correspond to the three competitions existing in the Rally: motorcycles (type BK), cars (type CR) and trucks (type TR). The identification code of a team has the following structure; AAAATTNNN on AAAA is the year, TT the team type and NNN a sequential number.

Regardless of the type, all teams have a pilot. In fact, each team runs with a vehicle (motorcycle, car or truck, depending on the type of team), which is of a brand and of a type (e.g. the Portuguese team "Renault Truck/Trifene 200" runs with a truck branded "Renault" and type "Kerax").

It is good not to forget that, for example, a motorcycle team cannot race with a vehicle that is a truck. In addition, car teams have a co-driver and truck teams have one or two co-drivers. Teams can switch from one edition/year of the race to another.

The vehicles are characterized by various properties common to all types (make, model, motor displacement, fuel). Trucks are still characterized by tare, in tons, and volume, in m3, and cars by the number of cylinders which is an integer between 3 and 8.

From each of the people participating in the race (pilots or co-pilots) there is a need to store some relevant information, such as nationality, telephone and email. The nationality of a team is not completely independent of the nationalities of its members (pilots and co-pilots). Nothing requires all members of a team to be of the same nationality. But the nationality of the team has to be one (any) of the nationalities of its members.

In an edition, each of the participants can only be in one team (it makes no sense for anyone, for example, to be a pilot or co-pilot of one team and at the same time a pilot or co-pilot of another!).

The Rally has a set of stages to be carried out by the different teams. Each stage is performed on a predefined day of the rally, starting and ending in certain locations and consists of several sections of more than one type (timed or non-timed).

For example, stage 11 that departs from Kayes and arrives in Bamako (both in Mali), has 3 sections: a first dand 51 km, a second of 23 km and a third of 424 km, all timed and all with start and end locations identified by their coordinates.

It is interesting to know the time and classification that each team obtained in each stage performed in each race, and any penalties (type of penalty and penalty time). Penalties are typified in a table with a descriptive and maximum penalty value (time in minutes). For each year and competition (motorcycles, cars, trucks) it is necessary to know the final ranking and the ranking at the end of each stage.

a) Represent conceptual the data model using an ER diagram.
b) Design the relational data model normalized to the 3FN.
c) Build the physical data model (SQL script).
d) Describe the constraints that you cannot represent in the data model.