

## DEVELOPING AN APPLICATION FOR ACCESSING A DATABASE

This project consists of the development of a desktop application for allowing the access to a database (DB). Unless a specific permission of the professor in charge, the application will be developed in teams of 3 people. Every team member must belong to the same lab group. The teams will be formed on the corresponding activity on the virtual campus. The maximum grade which can be achieved is 15 out of the 100 total points of the course.

### Goal

The system to be developed is an application that allows managing data related to different seasons of a car racing competition, like Formula One. The database to be managed will contain several tables to store information about countries, racing teams, drivers, grand prix (GP), etc.

The following figure describes the relational schema of the DB to be used. A .mwb file containing this schema can be found on the virtual campus of the course.

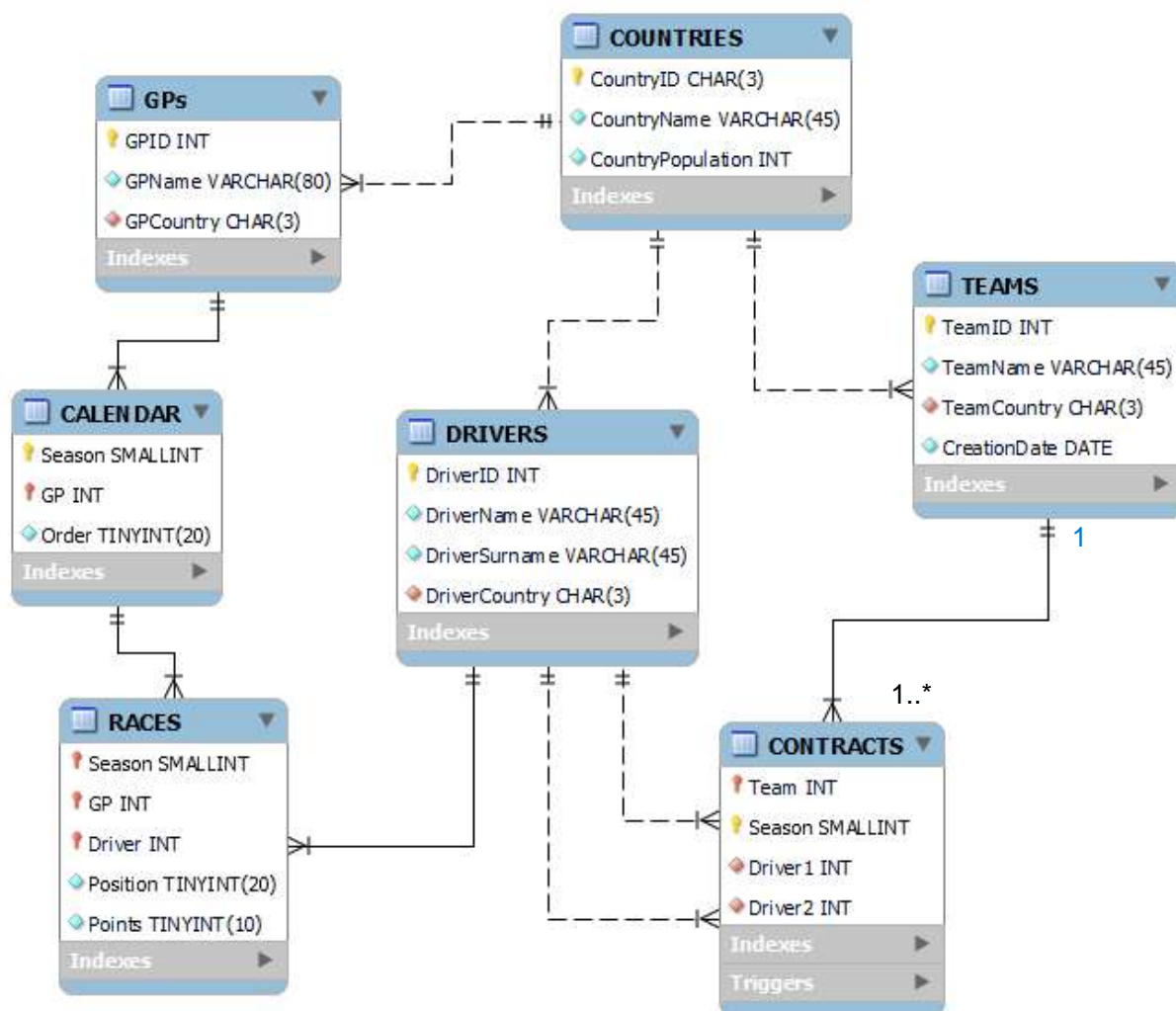


Figure 1. DB E/R schema

Tables and attributes names are self-explaining, so no further extra details about Figure 1's content is commented on. However, some considerations to be considered are:

- Each country is automatically assigned the first 3 letters of its name as an identifier whenever possible. In case of collision (for example, Austria and Australia), the application will allow manual entry of the identifier, but always composed of 3 letters.
- Some examples of GP names are: "Spanish Grand Prix," held in Spain, or "Asia-Pacific," held in Malaysia.
- The same country can host more than one different GP, either in the same or different seasons.
- Seasons are named by the year in which the races take place, such as 2024, 2023, 2022, etc.
- Each season, a racing team must have 2 different drivers. These drivers will remain associated with the racing team throughout the season.
- Drivers can race for different racing teams if it is in different seasons.

If there are any doubts, you are invited to discuss them with the laboratory practice professor as soon as possible.

## Functionality

The main functionalities of the system are:

- Upon starting the application, the system will connect to the database, as shown in Figure 1.
- From there, information can be managed (inserting, modifying, and deleting rows) through the corresponding forms of the following database tables: COUNTRIES, DRIVERS, TEAMS, and GPs.
- Once the necessary data is available, the generation of information related to a season will proceed. The following steps will be followed:
  1. Select the year of the season (always between 2024 and 1970).
  2. Choose how many and which teams will compete in the season, with a minimum of 5 and a maximum of 10.
  3. Select the 2 drivers who are part of each team in that season.
  4. Create the calendar, consisting of a minimum of 10 GPs and a maximum of 20, establishing the order in which they will be contested.

Steps 2, 3, and 4 will be generated **randomly** using the information contained in the database tables, allowing the user to choose, if desired, the lower and upper limits of the number of participating teams and the number of GPs to be contested in the season. If not chosen by the user, these numbers will also be generated randomly.

5. Once this environment is generated, races will be contested, randomly generating the final classification of each race in the championship and assigning the following points to each driver:

- FIRST PLACE: 10 points
- SECOND: 6 points
- THIRD: 4 points
- FOURTH: 3 points
- FIFTH: 2 points
- SIXTH: 1 point

- Necessary forms will be created for easy consultation of all information related to each season and each race within each season.
- The application will also generate a series of reports, choosing the format and information to display as deemed most appropriate based on the data contained in the database:
  - Final classification of drivers and constructors for a season, calculating and displaying the total points and determining the World Constructors' and Drivers' Champions. In case of a tie in points, priority will be given to the one who has won more races. If the tie persists, it will be based on the number of second places and so on.
  - Chronological history of a driver, allowing for consultation of their results in all races in which they have competed. This information can be limited to a specific period by establishing the start and end seasons of the period to be queried.
  - Chronological history of a team, showing the drivers and their results in the races in which they have competed. Again, this information can be limited to a specific period by establishing the start and end seasons of the period to be queried.
  - Report on drivers who were World Champions from a particular country, displaying their data, the season(s) in which they were champions, the team they raced for, the points they obtained, and the number of races they won in that season.
- Finally, there should be an option to completely delete all information related to a specific season.

## Additional Considerations

- Any additional design/development decision taken by the development team **MUST** be agreed with the lab professor. Any doubts that may arise regarding these decisions during the correction of the application must be appropriately justified before the laboratory practice professor during the evaluation of the practical assignment."
- At the time of submission, each table in the database must have a minimum number of rows sufficient to execute its functionality without restrictions.
- The selection of the development language and the DBMS is free, although VB.NET and MySQL are recommended, as in the previous projects. Technical doubts will only be answered about these language and frameworks.
- The system must be developed in a 3-layer architecture (presentation, domain and persistence) following the principles of the Software Engineering. The use of design patterns (e.g., database broker) will be especially valued.
- Any modification performed on the proposed schema **MUST** be conveniently justified and agreed with the professor.
- The (UNEXTENDIBLE) defense date is the last session of the lab group of the members of the development team (check on Moodle).
- The delivery will be done some (2-3) days earlier so that the defense can be conveniently prepared.