Name:

Exercise 1. From the following statement, get the Entity-Relationship diagram using ERDPlus (including minimum and maximum cardinalities of all relationships) and then convert it to a relational model. (5 points).

A company that organizes popular athletics races wants to upgrade its information system. To do this, it will be necessary to consider the following (**read carefully, every detail can be important**). (Changed in order to understand better)

There are runners who participate in the races. One runner can participate in many races, and in one race can participate many runners. It is considered that in order to hold a race at least one runner must participate and that there may be runners who have not participated in any race. It is important to store the email with which you have registered for the race, the bib(dorsal) number (it may be different in each race, just like the email) and the time obtained if the race.

There are runners who participate as independents and runners who belong to teams. We are interested in storing only for independent runners their best time achieved and the city in which they achieved it; and for runners with a team, the name of the team and the locality to which it belongs. Consider that there are no other types of runners and that a runner can only be independent or team, but never both.

A race will always be managed by at least one organiser, and, in turn, one organiser may manage several races. In addition, one organiser may have another organiser as a supervisor and an organiser who is a supervisor may have several organisers in charge.

Runners with a team (only them) will always have a coach and a coach may or may not belong to a team.

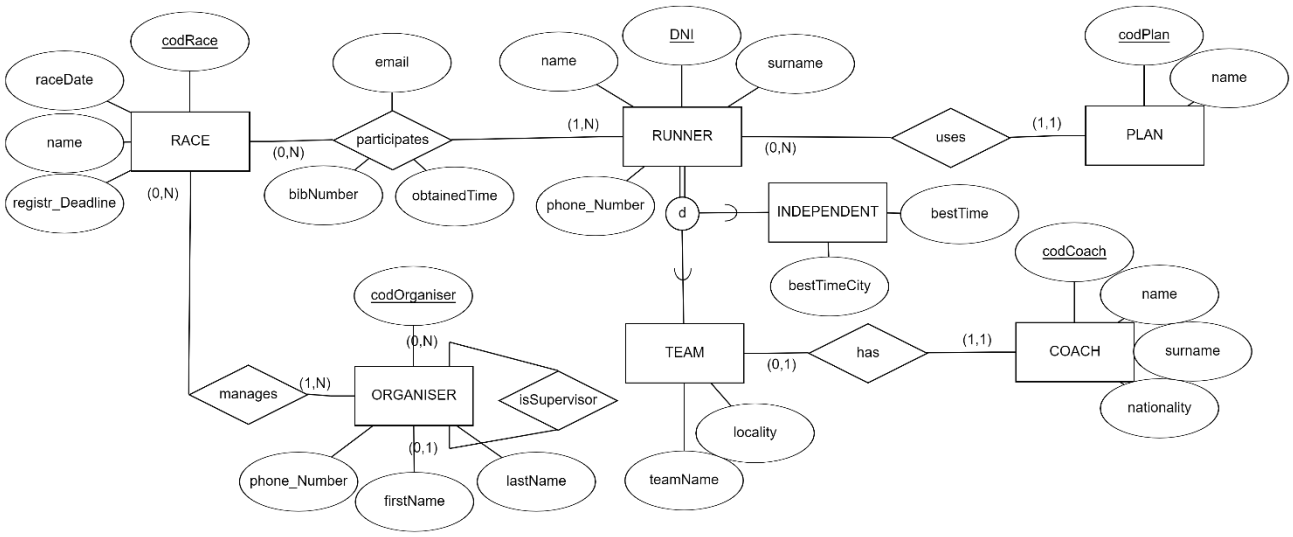
Finally, in order to improve the race times, "there are training plans for the races that the runners use". A runner, for a race, will make a single training plan, while if we have a training plan (for example, 10K in 35min), a runner can use it in several races.

We want to store from:

- **Runner**: DNI, name, surname and telephone number.
- **Race**: race code, name, race date and registration deadline.
- **Coach**: coach code, name, surname and nationality.
- **Organiser**: organiser code, first name, last name and telephone number.
- **Plan**: plan code and name of plan.

ANSWERS

Paste your E-R diagram down below.



Write here the relational model of the E-R diagram.

RACE (codRace, name, raceDate, registr_Daedline)

PK: codRace

RUNNER (DNI, name, surname, phone_Number, codPlan)

PK: DNI

FK: codPlan → PLAN

INDEPENDENT (DNI, bestTime, bestTimeCity)

PK: DNI

FK: DNI → RUNNER

TEAM (DNI, teamName, locality)

PK: DNI

FK: DNI → RUNNER

ORGANISER (codOrganiser, phone_Number, firstName, lastName, idSupervisor)

PK: codOrganiser

FK: idSupervisor → ORGANISER

COACH (codCoach, name, surname, nationality, DNI)

PK: codCoach

FK: DNI → TEAM

PLAN (codPlan, name)

PK: codPlan

PARTICIPANTS (codRace, DNI, email, bibNumber, obtainedTime)

PK: codRace, DNI

FK: codRace → RACE

FK: DNI → RUNNER

MANAGERS (codOrganiser, codRace)

PK: codOrganiser, codRace

FK: codOrganiser →ORGANISER

FK: codRace → RACE

Exercise 2. Get the E-R diagram from the following relational model (remember to place at least the cardinality of the relationship) (3 points)

SHOP (**idShop**, description, address, city, managerShop)
PK: idShop
FK: managerShop → EMPLOYEE (NOT NULL)

EMPLOYEE (**idEmployee**, name, city, phone, idShop, idEmployeeBoss)
PK: idEmployee
FK: idShop → SHOP (NOT NULL)
FK: idEmployeeBoss → EMPLOYEE

DISTRIBUTOR (**idDistributor**, name, address, phone, city)
PK: idDistributor

SUPPLY (**idShop, idProduct**, idDistributor, quantity, price, date)
PK: idShop, idProduct
FK: idShop → SHOP
FK: idProduct→ PRODUCT
FK: idDistributor → DISTRIBUTOR (NOT NULL)

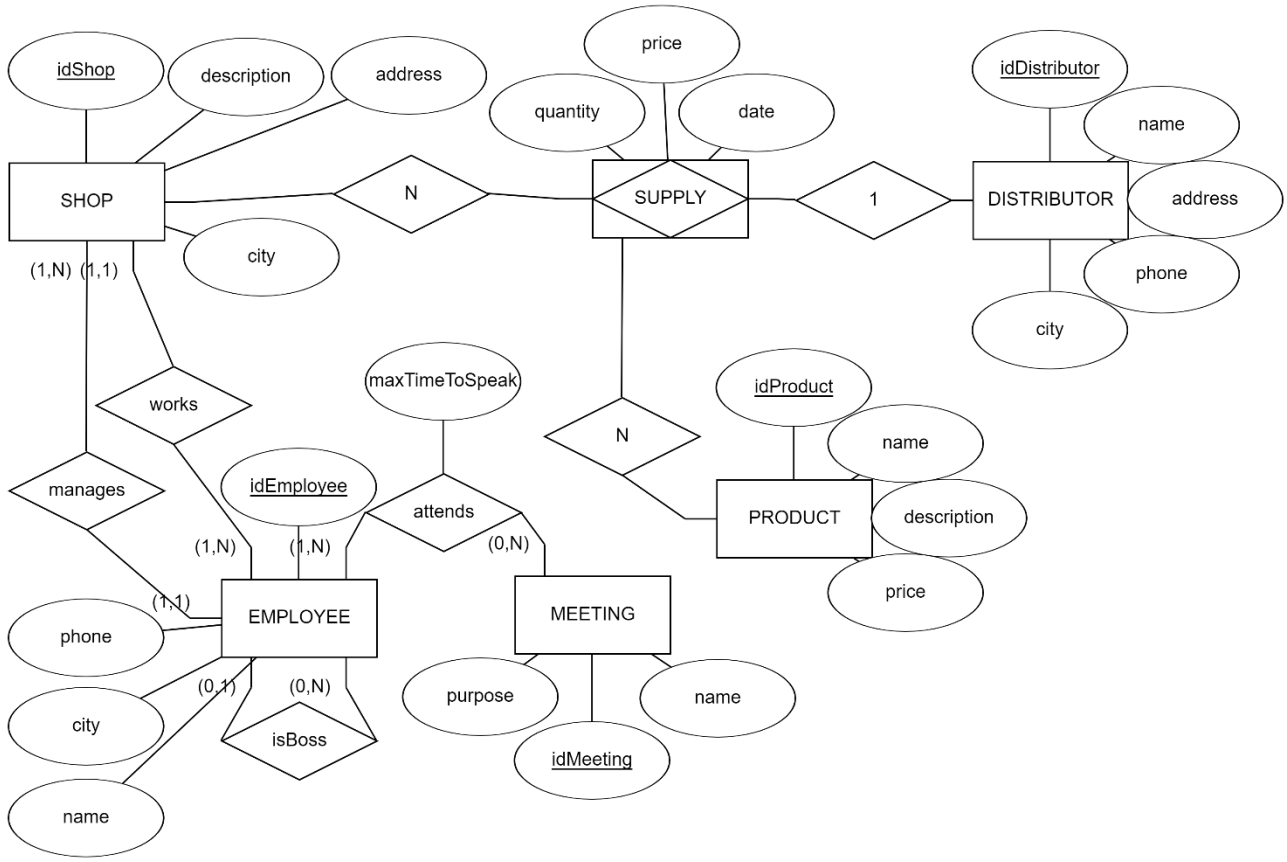
PRODUCT (**idProduct**, name, description, price)
PK: idProduct

MEETING (**idMeeting**, name, purpose)
PK: idMeeting

ATTEND-MEETING (**idMeeting, idEmployee**, maxTimeToSpeak)
PK: idMeeting, idEmployee
FK: idMeeting → MEETING
FK: idEmployee → EMPLOYEE

ANSWER

Paste your E-R diagram here.



Exercise 3. Solve the following relational algebra operations with the following tables (2 points, 0.5 points each).

NOTE: If there are several operations, it is enough to indicate the final result.

Tabla R

A	B
1	2
3	4

Tabla S

A	B
1	3
5	6
1	2

a) **R U S**

Tabla R U S

A	B
1	3
5	6
1	2
3	4

b) **S - (S ∩ R)**

Tabla S - (S ∩ R)

A	B
1	3
5	6

c) **S x R**

Tabla S x R

R.A	R.B	S.A	S.B
1	2	1	3
1	2	5	6
1	2	1	2
3	4	1	3
3	4	5	6
3	4	1	2

d) (**S x R**) ∩ **R**

ERROR (the number of columns does not match).