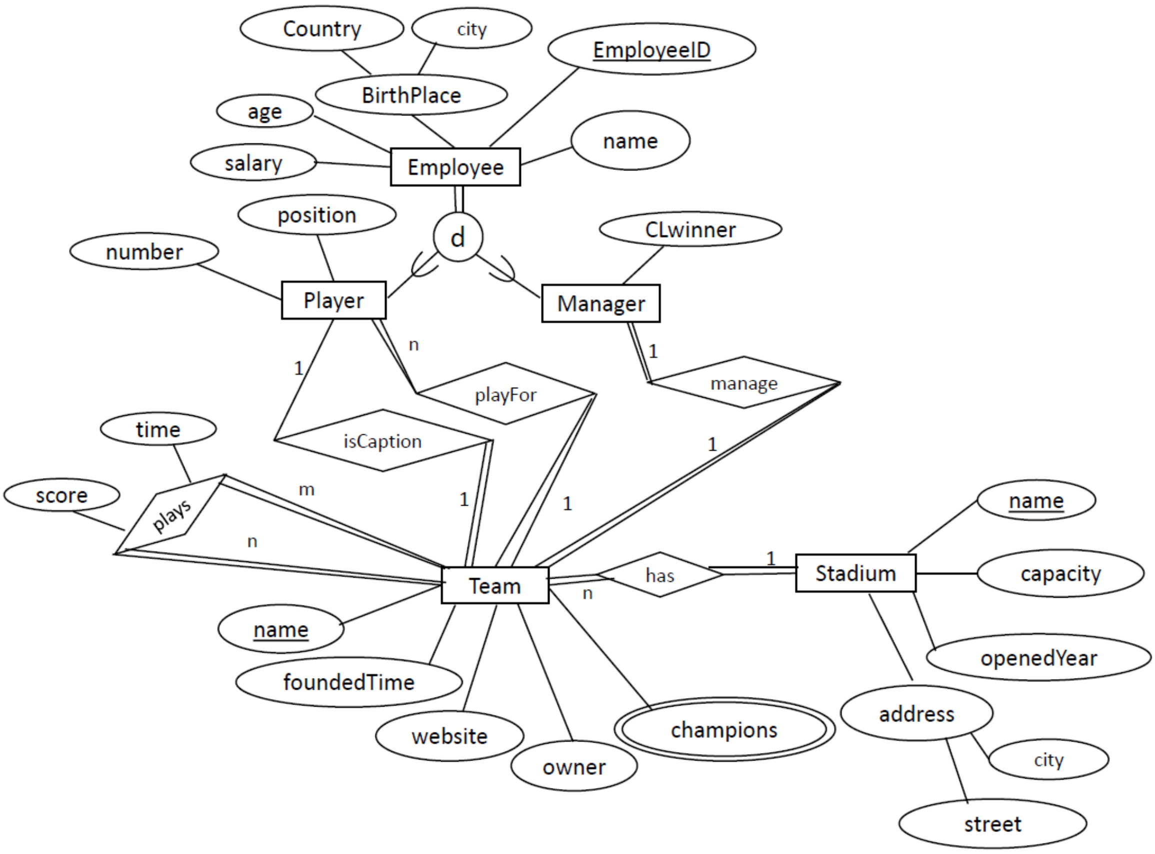
# Assignment 1

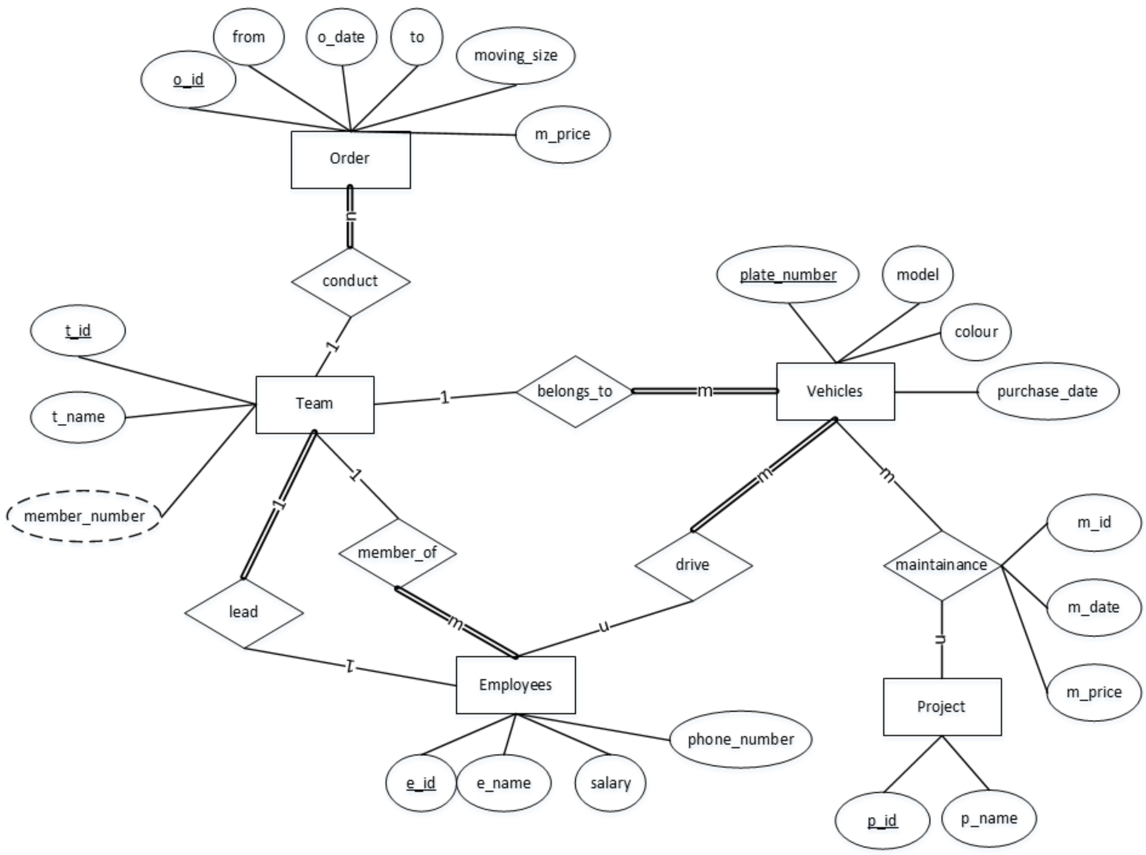
## Question 1 (3 marks)

Solution:




We assume that one stadium can be the home stadium of many teams.

## Question 2 (4 marks)



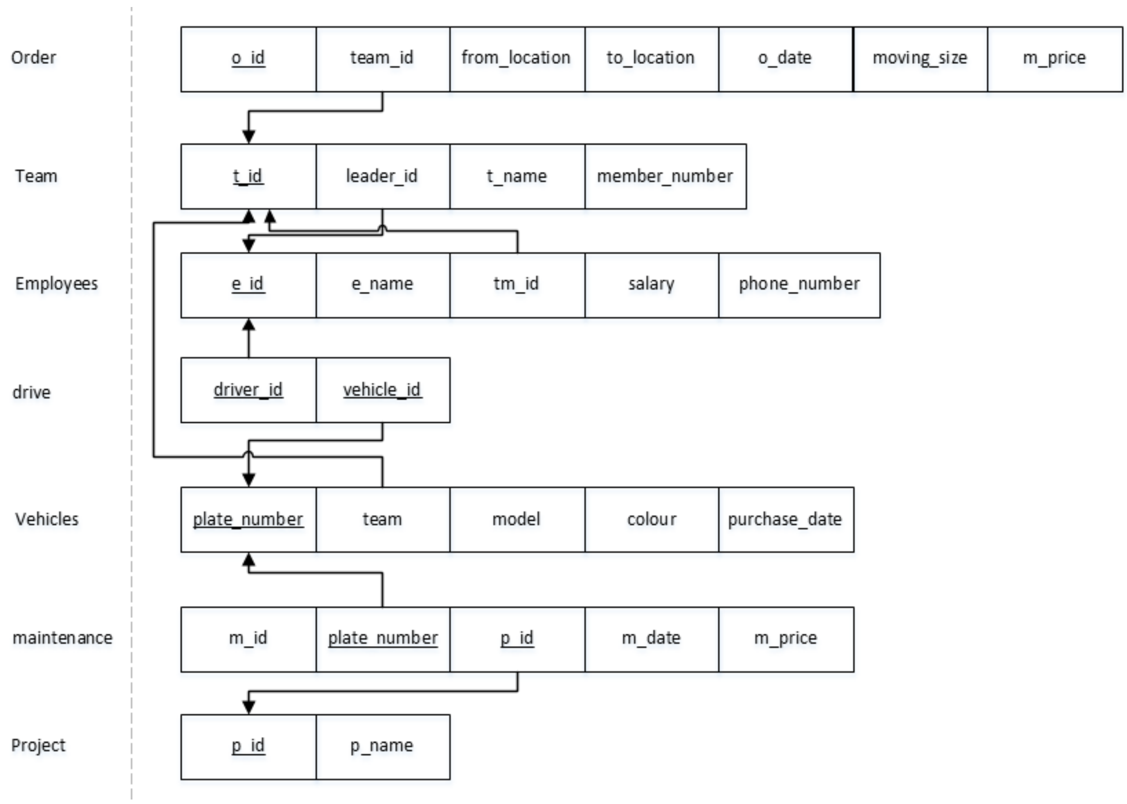

- The relationship between Team and Vehicles could be m:n in which case a table TeamVeh should be included in the relational model for next question.

  TeamVeh

  | | |
  |---|---|
  | plate_number | t_id |

  where plate_number and t_id are foreign keys which refer to the primary key of relations Team and Vehicles respectively.

Convert the above ER-diagram into a relational model.




# Question 3 (3 marks)

(1) Solution:

If every attribute is a key, based on the definition of super-key, the maximum number of possible super-keys for R is $2^n - 1$.

(2) Solution:

$C^n_{\lfloor \frac{n}{2} \rfloor}$, where $C^n_k$ denotes the number of k-combinations from a given set S of n elements.

Let us assume that the number of attributes for each candidate key is not the same. We denote the possible candidate key as $C_i$ ... $C_j$ and the corresponding number of attributes for each candidate key is $c_i$ ... $c_j$. Let $c_{max}$ be the maximum number in $c_i$ ... $c_j$. It is obvious that we can always construct a candidate key $C'_i$ with $c_{max}$ attributes by adding $c_{max} - c_i$ attributes to $C_i$. It implies that the number of possible candidate keys with same number of attributes is not less than the number of possible candidate keys with different number of attributes. Then for every candidate key with same number of attributes, based on combination property, the maximum number of possible candidate keys is $C^n_{\lfloor \frac{n}{2} \rfloor}$, where the number of attributes for each candidate key is $\lfloor \frac{n}{2} \rfloor$. Thus, the maximum number of possible candidate keys for R is $C^n_{\lfloor \frac{n}{2} \rfloor}$.