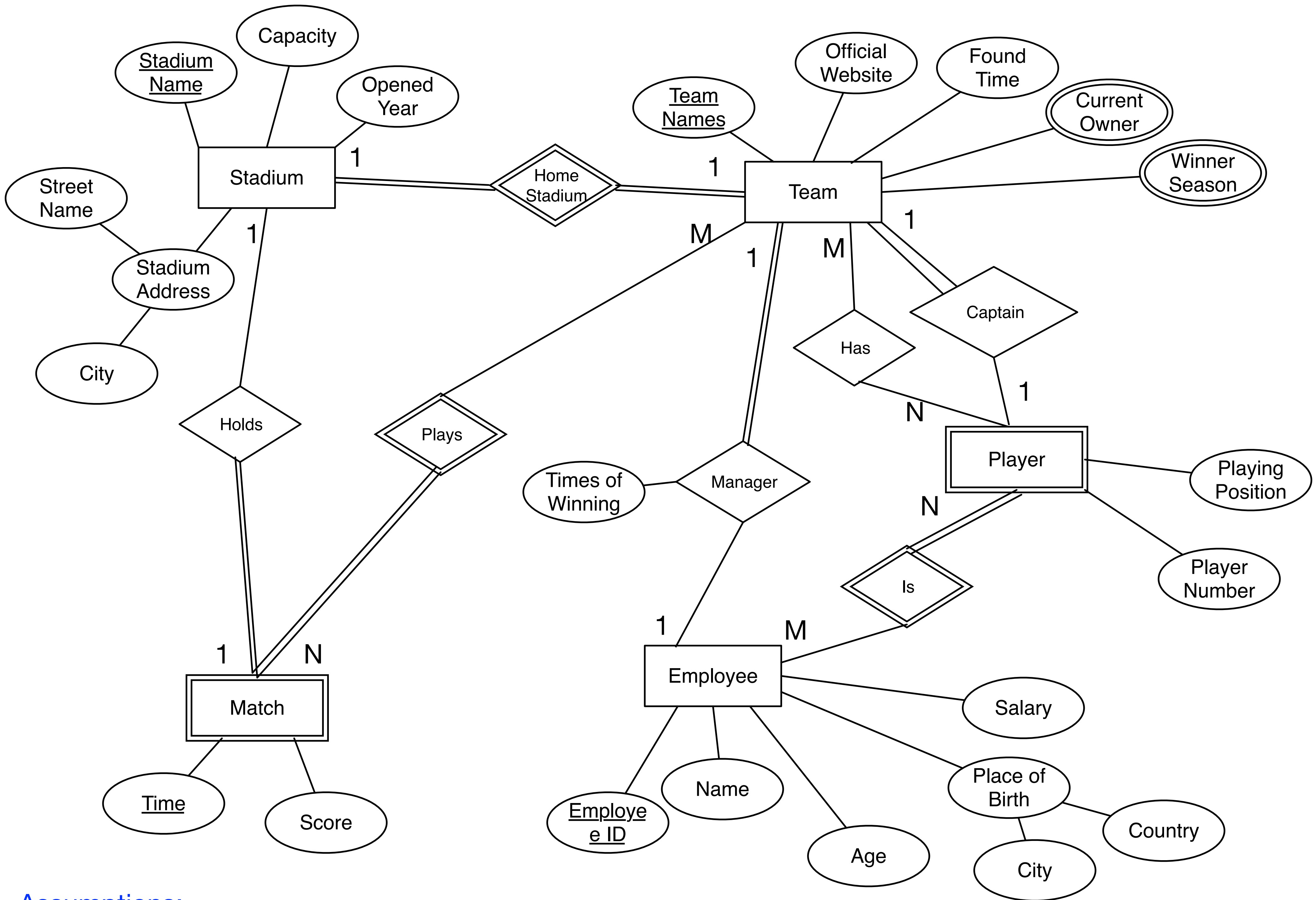
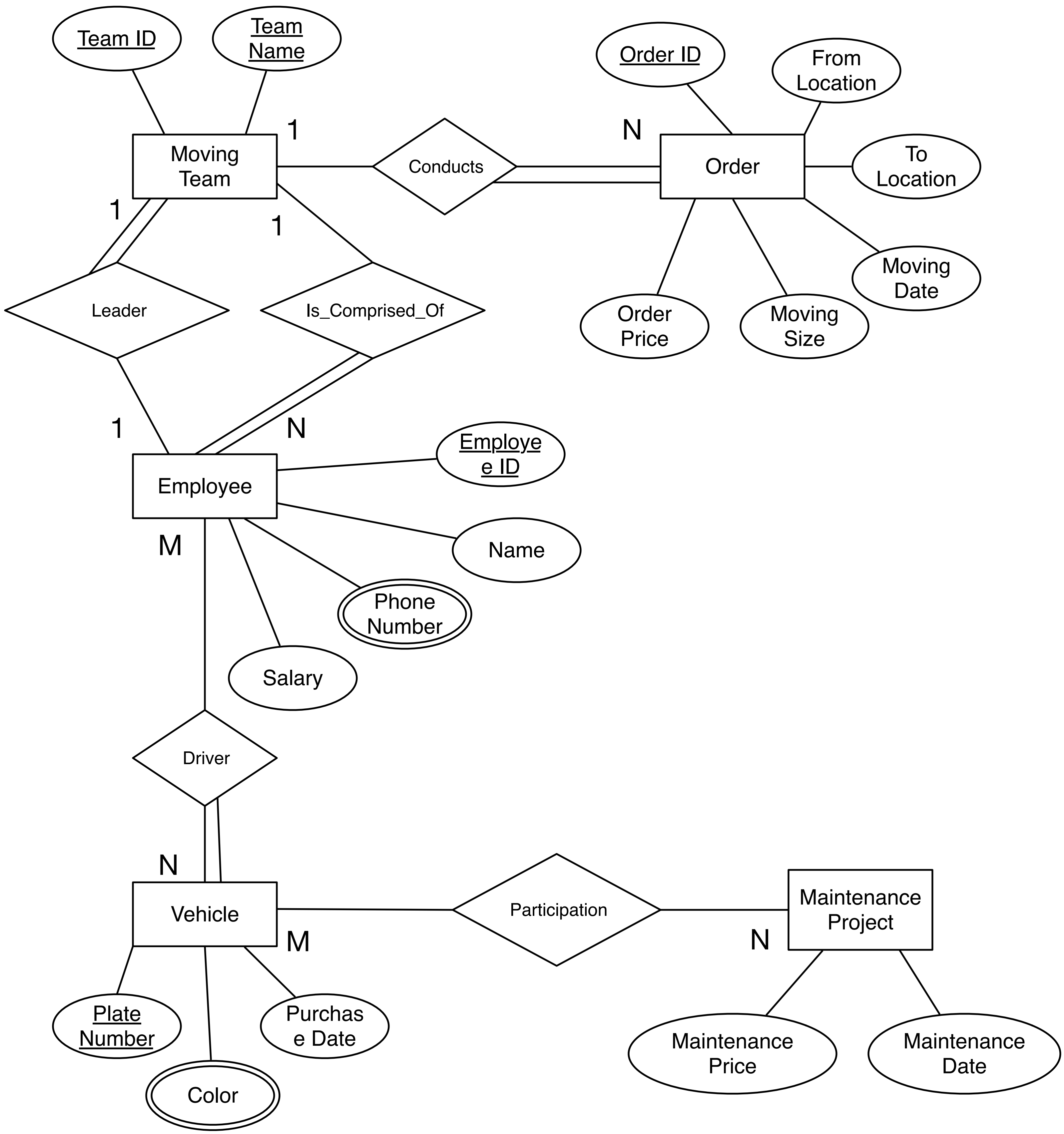
Question_1_ER_Diagram



Assumptions:

1. Current Owner Can be multiple people, such as brothers.
2. The league has a provision that every player can only have exactly one number and one position.
3. In a team, captain is one of a players.
4. Every single match is held in one of the home stadiums owned by the competing teams of this match
5. In one season, every team has at least one match, and where plays the match depends on coin flipping.

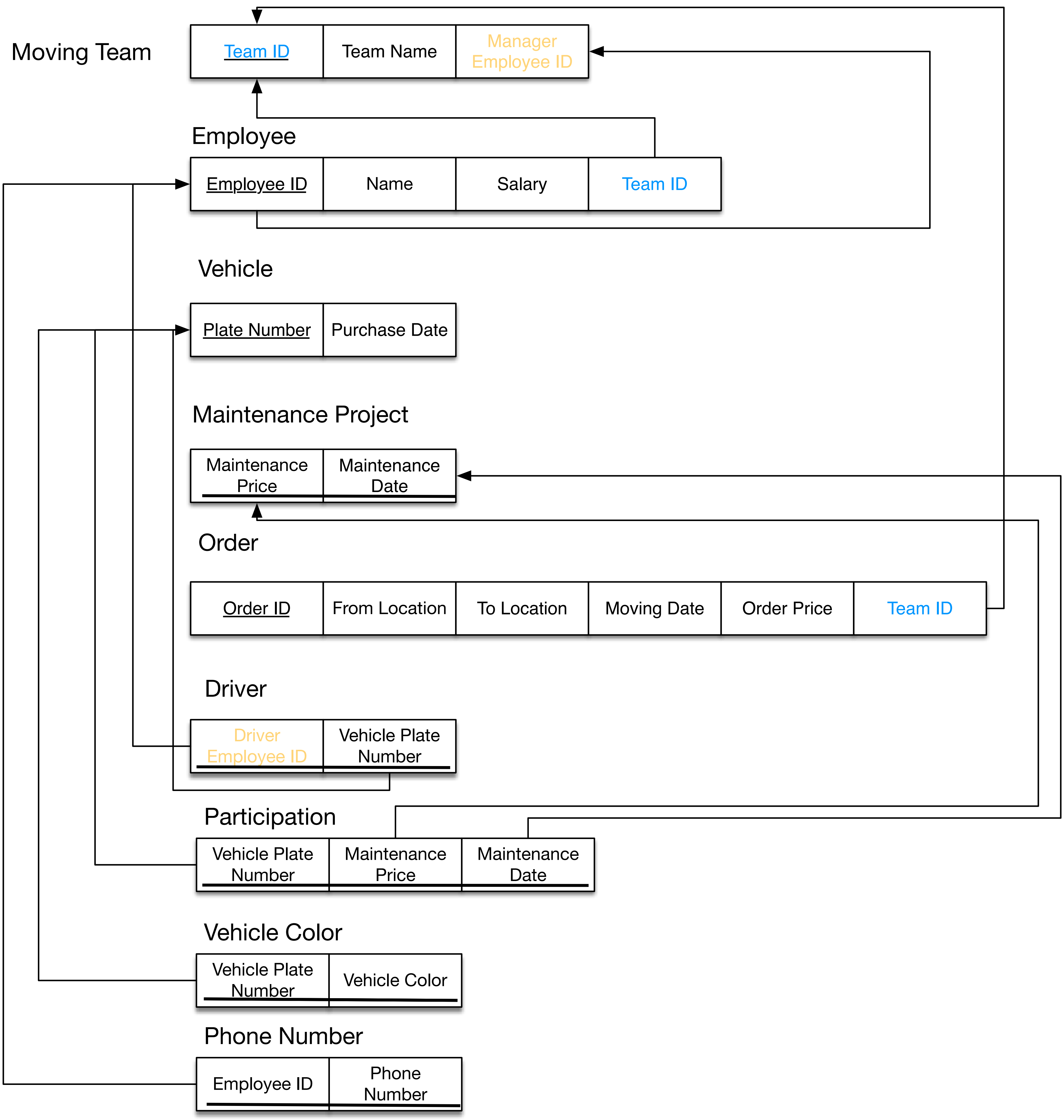
Question_2_ER_Diagram



An Assumption:

Every vehicle has at least one driver.

Question_2_Ralation_Model



Question_3

(1) The maximum number of possible super–keys for R is 2^n – 1, for the reason that:

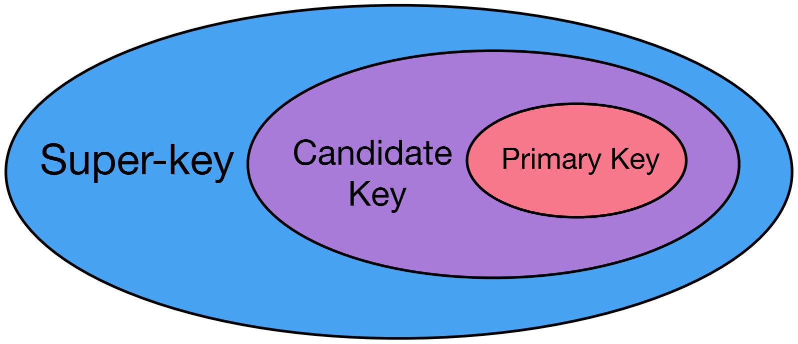
if every single attribute of R is super-key, then all the non-empty subsets of the attributes are super-keys,

and the non-empty subset number of a set which has n elements is 2^n - 1, therefore the answer is 2^n - 1.

(2) The maximum number of possible candidate keys for R is:

$$\frac{n!}{(\frac{1}{2}n)! \cdot (\frac{1}{2}n)!}$$,when n is even;

$$\frac{n!}{(n - \frac{n+1}{2})! \cdot (\frac{n+1}{2})!} \text{ or } \frac{n!}{(n - \frac{n-1}{2})! \cdot (\frac{n-1}{2})!}$$,when n is odd.



The reason for this is that,

according to the definition of a candidate key, if a candidate key consist of n attributes,

any (n-1) attributes of them cannot be a super key.Therefor we get m attributes of n attributes,

and let all the combinations are candidate keys, and all the combinations of (m–1) attributes are not super–keys.

On the basis of math knowledge, we know that when m is the ceil of or the floor of (n / 2), C_n^m would reach the maximum number.

As a result, we calculate the values of them as above.