Assignment 1 (Due: Tuesday 28/September/2021 )

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Question A. (50 marks)

1) A database is being constructed to keep track of the teams and games of a football league:

\*the league has many teams, each team has a name, a city, a coach, a captain, and a set of players.

\*each player belongs to only one team, each player has an id, a name, a position (such as right back or center forward), a skill level, and a set of injury records.

\* a team captain is also a player

\* each injury record keeps track of the payer who has been treated, the date of the treatment, several drugs used in the treatment.

\* a game is played between two teams (referred to as host\_team and guest\_team) and has a date (such as June 11th, 2015) and a score (such as 4 to 2).

Design an ER diagram for this application, stating any assumptions you make. [30 marks]

2) For your ER diagram given above, convert it into relational schema using the mapping guidelines discussed in the lecture. For each relation (table) obtained, specify the name and its attributes, as well as its primary key. [20 marks]

Question B. [50 marks]

Consider the relation R = {A, B, C, D, E, F, G, H, I,J} and the set of functional dependencies F = { {A, B} -> {C}, {A} -> {D, E}, {B} -> {F}, {F} ->{G, H}, {D} -> {I, J} }.

(a) Proof {A}->{E,J} holds by using inference rules. (10 marks)

(b) Whether {A,B,C} is a super key? Whether {A,B,C} is a candidate key? Why? (10 marks)

(c) Whether {A,F} is a super key? Whether {A,F} is a candidate key? Why? (10 marks)

(d) Decompose R into 2NF. (10 marks)

(e) Decompose R into BCNF. (10 marks)