Course: CS3402 Database Systems
Term: 2019-20 Semester B
Assignment #1 (100 marks)
Submission deadline: March 14, 2020

Name: _____

Student ID: _____

Consider the following relational model for a basketball league:

- Player (PlayerID, PName, Position, TeamID)
- Team (TeamID, TName, Venue)
- Game (GameNo, Date, Time, HomeTeamID, AwayTeamID)
- Record (GameNo, PlayerID, Points, Rebounds, Assists)

In this basketball league, each team has a unique name and each player plays for only one team. One team has at least 10 players. Two teams (home team versus away team) participate in each game at home team's venue. Each team meets all other teams twice (i.e., double round-robin tournament), one time as home team and the other time as away team. For each game, the league records points, the number of rebounds and the number of assists for each player. If a player did not play for a game, there is no record for this player in that game.

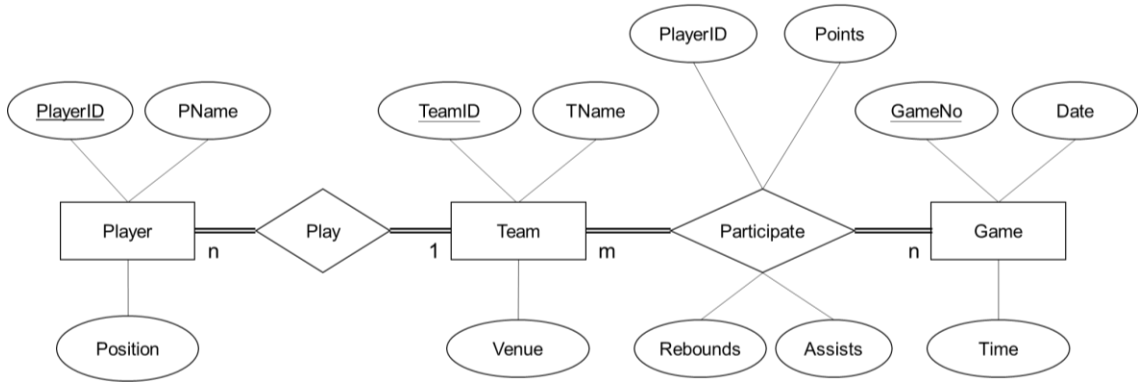
Please answer all the following questions based on the provided relational model and information for the basketball league.

**Question 1. Draw an ER-diagram model for the basketball league. (The relationship between two entities should be 1-to-1, 1-to-many, many-to-1 or many-to-many.) [20 marks]**

This is just one suggested solution. The answer is correct if it is reasonable. However, the ER-diagram must show the following properties:

1. All relationships are total participations.
2. PlayerID, TeamID and GameNo are unique attributes.
3. The relationship between Player and Team is 1-to-many relationship.
4. The relationship between Team and Game is many-to-many relationship.
5. All the attributes should be involved in the ER-diagram.

Note: A correct answer may have additional entities.
It is also correct to have HomeTeamID and AwayTeamID as Game's attributes.



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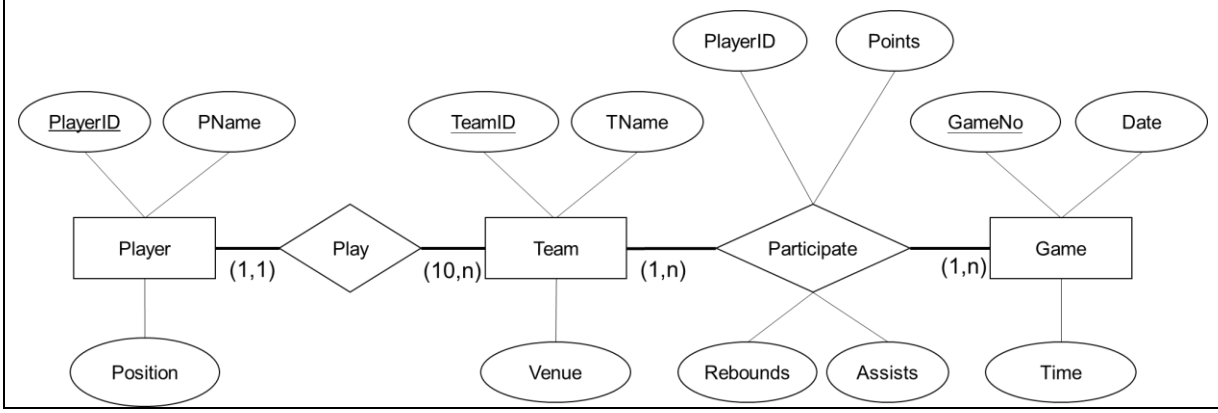
If a student chose to use Cardinality Constraints:

1. the notation is (min, max), missing min or max is wrong
2. the min cannot be zero, due to the total participation




**Question 2. Write a relational algebra that returns the PlayerID and PName of players who did not play for any game. [20 marks]**

Tmp ← $\pi_{\text{PlayerID}}$ (Player) - $\pi_{\text{PlayerID}}$ (Record)
Result ← $\pi_{\text{PlayerID, PName}}$ (Tmp * Player)

(This is just one suggested solution. The answer is correct if it retrieves the required result. The "Result ←" can be omitted.)

**Question 3. Write a relational algebra that returns the GameNo, Venue, team name of the home team (renamed it as HomeTeamName) and team name of the away team (renamed it as AwayTeamName). [20 marks]**

Tmp ← $\pi_{\text{GameNo, Venue, TName, AwayTeamID}}$ (Game $\bowtie_{\text{HomeTeamID=TeamID}}$ Team)
Tmp2 ← ρ(GameNo, Venue, HomeTeamName, AwayTeamID)(Tmp)
Tmp3 ← $\pi_{\text{GameNo, Venue, HomeTeamName, TName}}$ (Tmp2 $\bowtie_{\text{AwayTeamID=TeamID}}$ Team)
Result ← ρ(GameNo, Venue, HomeTeamName, AwayTeamName)(Tmp3)

(This is just one suggested solution. The answer is correct if it retrieves the required result. The "Result ←" can be omitted.)

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**Question 4. Write a SQL to retrieve the TeamID, TeamName and the number of players for each team. [20 marks]**

```
SELECT Team.TeamID, TName, COUNT(*)
FROM Team, Player
WHERE Team.TeamID=Player.TeamID
GROUP BY Team.TeamID, TName;
```

(This is just one suggested solution. The answer is correct if it retrieves the required result. No mark will be deducted if you use TeamName instead of TName.)

**Question 5. Write a SQL to retrieve the PlayerID and PName of players who played for their team in two or more games. [20 marks]**

```
SELECT Player.PlayerID, PName
FROM Player, Record
WHERE Player.PlayerID=Record.PlayerID
GROUP BY Player.PlayerID, PName
HAVING COUNT(*) >= 2;
```

(This is just one suggested solution. The answer is correct if it retrieves the required result.)