**Problem Description:**

Consider the following relation about cricket players during a season. The following table tracks the number of runs scored by the player. An instance of the table as it stands is given. Assume:

1. No two players have the same name.
2. A player can play against another team more than once but not on the same date. Further, a player plays only one game on any date
3. A coach coaches only one team.
4. Two teams can have a game against different opponents on the same date.
5. Every player is given a number and no two players on the same team can have the same number. Two players on different teams can have the same number.

**Player (PlayerName, PlayerState, PlayerNumber, PlayerTeam, TeamCoach, GameAgainst, GameDate, PlayerRuns)**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Sachin Tendulkar | Maharashtra | 11 | India | Greg Chappel | Pakistan  Pakistan  England | 12/3/03  25/3/03  29/3/03 | 95  22  88 |
| Adam Gilchrist | Western Australia | 34 | Australia | John Buchanan | S. Africa  S. Africa  New Zealand | 10/3/03  11/3/03  12/3/03 | 42  61  62 |

For the following questions, explain your steps clearly.

1. Is the relation in 1NF? Why or why not? If not, reduce the relation to 1NF.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **player name** | **player state** | **player number** | **player team** | **team coach** | **game against** | **game date** | **runs** |
| sachin Tendulkar | Maharashtra | 11 | India | Greg Chappel | Pakistan | 12/3/03 | 95 |
| sachin Tendulkar | Maharashtra | 11 | India | Greg Chappel | Pakistan | 25/3/03 | 22 |
| sachin Tendulkar | Maharashtra | 11 | India | Greg Chappel | England | 29/3/03 | 88 |
| Adam Gilchrist | Western Australia | 34 | Australia | John Buchanan | S. Africa | 10/3/03 | 42 |
| Adam Gilchrist | Western Australia | 34 | Australia | John Buchanan | S. Africa | 11/3/03 | 61 |
| Adam Gilchrist | Western Australia | 34 | Australia | John Buchanan | New Zealand | 12/3/03 | 62 |

1. Using your knowledge of cricket and from the instance, identify the functional dependencies for this relation.

**PlayerName, PlayerState,PlayerNumber, PlayerTeam, TeamCoach==>GameAgainst, GameDate, PlayerRuns**

1. Is the table you created in question 1 also in 2NF? If not decompose the relation into ones that are in 2NF.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **player number** | **player name** | **player state** | **player team** | **team coach** |
| 11 | sachin Tendulkar | Maharashtra | India | Greg Chappel |
| 34 | Adam Gilchrist | Western Australia | Australia | John Buchanan |

|  |  |  |
| --- | --- | --- |
| **game against** | **game date** | **runs** |
| pakistan | 12/03/03 | 95 |
| pakistan | 25/03/03 | 22 |
| england | 29/03/03 | 88 |
| south africa | 10/03/03 | 42 |
| south africa | 11/03/03 | 61 |
| new zealand | 12/03/03 | 62 |

1. Is/Are the table(s) you created in question 3 also in 3NF? If not decompose into 3NF.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **player number(PK)** | **player name** | **player state** | **player team** | **team coach** |
| 11 | sachin Tendulkar | Maharashtra | India | Greg Chappel |
| 34 | Adam Gilchrist | Western Australia | Australia | John Buchanan |

|  |  |  |  |
| --- | --- | --- | --- |
| **player number(FK)** | **game against** | **game date** | **runs** |
| 11 | pakistan | 12/03/03 | 95 |
| 11 | pakistan | 25/03/03 | 22 |
| 11 | england | 29/03/03 | 88 |
| 34 | south africa | 10/03/03 | 42 |
| 34 | south africa | 11/03/03 | 61 |
| 34 | new zealand | 12/03/03 | 62 |