**1.** 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.
2. Using your knowledge of cricket and from the instance, identify the functional dependencies for this relation.
3. Is the table you created in question 1 also in 2NF? If not decompose the relation into ones that are in 2NF.
4. Is/Are the table(s) you created in question 3 also in 3NF? If not decompose into 3NF.

**1NF:**

A Table to be in 1NF it should have atomic data (the data should not be divided further)

The above table should be converted to 1NF

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **PlayerName** | **PlayerState** | **PlayerNumber** | **PlayerTeam** | **TeamCoach** | **GameAgainst** | **GameDate** | **PlayerRuns** |
| 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 |
|  |  |  |  |  |  |  |  |

**2NF :**

If a table should be in 2NF, It should be in 1NF and there should be no partial dependencies.

Player Details:

|  |  |  |
| --- | --- | --- |
| **PlayerName(PK)** | **PlayerState** | **PlayerNumber** |
| Sachin Tendulkar | Maharashtra | 11 |
| Adam Gilchrist | Western Australia | 34 |

TeamInfo:

|  |  |
| --- | --- |
| **PlayerTeam(PK)** | **TeamCoach** |
| India | Greg Chappel |
| Australia | John Buchanan |

MatchDatails

|  |  |  |
| --- | --- | --- |
| **GameAgainst** | **GameDate** | **PlayerRuns** |
| Pakistan | 12/3/03 | 95 |
| Pakistan | 25/3/03 | 22 |
| England | 29/3/03 | 88 |
| S. Africa | 10/3/03 | 42 |
| S. Africa | 11/3/03 | 61 |
| New Zealand | 12/3/03 | 62 |

**3NF :**

If a table should be in 3NF, It should be in 2NF and there should be no transition dependencies.

PlayerDatails

|  |  |  |  |
| --- | --- | --- | --- |
| **PlayerName(PK)** | **PlayerState** | **PlayerNumber** | **PlayerTeam(FK)** |
| Sachin Tendulkar | Maharashtra | 11 | India |
| Adam Gilchrist | Western Australia | 34 | Australia |

TeamInfo

|  |  |
| --- | --- |
| **PlayerTeam(PK)** | **TeamCoach** |
| India | Greg Chappel |
| Australia | John Buchanan |

Match details

|  |  |  |  |
| --- | --- | --- | --- |
| **PlayerName(FK)** | **GameAgainst** | **GameDate** | **PlayerRuns** |
| Sachin Tendulkar | Pakistan | 12/3/03 | 95 |
| Sachin Tendulkar | Pakistan | 25/3/03 | 22 |
| Sachin Tendulkar | England | 29/3/03 | 88 |
| Adam Gilchrist | S. Africa | 10/3/03 | 42 |
| Adam Gilchrist | S. Africa | 11/3/03 | 61 |
| Adam Gilchrist | New Zealand | 12/3/03 | 62 |