**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 |

Ques1)Is the relation in 1NF? Why or why not? If not, reduce the relation to 1NF.

1)1NF

A relation is in first normal form if and only if the domain of each attribute contains only atomic (indivisible) values, and the value of each attribute contains only a single value from that domain.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Player\_name | Player\_state | Player\_team | Team\_Coach | Game\_aggainst | Gamedate | Player\_Run | Player\_No. |
| Sachin Tendulkar | Maharashtra | India | Greg Chappel | Pakistan | 12/3/03 | 95 | 11 |
| Sachin Tendulkar | Maharashtra | India | Greg Chappel | Pakistan | 25/3/03 | 22 | 11 |
| Sachin Tendulkar | Maharashtra | India | Greg Chappel | England | 29/3/03 | 85 | 11 |
| Adam Gilchrist | Western Australia | Australia | John Buchanan | S. Africa | 10/3/03 | 42 | 34 |
| Adam Gilchrist | Western Australia | Australia | John Buchanan | S. Africa | 11/3/03 | 61 | 34 |
| Adam Gilchrist | Western Australia | Australia | John Buchanan | New Zealand | 12/3/03 | 62 | 34 |

Ques2)Using your knowledge of cricket and from the instance, identify the functional dependencies for this relation.

2)Functional dependencies: The functional dependency is a relationship that exists between two attributes. It typically exists between the primary key and non-key attribute within a table. X   →   Y

* player state is dependent on player name(PlayerName🡪PlayerState)
* player no. is dependent on player \_name+ player team(PlayerTeam+PlayerName🡪Player\_No.)
* player run depends on player name+game\_date(PlayerName+GameDate🡪PlayerRun)
* team coach depends on player team(PlayerTeam🡪TeamCoach)
* game against dependents on player\_ team+ game date(PlayerTeam+GameDate🡪GameAggainst)

Ques 3)Is the table you created in question 1 also in 2NF? If not decompose the relation into ones that are in 2NF.

3)2NF

Second Normal Form (2NF) is based on the concept of full functional dependency.

To be in second normal form, a relation must be in first normal form and relation must not contain any partial dependency.

A relation is in 2NF if it has No Partial Dependency

|  |  |
| --- | --- |
| Player\_name | Player\_state |
| Sachin Tendulkar | Maharashtra |
| Sachin Tendulkar | Maharashtra |
| Sachin Tendulkar | Maharashtra |
| Adam Gilchrist | Western Australia |
| Adam Gilchrist | Western Australia |
| Adam Gilchrist | Western Australia |
| Sachin Tendulkar | Maharashtra |

|  |  |  |
| --- | --- | --- |
| Player\_name | Player\_team | Player\_No |
| Sachin Tendulkar | India | 11 |
| Sachin Tendulkar | India | 11 |
| Sachin Tendulkar | India | 11 |
| Adam Gilchrist | Australia | 34 |
| Adam Gilchrist | Australia | 34 |
| Adam Gilchrist | Australia | 34 |

|  |  |  |
| --- | --- | --- |
| Player\_name | Game\_date | Player\_run |
| Sachin Tendulkar | 12/3/03 | 95 |
| Sachin Tendulkar | 25/3/03 | 22 |
| Sachin Tendulkar | 29/3/03 | 85 |
| Adam Gilchrist | 10/3/03 | 42 |
| Adam Gilchrist | 11/3/03 | 61 |
| Adam Gilchrist | 12/3/03 | 62 |

|  |  |
| --- | --- |
| Player\_team | Team\_coach |
| India | Greg Chappel |
| India | Greg Chappel |
| India | Greg Chappel |
| Australia | John Buchanan |
| Australia | John Buchanan |
| Australia | John Buchanan |

|  |  |  |
| --- | --- | --- |
| Player\_team | Game\_date | Game\_against |
| India | 12/3/03 | Pakistan |
| India | 25/3/03 | Pakistan |
| India | 29/3/03 | England |
| Australia | 10/3/03 | S. Africa |
| Australia | 11/3/03 | S. Africa |
| Australia | 12/3/03 | New Zealand |

Ques 4)Is/Are the table(s) you created in question 3 also in 3NF? If not decompose into 3NF.

4)Yes the above is in 3nf as there is no transitive dependencies

Third normal form:

A relation is in third normal form if it is in 2NF and no non key attribute is transitively dependent on the primary key.