**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 |

SOLUTION::

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

1NF only hold single-valued attribute.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **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 |

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

Relation of one attribute to another attribute in a DBMS. Functional Dependency helps to maintain the quality of data in the database.

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

playerNumber(N) <= PlayerTeam(1)

playerTeam(N)<=TeamCoach(1)

GameAgainst(N)<=GameDate(1)

playerName(N)=>PlayerRuns(N)

playerName(1)=>playerNumber(1)

When we find closure, only PlayerNumber can uniquely determine all the attributes of PLAYER. Hence, Player-no is the only candidate key.

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 | Game Against | Game Date | Players Runs |
| 11 | Pakistan | 12/3/03 | 95 |
| 11 | Pakistan | 25/3/03 | 22 |
| 11 | England | 29/3/03 | 88 |
| 34 | S. Africa | 10/3/03 | 42 |
| 34 | S. Africa | 11/3/03 | 61 |
| 34 | New Zealand | 12/3/03 | 62 |

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

3NF is used to reduce the data duplication. It is also used to achieve the data integrity.If there is no transitive dependency for non- prime attributes, then the relation must be in third normal form.

Attributes of the relation which does not exist in any of the possible candidate keys of the relation, such attributes are called non prime or non key attributes.

1.Player : PlayerName PlayerState, playerNumber

|  |  |  |
| --- | --- | --- |
| playerName | playerState | playerNumber |
| Sachin Tendulkar | Maharashtra | 11 |
| Adam Gilchrist | Western Australia | 34 |

2.Team: PlayerNumber, PlayerTeam, TeamCoach, GameAgainst, GameDate,PlayerRun

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| PlayerNumber | PlayerTeam | TeamCoach | GameAgainst | GameDate | PlayerRun |
| 11 | India | Greg Chappel | Pakistan | 12/3/03 | 95 |
| 11 | India | Greg Chappel | Pakistan | 25/3/03 | 22 |
| 11 | India | Greg Chappel | England | 29/3/03 | 88 |
| 34 | Australia | John Buchanan | S. Africa | 10/3/03 | 42 |
| 34 | Australia | John Buchanan | S. Africa | 11/3/03 | 61 |
| 34 | Australia | John Buchanan | New Zealand | 12/3/03 | 62 |