

## Abbreviations Used:

V-S for Venue-Stadium  
V-C for Venue-Country  
M-Team for Match-Team  
M-Bat for Match-Batting

M-Bowl for Match-Bowling  
CPid for Captain Pid  
WPid for Wicket-keeper Pid

Roll Number \_\_\_\_\_

## CS3400 Database Systems

### Quiz 2 - 4<sup>th</sup> Dec 2006

A. For the questions given below, write the corresponding relational algebra expression. The primary keys for each of the relations are underlined.

Player (Pid, First Name, Last Name, Age, Country)

Match (Mid, Date, Venue\_Stadium, Venue\_Country)

Match\_Team (Mid, CaptainPid, Wicket-KeeperPid)

Match\_Batting (Mid, Pid, Runs\_Scored, Balls\_Faced)

Match\_Bowling (Mid, Pid, Overs\_Bowled, Runs\_Given, Wickets\_Taken)

#### The foreign key, primary key relationships:

Match\_Team(Mid) references Match(Mid)

Match\_Batting(Mid) references Match(Mid)

Match\_Bowling(Mid) references Match(Mid)

Match\_Team(CaptainPid) references Player(Pid)

Match\_Team(Wicket-KeeperPid) references Player(Pid)

Match\_Batting(Pid) references Player(Pid)

Match\_Bowling(Pid) references Player(Pid)

1. Give the details of the matches (date and venue stadium) which are played in 'India' between '01-01-2000' and '01-01-2004'.

$$\pi_{\text{Date, V-S}} (\sigma_{\text{Date} > '01-01-2000' \text{ and } \text{Date} < '01-01-2004'} (\text{Match}))$$

2. For all the matches played in 'India', give the match details (date and venue stadium) in which the captain scored more than 100 runs.

3. Give the match details (date and venue stadium) in which at least one player scored more than 50 runs.

$$\pi_{\text{Date, V-S}} (\text{Match} \bowtie (\sigma_{\text{Runs-Scored} > 50} (\text{Match-Batting})))$$

②

$$\text{M-Captains} \leftarrow \pi_{\text{Mid, CPid, Date, V-S}} (\text{M-Team} \bowtie (\sigma_{\text{Mid}=\text{Mid} \text{ and } \text{V-C}='India'} (\text{Match})))$$

$$\text{Result} \leftarrow \pi_{\text{Date, V-S}} (\text{M-Captains} \bowtie (\sigma_{\text{Runs-Scored} > 100} (\text{M-Batting})))$$

Mid=Mid & CPid=Pid



5) 
$$\text{Played-India} \leftarrow \Pi_{Pid} \left( \sigma_{\substack{\text{Runs-Scored} > 1000 \\ \text{Mid} = \text{Mid} \\ \text{V-C} = \text{'India'}}} (M-Bat) \bowtie (M-Match) \right)$$

$$\text{Result} \leftarrow \Pi_{\substack{\text{FirstName} \\ \text{LastName}}} (Player \bowtie \text{Played-India})$$

4. Give the ids of the matches in which the same player scored more than 100 runs and has taken more than 5 wickets.

$$\Pi_{Mid} \left( \left( \sigma_{\substack{\text{Runs-Scored} > 100}} (M-Bat) \right) \bowtie_{\substack{\text{Mid} = \text{Mid} \\ \& \text{Pid} = \text{Pid}}} \left( \sigma_{\substack{\text{Wickets-Taken} > 5}} (M-Bowl) \right) \right)$$

5. Give the first name and last name of the players who played matches held in 'India' and who scored more than 100 runs.

6. Give the details of the matches (date and venue stadium) in which the wicket keeper scored more runs than the captain.

7. Give the details of the matches (date and venue stadium) in which the captain of a team whose age is more than 30 scored more than 100 runs and took more than 5 wickets.

$$\text{Captains} \leftarrow \Pi_{Mid, Pid} \left( \sigma_{\substack{\text{Wickets-Taken} > 5}} (M-Bowl) \bowtie_{\substack{\text{Mid} = \text{Mid} \\ \text{Pid} = \text{CPid}}} M-Team \bowtie_{\substack{\text{Mid} = \text{Mid} \\ \text{Pid} = \text{CPid}}} \left( \sigma_{\substack{\text{Runs-Scored} > 100}} (M-Bat) \right) \right)$$

$$\text{Result} \leftarrow \Pi_{\substack{\text{Date}, \text{V-S}}} (Match \bowtie_{\substack{\text{Mid} = \text{Mid} \\ \text{CPid} = \text{Pid}}} \text{Captains} \bowtie_{\substack{\text{Age} > 30}} (Player))$$

B. For each of the following updates, determine if it violates any integrity constraint. If so, what would you do to handle it.

Player

Pid	First Name	Last Name	Age	Country
P001	Sachin	Tendulkar	33	India
P002	Rahul	Dravid	33	India
P003	Mahendra	Dhoni	25	India
P004	Jacques	Kallis	31	South Africa
P005	Graeme	Smith	25	South Africa
P006	Mark	Boucher	30	South Africa

a. 
$$\text{Captain Runs} \leftarrow \Pi_{\substack{\text{Mid}, \text{Runs-Scored}}} (M-Batting \bowtie_{\substack{\text{Mid} = \text{Mid} \\ \text{Pid} = \text{CPid}}} M-Team)$$

b. 
$$\text{Wicket Keeper Runs} \leftarrow \Pi_{\substack{\text{Mid}, \text{Runs-Scored}}} (M-Batting \bowtie_{\substack{\text{Mid} = \text{Mid} \\ \text{Pid} = \text{WPid}}} M-Team)$$

c. 
$$\text{Match IDs} \leftarrow \Pi_{Mid} (\text{Captain Runs} \bowtie_{\substack{\text{Mid} = \text{Mid} \text{ and} \\ \text{Runs Scored} > \text{Runs Scored}}} \text{Wicket Keeper Runs})$$

d. 
$$\text{Result} \leftarrow \Pi_{\substack{\text{Date}, \text{V-S}}} (Match \bowtie_{\substack{\text{Mid} = \text{Mid}}} \text{Match IDs})$$

### Match

<u>Mid</u>	<u>Date</u>	<u>Venue_Stadium</u>	<u>Venue_Country</u>
M001	19-11-2006	New Wanderers Stadium, Johannesburg,	South Africa
M002	22-11-2006	Kingsmead, Durban	South Africa
M003	26-11-2006	Newlands, Cape Town	South Africa
M004	29-11-2006	St George's Park, Port Elizabeth	South Africa
M005	03-12-2006	SuperSport Park, Centurion	South Africa

### Match\_Team

<u>Mid</u>	<u>CaptainPid</u>	<u>Wicket-KeeperPid</u>
M001	P002	P003
M001	P005	P006
M002	P002	P003
M002	P005	P006

### Match\_Batting

<u>Mid</u>	<u>Pid</u>	<u>Runs_Scored</u>	<u>Balls_Faced</u>
M002	P001	35	79
M002	P002	18	32
M002	P004	119	189
M002	P005	1	7

### Match\_Bowling

<u>Mid</u>	<u>Pid</u>	<u>Overs_Bowled</u>	<u>Runs_Given</u>	<u>Wickets_Taken</u>
M003	P001	3	12	0
M003	P004	8	29	2
M004	P001	8	46	1
M004	P004	8	41	1

#### 1. Insert

- a. Insert into Player (Null, Virender, Sehwag, 28, India)

It violates **entity integrity constraint**. We should provide unique Pid for the player, say P007.

- b. Insert into Match\_Batting (M002, P008, 47, 34)

It violates **referential integrity constraint** because player Pid=P008 is not present in the Player relation. We should throw an error to the user to change the Pid.

## 2. Delete

- a. Delete from Player where Age = 30

If the deletion is made, then it violates **referential integrity constraint** because it results in deletion of player with Pid=P006 and the Match\_Team relation contains two tuples with this value. We cannot set the Wicket-KeeperPid values in Match\_Team relation to NULL because the attribute is part of the primary key. Hence we should throw an error to the user.

- b. Delete from Match where Mid = M001

If the deletion is made, then it violates **referential integrity constraint** because the Match\_Team relation contains two tuples with this value. We cannot set the Mid values in Match\_Team relation to NULL because the attribute is part of the primary key. Hence we should throw an error to the user.

## 3. Update

- a. Update Match\_Team where change Wicket-KeeperPid=P006 to P003

It does not cause violation of any integrity constraint.

- b. Update Match where change Mid=M003 to M005.

It violates primary key constraint because there is already a tuple with M005 in Match relation. We should either change the query to Mid=M006 (or any other value already not present in the Match relation) or throw an error to the user.