Assignment 1

Dongyao He 215917610

CSE:dhe16

Instructor: Manos Papagelis

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Part1

1. No player can play against themselves.

   Cannot be expressed

   $\sigma_{playerA=playerB}(Event) = \phi$

2. All vouchers for an event have to be purchased before the time of the event

   $\sigma_{dataIssued>date}(Voucher \bowtie Event) = \phi$

3. The number of vouchers purchased for an event should not exceed the capacity of the court where the event takes place.

   Cannot be expressed

4. There exist players who have never played in any event.

   Cannot be expressed

5. A tournament's slam should be one of 'AO', 'FO', 'UO', or 'W' representing each of the Australian Open, French Open, U.S. Open, and Wimbledon Grant Slams.

   $\sigma_{slam\neq' AO' \wedge slam\neq' FO' \wedge slam\neq' UO' \wedge slam\neq' W'}(\pi_{slam} Tournament) = \phi$

Part2

1. Report the first and last name of the player that has competed in every court. If there are ties report all of them.

   $A = (\rho CID \leftarrow courtID, PID \leftarrow playerA(\pi playerA, courtID(Event))) \cup (\rho CID \leftarrow courtID, PID \leftarrow playerB(\pi playerB, courtID(Event)))$

   $B = \pi CID(Court)$

   $\pi PID\ A - \pi PID((\pi PIDA \times B) - A)$

2. Report the EID of the event for which the highest number of vouchers were purchased. If there are ties report all of them.

   Cannot be expressed

3. Report the name(s) of the countries that had players who didn't play in any event.

   $A = \pi PID(Player) - \pi PID(\rho PID \leftarrow playerA(\pi playerA(Event))) \cup (\rho PID \leftarrow playerB(\pi playerB(Event)))$

   $B = \pi ctryID(A \bowtie (Player))$

   $\pi name(B \bowtie \rho ctryID \leftarrow CTRYID(Country))$

4. Report the CID(s) and name of the court(s) where exactly one event took place.

   $A = \pi EID, courtID(Event) \bowtie \rho EID1 < -EID, courtID1 < -courtID(Event)$

   $B = \pi courtIDEvent - \pi courtID(A)$

   $\rho CID < -courtID(B) \bowtie \pi CID, name(Court)$

5. Report the countries of the players with the highest difference in the number of sets won when competed with each other at an event. If there are ties, report all of them.

   Cannot be expressed

6. Report the PID of the player(s) who have played in the court(s) with the largest capacity.

   $A = (\rho CID \leftarrow courtID, PID \leftarrow playerA(\pi playerA, courtID(Event))) \cup (\rho CID \leftarrow courtID, PID \leftarrow playerB(\pi playerB, courtID(Event)))$

   $B = \rho R1(Court) \bowtie R1.capacity < R2.capacity(\rho R2(Court))$

   $C = \pi CID(Court) - \pi R1.CID(B)$

   $\pi PID(A \bowtie C)$

7. Find the winning country of the event for which the very first voucher out of all the vouchers in the database were purchased.

   $A = \pi VID, EID\ \sigma dateIssued1 < dateIssued(Voucher \bowtie (\rho\ dateIssued1 < -dateIssued\ \pi\ dateIssued(Voucher))$

   $B = \pi\ VID, EID(Voucher) - (A)$

   $C = \pi\ EID, player < -playerA, won < -setswonA\ \sigma setswonA > setwonB(Event)$

   $D = \pi\ EID, player < -playerB, won < -setswonB\ \sigma setswonB > setwonA(Event)$

   $E = D \cup C$

   $F = \pi player(E) - (\pi\ p1.player(\rho\ p1(E) \bowtie p1.won > p2.won(\rho\ p2(E)))$

   $\pi\ name(Country \bowtie \pi CTRYID < -ctryID(Player \bowtie \pi\ PID < -playerF))$

8. Report the first and last name of the player of the country 'Canada' with the second highest number of total points among players of the same country.

   $A = \sigma name =' CANADA'(Player \bowtie \rho ctryID < -CTRYID\ Country)$

   $B = \pi PID, totalPoints(A)$

9. Report the EID(s) of the events for which at least two vouchers were bought on the date of the event.

   $A = \pi dateIssued, EID, VIDVoucher \bowtie \pi date, EIDEvent$

   $B = \sigma date - dateIssued \leq 2400 \wedge date1 - dateIssued \leq 2400 \wedge date = date1(A \times \rho dateIssued1 < -dateIssued, date1 < -date, VID1 < -VI.$

   $\pi EID\sigma VID \neq VID1(B)$

10. Consider all countries that have won at least one event. For each of those countries, report its name, and the first and last name of its player(s) who achieved the highest number of wins. If there are ties, report all of them.

    $A = \pi PID, ctryID, wins(\sigma setwonA > setwonB \vee setwonB > setwonA(Event) \bowtie Player)$

$$B = \rho\, ctryID < -ctryID1, wins1 < -wins, PID1 < -PID(A)$$

$$C = A - \pi ctryID, wins, PID(\sigma ctryID = ctryID1 \wedge wins1 > wins(A \bowtie B))$$

$$\pi name, fname, lname(Country \bowtie \rho CTRYID < -ctryID(C \bowtie Player))$$