COMP 421
William Wang
Ibrahim Younas

Project 2 : Database Creation

2. Relational Schema

WordCup(Year, HostCountry)

Matches(mID, Round, Length, NumberOfYellowCards, DateAndTime, Name, Country1, Country2)

Foreign key Name references Stadium
Name is NOT NULL
Foreign key Country1 references Teams
Foreign key Country2 references Teams
Country1 is NOT NULL
Country2 is NOT NULL

Participant(pID, Name)

Referees(pID, YearsOfExperience, Country)

Foreign key pID references Participant

EnforceRule(pID, mID,Role)

Foreign key pID references Referees
Foreign key mID references Matches
pID is NOT NULL
mID is NOT NULL

Competitor(pID, DateOfBirth)

Foreign key pID references Participant

Players(pID, Position, ShirtNumber, Country)

Foreign key Country references Teams
Foreign key pID references Competitor

Tickets(tID, Price, mID)

Foreign key mID references Matches
mID is NOT NULL

Coaches(pID, Role, Country)
Foreign key pID references Competitor
Foreign key Country references Teams
pID is NOT NULL
Country is NOT NULL

Seats(seatNumber,Name,Type, isReserved)
Foreign key Name references Stadium
Name is NOT NULL

Customer(email, PhoneNumber, Name)

Stadium(Name, Location, Capacity)

Goals(mID,Occurrence, isPenalty)

Reserve(tID, email, seatNumber, DateBought)
Foreign key email references Customer
Foreign key seatNumber references Seats
Foreign key tID references Tickets
email is NOT NULL
seatNumber is NOT NULL
tID is NOT NULL

ScoredBy(mID,Occurrence, pID)
Foreign key mID references Matches
Foreign key Occurrence references Goals
pID references Players
mID is NOT NULL
pID is NOT NULL

COMP 421
William Wang
Ibrahim Younas

ScoredFor(mID, Occurrence, Country)

Foreign key Occurrence references Goals

Foreign key Country references Team

Foreign key mID references Matches

Teams(Country, website URL, GroupName,OrganizationName)

Participate(Year, Country)

Foreign key Year references WorldCup

Foreign key Country references Teams

Country is NOT NULL

Played(Year, mID)

Foreign key Year references WorldCup

Foreign key mID references Matches

mID is NOT NULL

PlayerStats(mID, pID, StartingTime,RedCardTime, ExactPosition,LeavingTime)

Foreign key pID references Players

Foreign key mID references Matches

pID is NOT NULL

mID is NOT NULL

COMP 421
William Wang
Ibrahim Younas

3. Pending constraints

- The stadiums where the matches take place have to take place in a city that is within the host country of the world cup which in this case is Canada.
- If a goal is scored in a match then it can only be scored by one of the players that is present on the field and playing for one of the two teams.
- A player can only enter a match if the player belongs to either of the 2 teams playing
- A player can only enter and leave the match once
- Reserved seats cannot exceed the capacity of a stadium.
- The women’s world cup can only happen once every four years
- For every match, there is at least one player on each team that enters and leaves the field

COMP 421
William Wang
Ibrahim Younas

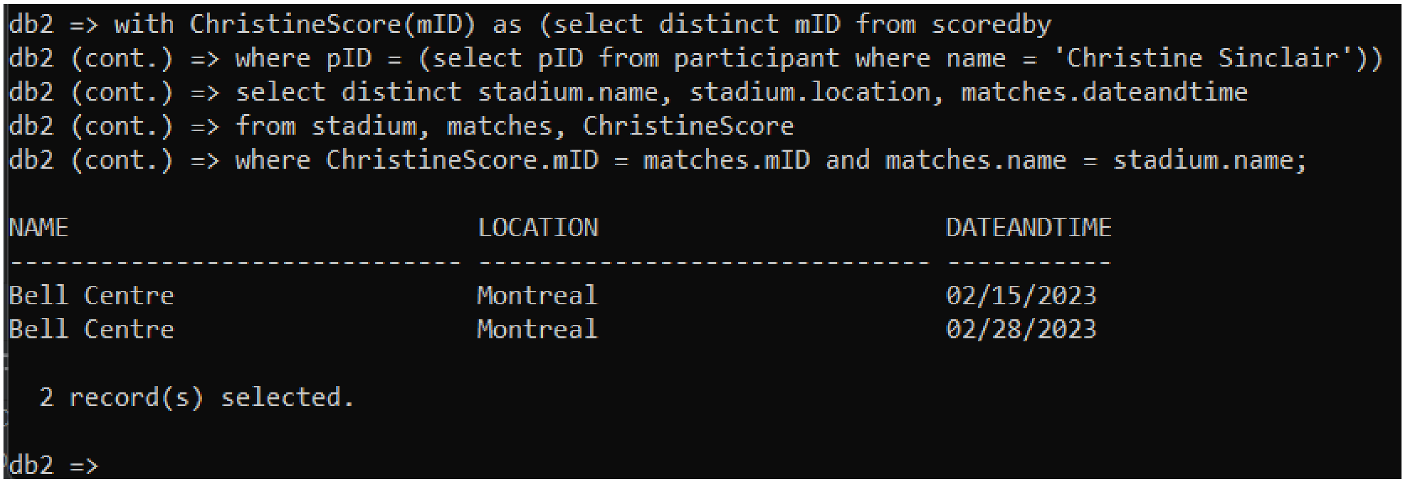
5. SQL Queries

Q5(a)

Query

```
with ChristineScore(mID) as
   (select distinct mID
    from scoredby
    where pID = (select pID from participant where name = 'Christine Sinclair'))

select distinct stadium.name, stadium.location, matches. dateandtime
from stadium, matches, ChristineScore
where ChristineScore.mID = matches.mID and matches.name = stadium.name;
```

Screenshot:



```
db2 => with ChristineScore(mID) as (select distinct mID from scoredby
db2 (cont.) => where pID = (select pID from participant where name = 'Christine Sinclair'))
db2 (cont.) => select distinct stadium.name, stadium.location, matches.dateandtime
db2 (cont.) => from stadium, matches, ChristineScore
db2 (cont.) => where ChristineScore.mID = matches.mID and matches.name = stadium.name;

NAME                           LOCATION                       DATEANDTIME
------------------------------ ------------------------------ -----------
Bell Centre                    Montreal                       02/15/2023
Bell Centre                    Montreal                       02/28/2023

  2 record(s) selected.

db2 =>
```

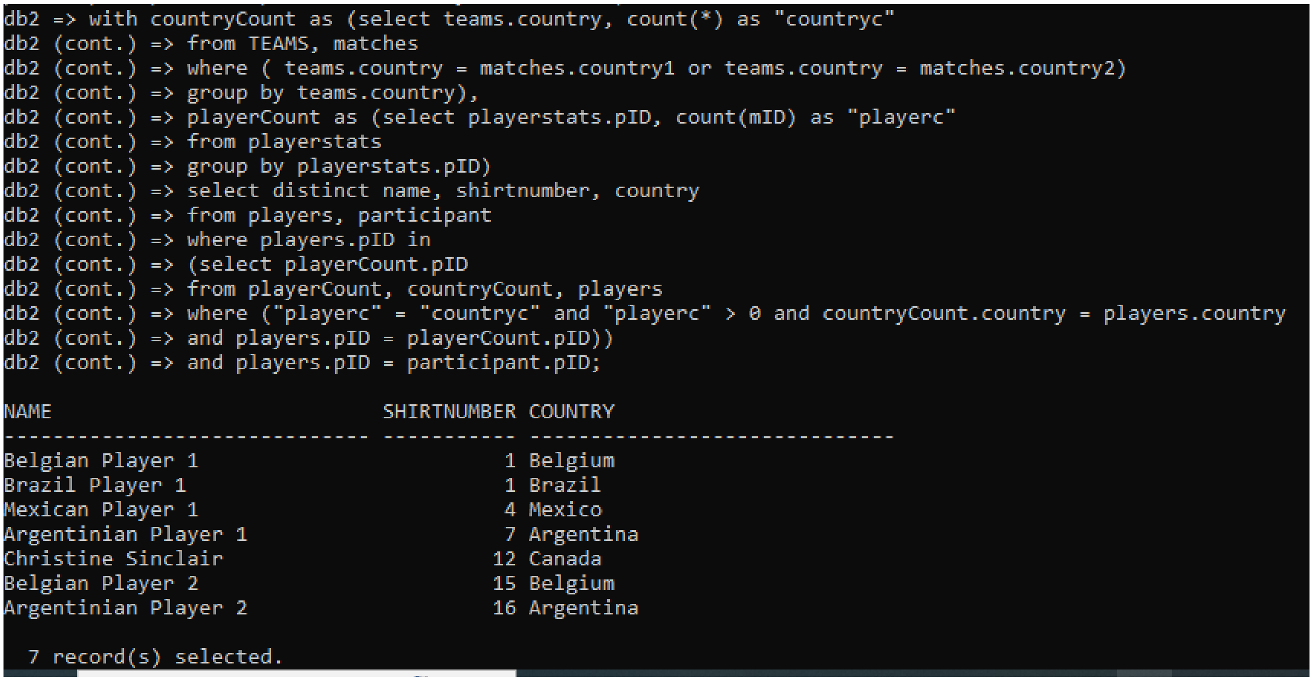
COMP 421
William Wang
Ibrahim Younas

Q5(b)

Query

```
with countryCount as (select teams.country, count(*) as "countryc"
from TEAMS, matches
where ( teams.country = matches.country1 or teams.country = matches.country2)
group by teams.country),

playerCount as (select playerstats.pID, count(mID) as "playerc"
from playerstats
group by playerstats.pID)

select distinct name, shirtnumber, country
from players, participant
where players.pID in
(select playerCount.pID
from playerCount, countryCount, players
where ("playerc" = "countryc" and "playerc" > 0 and countryCount.country = players.country
        and players.pID = playerCount.pID))
and players.pID = participant.pID;
```

Screenshot:



```
db2 => with countryCount as (select teams.country, count(*) as "countryc"
db2 (cont.) => from TEAMS, matches
db2 (cont.) => where ( teams.country = matches.country1 or teams.country = matches.country2)
db2 (cont.) => group by teams.country),
db2 (cont.) => playerCount as (select playerstats.pID, count(mID) as "playerc"
db2 (cont.) => from playerstats
db2 (cont.) => group by playerstats.pID)
db2 (cont.) => select distinct name, shirtnumber, country
db2 (cont.) => from players, participant
db2 (cont.) => where players.pID in
db2 (cont.) => (select playerCount.pID
db2 (cont.) => from playerCount, countryCount, players
db2 (cont.) => where ("playerc" = "countryc" and "playerc" > 0 and countryCount.country = players.country
db2 (cont.) => and players.pID = playerCount.pID))
db2 (cont.) => and players.pID = participant.pID;

NAME                           SHIRTNUMBER COUNTRY
------------------------------ ----------- ------------------------------
Belgian Player 1                         1 Belgium
Brazil Player 1                          1 Brazil
Mexican Player 1                         4 Mexico
Argentinian Player 1                     7 Argentina
Christine Sinclair                      12 Canada
Belgian Player 2                        15 Belgium
Argentinian Player 2                    16 Argentina

  7 record(s) selected.
```

COMP 421
William Wang
Ibrahim Younas

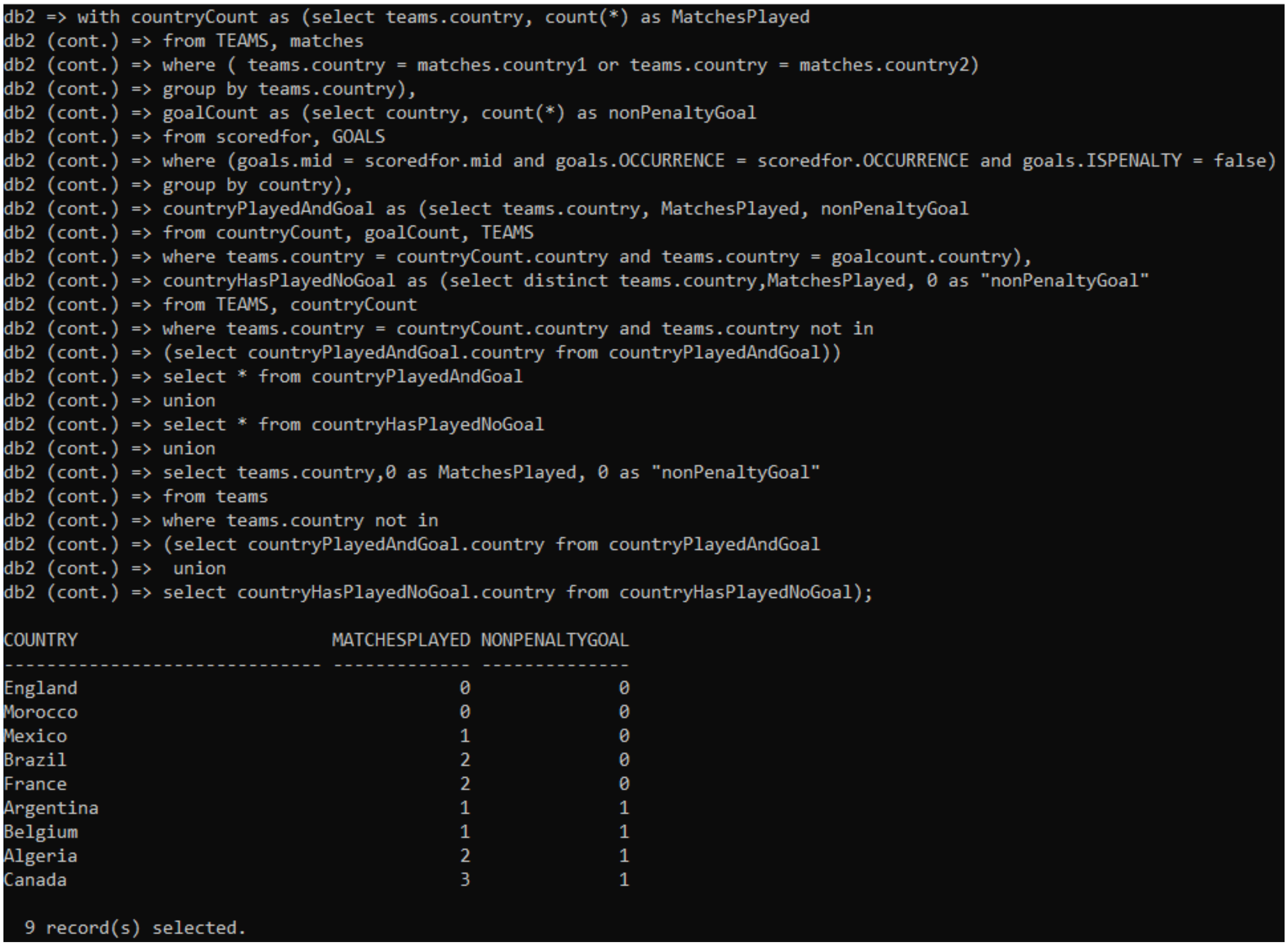
Q5(c)

Query

```
with countryCount as (select teams.country, count(*) as MatchesPlayed
from TEAMS, matches
where ( teams.country = matches.country1 or teams.country = matches.country2)
group by teams.country),

goalCount as (select country, count(*) as nonPenaltyGoal
          from scoredfor, GOALS
          where (goals.mid = scoredfor.mid and goals.OCCURRENCE =
scoredfor.OCCURRENCE and goals.ISPENALTY = false)
           group by country),

countryPlayedAndGoal as (select teams.country, MatchesPlayed, nonPenaltyGoal
       from countryCount, goalCount, TEAMS
       where teams.country = countryCount.country and teams.country = goalcount.country),

countryHasPlayedNoGoal as (select distinct teams.country,MatchesPlayed, 0 as
"nonPenaltyGoal"
       from TEAMS, countryCount
       where teams.country = countryCount.country and teams.country not in
                                        (select countryPlayedAndGoal.country from
countryPlayedAndGoal))

select * from countryPlayedAndGoal

union

select * from countryHasPlayedNoGoal

union

select teams.country,0 as MatchesPlayed, 0 as "nonPenaltyGoal"
from teams
where teams.country not in
(select countryPlayedAndGoal.country from countryPlayedAndGoal

union

select countryHasPlayedNoGoal.country from countryHasPlayedNoGoal);
```

COMP 421
William Wang
Ibrahim Younas

Screenshot :



```
db2 => with countryCount as (select teams.country, count(*) as MatchesPlayed
db2 (cont.) => from TEAMS, matches
db2 (cont.) => where ( teams.country = matches.country1 or teams.country = matches.country2)
db2 (cont.) => group by teams.country),
db2 (cont.) => goalCount as (select country, count(*) as nonPenaltyGoal
db2 (cont.) => from scoredfor, GOALS
db2 (cont.) => where (goals.mid = scoredfor.mid and goals.OCCURRENCE = scoredfor.OCCURRENCE and goals.ISPENALTY = false)
db2 (cont.) => group by country),
db2 (cont.) => countryPlayedAndGoal as (select teams.country, MatchesPlayed, nonPenaltyGoal
db2 (cont.) => from countryCount, goalCount, TEAMS
db2 (cont.) => where teams.country = countryCount.country and teams.country = goalcount.country),
db2 (cont.) => countryHasPlayedNoGoal as (select distinct teams.country,MatchesPlayed, 0 as "nonPenaltyGoal"
db2 (cont.) => from TEAMS, countryCount
db2 (cont.) => where teams.country = countryCount.country and teams.country not in
db2 (cont.) => (select countryPlayedAndGoal.country from countryPlayedAndGoal))
db2 (cont.) => select * from countryPlayedAndGoal
db2 (cont.) => union
db2 (cont.) => select * from countryHasPlayedNoGoal
db2 (cont.) => union
db2 (cont.) => select teams.country,0 as MatchesPlayed, 0 as "nonPenaltyGoal"
db2 (cont.) => from teams
db2 (cont.) => where teams.country not in
db2 (cont.) => (select countryPlayedAndGoal.country from countryPlayedAndGoal
db2 (cont.) =>  union
db2 (cont.) => select countryHasPlayedNoGoal.country from countryHasPlayedNoGoal);

COUNTRY                        MATCHESPLAYED NONPENALTYGOAL
------------------------------ ------------- --------------
England                                    0              0
Morocco                                    0              0
Mexico                                     1              0
Brazil                                     2              0
France                                     2              0
Argentina                                  1              1
Belgium                                    1              1
Algeria                                    2              1
Canada                                     3              1

  9 record(s) selected.
```

COMP 421
William Wang
Ibrahim Younas

Q5(d)

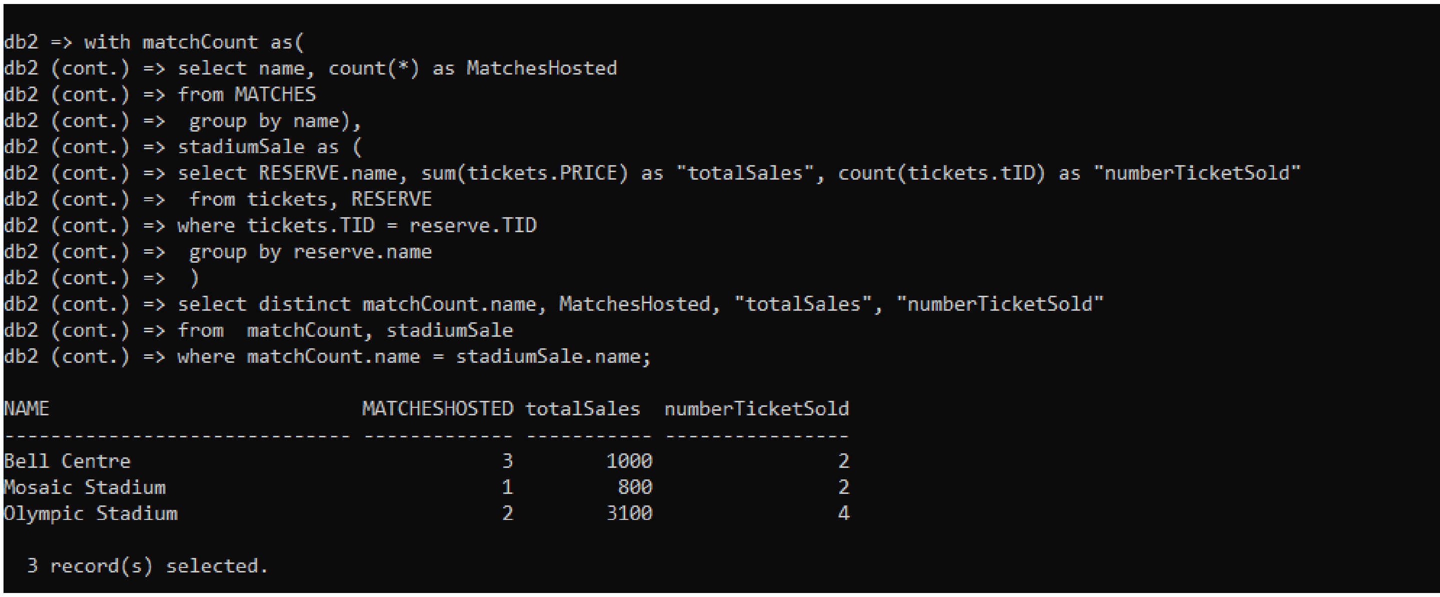
Description

The query we came up with for the purchase of tickets allows us to retrieve for every stadium that hosts at least one match the number of matches hosted, the total dollar amount of ticket sales across the whole tournament and the number of tickets sold. The stadiums that do not host any matches have been excluded as they are not relevant to the total sales nor the number of tickets sold.

Query

```
with matchCount as(
  select name, count(*) as MatchesHosted
  from MATCHES
  group by name),

  stadiumSale as (
     select RESERVE.name, sum(tickets.PRICE) as "totalSales", count(tickets.tID) as
"numberTicketSold"
     from tickets, RESERVE
     where tickets.TID = reserve.TID
     group by reserve.name
  )

select distinct matchCount.name, MatchesHosted, "totalSales", "numberTicketSold"
from  matchCount, stadiumSale
where matchCount.name = stadiumSale.name;
```

Screenshot:



```
db2 => with matchCount as(
db2 (cont.) => select name, count(*) as MatchesHosted
db2 (cont.) => from MATCHES
db2 (cont.) =>  group by name),
db2 (cont.) => stadiumSale as (
db2 (cont.) => select RESERVE.name, sum(tickets.PRICE) as "totalSales", count(tickets.tID) as "numberTicketSold"
db2 (cont.) =>  from tickets, RESERVE
db2 (cont.) => where tickets.TID = reserve.TID
db2 (cont.) =>  group by reserve.name
db2 (cont.) =>  )
db2 (cont.) => select distinct matchCount.name, MatchesHosted, "totalSales", "numberTicketSold"
db2 (cont.) => from  matchCount, stadiumSale
db2 (cont.) => where matchCount.name = stadiumSale.name;

NAME                           MATCHESHOSTED totalSales  numberTicketSold
------------------------------ ------------- ----------- ----------------
Bell Centre                                3        1000                2
Mosaic Stadium                             1         800                2
Olympic Stadium                            2        3100                4

  3 record(s) selected.
```

Q5(e)

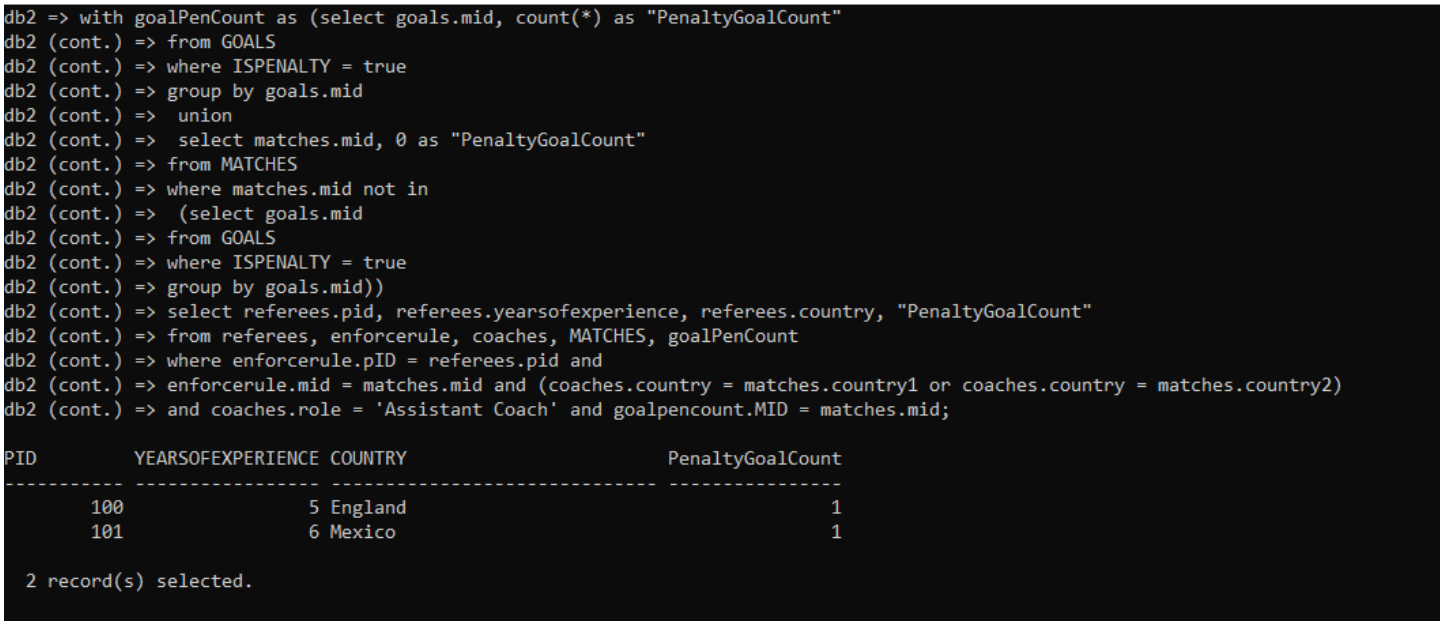
Description

This query selects all the referees that have enforced rules from matches where there is a coach present in either of the teams playing with the role of Assistant Coach. Then, for each of the referees that fulfill this requirement, display the pID, the years of experience, the country and the total number of penalty goals they have supervised.

Query

```
with goalPenCount as (select goals.mid, count(*) as "PenaltyGoalCount"
                from GOALS
                where ISPENALTY = true
                group by goals.mid
                union
                select matches.mid, 0 as "PenaltyGoalCount"
                from MATCHES
                where matches.mid not in
                (select goals.mid
                from GOALS
                where ISPENALTY = true
                group by goals.mid))

select referees.pid, referees.yearsofexperience, referees.country, "PenaltyGoalCount"
from referees, enforcerule, coaches, MATCHES, goalPenCount
where enforcerule.pID = referees.pid and
enforcerule.mid = matches.mid and (coaches.country = matches.country1 or coaches.country =
matches.country2)
and coaches.role = 'Assistant Coach' and goalpencount.MID = matches.mid;
```

Screenshot:



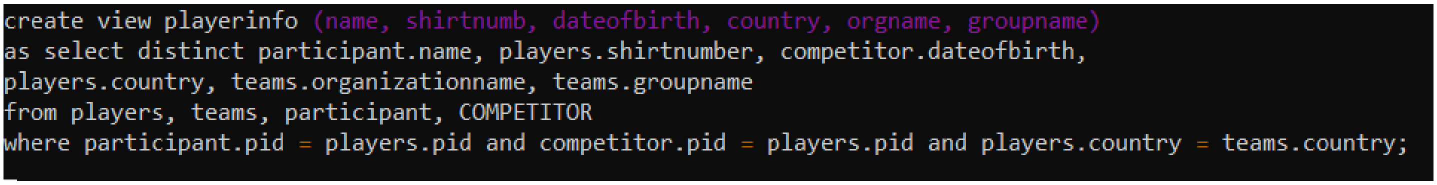
```
db2 => with goalPenCount as (select goals.mid, count(*) as "PenaltyGoalCount"
db2 (cont.) => from GOALS
db2 (cont.) => where ISPENALTY = true
db2 (cont.) => group by goals.mid
db2 (cont.) =>  union
db2 (cont.) =>  select matches.mid, 0 as "PenaltyGoalCount"
db2 (cont.) => from MATCHES
db2 (cont.) => where matches.mid not in
db2 (cont.) =>  (select goals.mid
db2 (cont.) => from GOALS
db2 (cont.) => where ISPENALTY = true
db2 (cont.) => group by goals.mid))
db2 (cont.) => select referees.pid, referees.yearsofexperience, referees.country, "PenaltyGoalCount"
db2 (cont.) => from referees, enforcerule, coaches, MATCHES, goalPenCount
db2 (cont.) => where enforcerule.pID = referees.pid and
db2 (cont.) => enforcerule.mid = matches.mid and (coaches.country = matches.country1 or coaches.country = matches.country2)
db2 (cont.) => and coaches.role = 'Assistant Coach' and goalpencount.MID = matches.mid;

PID         YEARSOFEXPERIENCE COUNTRY                        PenaltyGoalCount
----------- ----------------- ------------------------------ ----------------
        100                 5 England                                       1
        101                 6 Mexico                                        1

  2 record(s) selected.
```

COMP 421
William Wang
Ibrahim Younas

COMP 421
William Wang
Ibrahim Younas

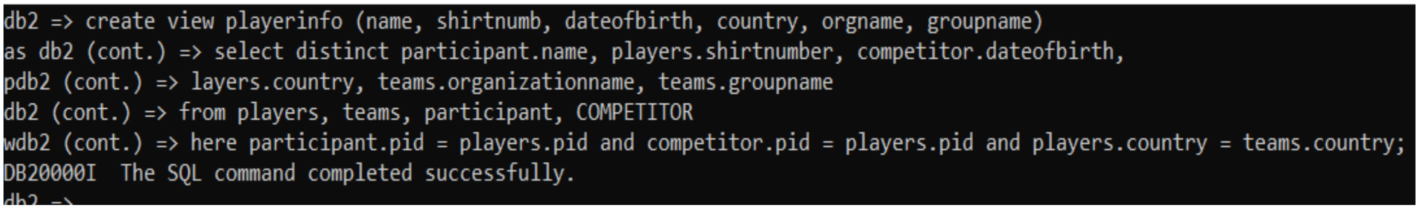
6. Player Information

Q6(a)



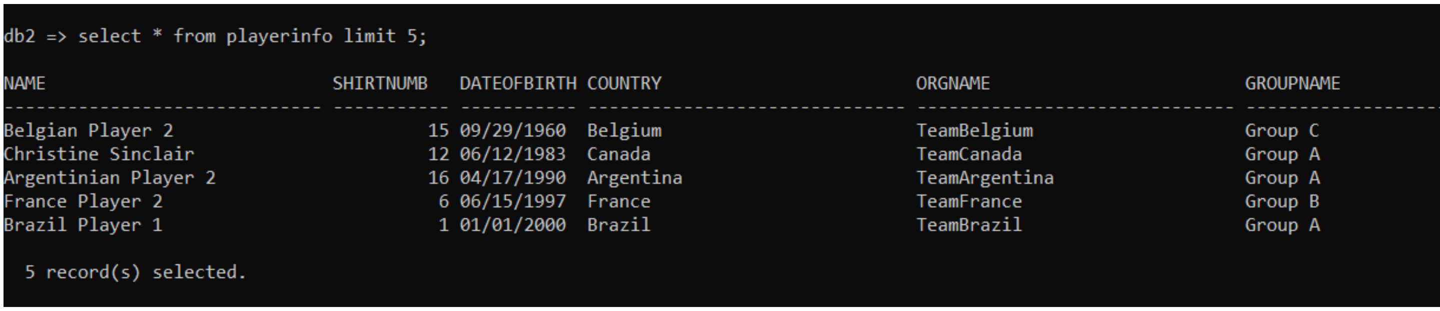
```
create view playerinfo (name, shirtnumb, dateofbirth, country, orgname, groupname)
as select distinct participant.name, players.shirtnumber, competitor.dateofbirth,
players.country, teams.organizationname, teams.groupname
from players, teams, participant, COMPETITOR
where participant.pid = players.pid and competitor.pid = players.pid and players.country = teams.country;
```

Q6(b)



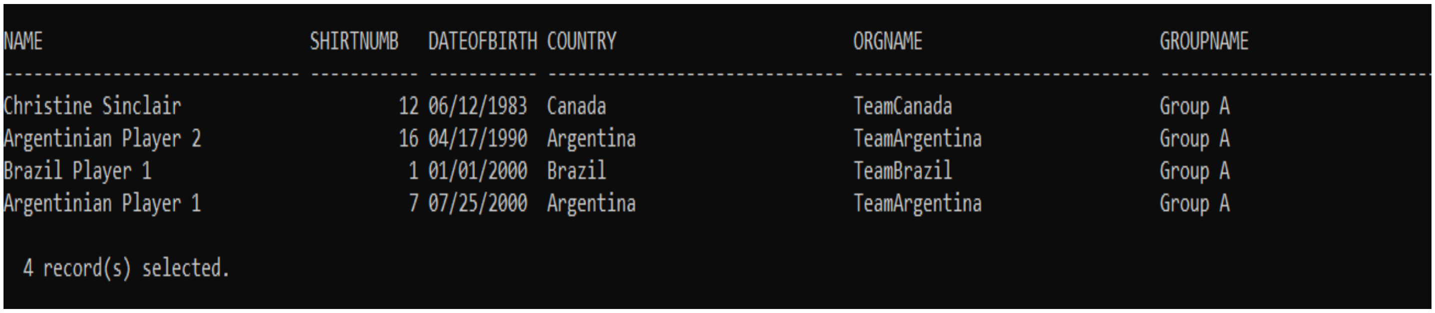
```
db2 => create view playerinfo (name, shirtnumb, dateofbirth, country, orgname, groupname)
as db2 (cont.) => select distinct participant.name, players.shirtnumber, competitor.dateofbirth,
pdb2 (cont.) => layers.country, teams.organizationname, teams.groupname
db2 (cont.) => from players, teams, participant, COMPETITOR
wdb2 (cont.) => here participant.pid = players.pid and competitor.pid = players.pid and players.country = teams.country;
DB20000I  The SQL command completed successfully.
db2 =>
```

Q6(c)



```
db2 => select * from playerinfo limit 5;

NAME                           SHIRTNUMB   DATEOFBIRTH COUNTRY                        ORGNAME                        GROUPNAME
------------------------------ ----------- ----------- ------------------------------ ------------------------------ ------------------
Belgian Player 2                        15 09/29/1960  Belgium                        TeamBelgium                    Group C
Christine Sinclair                      12 06/12/1983  Canada                         TeamCanada                     Group A
Argentinian Player 2                    16 04/17/1990  Argentina                      TeamArgentina                  Group A
France Player 2                          6 06/15/1997  France                         TeamFrance                     Group B
Brazil Player 1                          1 01/01/2000  Brazil                         TeamBrazil                     Group A

  5 record(s) selected.
```

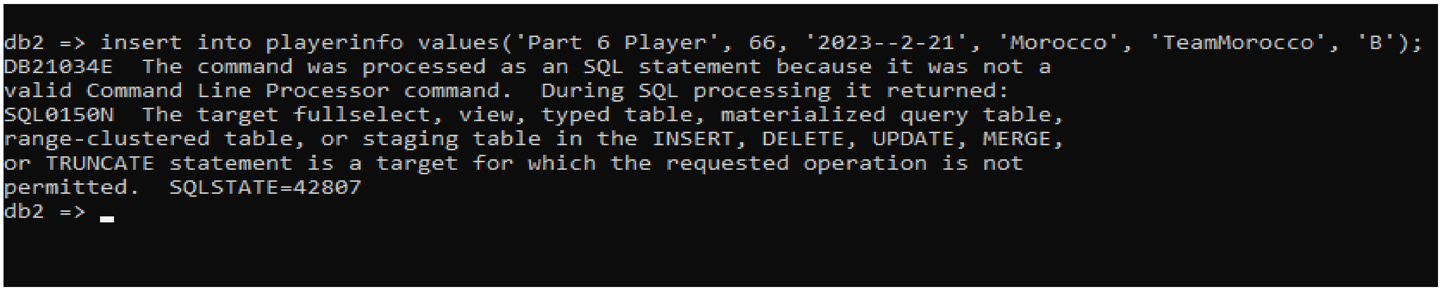
Q6(d)



```
NAME                           SHIRTNUMB   DATEOFBIRTH COUNTRY                        ORGNAME                        GROUPNAME
------------------------------ ----------- ----------- ------------------------------ ------------------------------ --------------------------
Christine Sinclair                      12 06/12/1983  Canada                         TeamCanada                     Group A
Argentinian Player 2                    16 04/17/1990  Argentina                      TeamArgentina                  Group A
Brazil Player 1                          1 01/01/2000  Brazil                         TeamBrazil                     Group A
Argentinian Player 1                     7 07/25/2000  Argentina                      TeamArgentina                  Group A

  4 record(s) selected.
```

COMP 421
William Wang
Ibrahim Younas

Q6(e)



```
db2 => insert into playerinfo values('Part 6 Player', 66, '2023--2-21', 'Morocco', 'TeamMorocco', 'B');
DB21034E  The command was processed as an SQL statement because it was not a
valid Command Line Processor command.  During SQL processing it returned:
SQL0150N  The target fullselect, view, typed table, materialized query table,
range-clustered table, or staging table in the INSERT, DELETE, UPDATE, MERGE,
or TRUNCATE statement is a target for which the requested operation is not
permitted.  SQLSTATE=42807
db2 =>
```

Explanation:

We are not able to insert the record into the view because of the following reasons:

- The select statement joins three tables and we can only insert in a view if the select statement only uses one table
- The select statement uses the distinct keyword

COMP 421
William Wang
Ibrahim Younas

7. Check Constraints

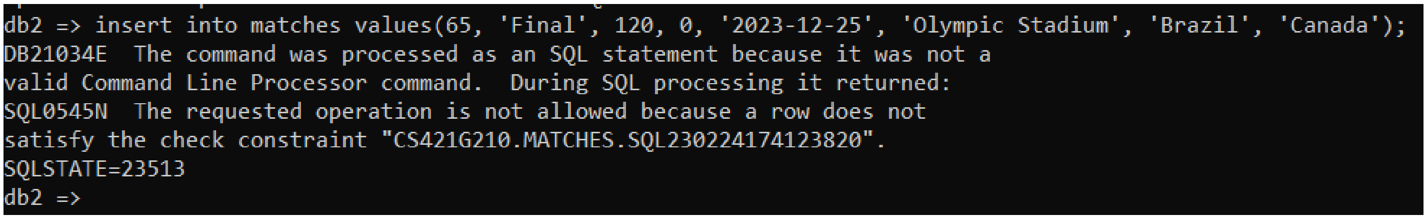
In our Matches DDL statement, we added the following check constraint:

mID int not null check (mID > 0 and mID < 65)

We set the upper bound to 65 and lower bound to 0, both exclusive, because this allows our design to put a maximum of 64 matches, which corresponds to the maximum number of matches in a football World Cup. Thus, all of the WorldCup matches in our database have a mID from 1 to 64 inclusively. It is also important to note that the order of the mID's do not correspond to the order in which the matches play out during the tournament.

The following screenshot demonstrates an edge case where we try to insert a match into the Matches table that has mID >= 65.

Screenshot:



```
db2 => insert into matches values(65, 'Final', 120, 0, '2023-12-25', 'Olympic Stadium', 'Brazil', 'Canada');
DB21034E  The command was processed as an SQL statement because it was not a
valid Command Line Processor command.  During SQL processing it returned:
SQL0545N  The requested operation is not allowed because a row does not
satisfy the check constraint "CS421G210.MATCHES.SQL230224174123820".
SQLSTATE=23513
db2 =>
```