**Relational Schema**

*Note that primary keys are all NOT NULL*

Team (<u>country</u>, nationalAssociation, url, group)
    nationalAssociation: NOT NULL
    group: NOT NULL

Player (<u>memberId</u>, mname, dob, shirtNumber, generalPosition, country)
    mname: NOT NULL
    dob: NOT NULL
    country: foreign key referencing Team, NOT NULL

Coach(<u>memberId</u>, mname, dob, crole, country)
    mname: NOT NULL
    dob: NOT NULL
    country: foreign key referencing Team NOT NULL

Referee(<u>refereeId</u>, rname, yearsOfExperience, country)
    rname: NOT NULL

Stadium(<u>stadiumName</u>, stadiumLocation, capacity)
    stadiumLocation: NOT NULL
    capacity: NOT NULL

Match(<u>matchId</u>, Date, StartTime, Length, Round, stadiumName)
    Date: NOT NULL
    Round: NOT NULL
    stadiumName: foreign key referencing Stadium

Client(<u>email</u>, name, password, countryOfResidence, postalCode)
    name: NOT NULL
    password: NOT NULL
    countryOfResidence: NOT NULL
    postalCode: NOT NULL

Ticket(<u>ticketId</u>, price, isAvailable, isVip, matchId, email, seatNumber, stadiumName)
    price: NOT NULL
    isAvailable: NOT NULL
    isVip: NOT NULL

matchId: foreign key referencing Match, NOT NULL
email: foreign key referencing Client
seatNumber: foreign key referencing Seat, NOT NULL
stadiumName: foreign key referencing Stadium (since Seat is weak), NOT NULL

matchPlayer(matchId, memberId, position, entranceTime, exitTime, yellowCardCount, receivedRedCard)
matchId: foreign key referencing Match, NOT NULL
memberId: foreign key referencing Player, NOT NULL
yellowCardCount: NOT NULL
receivedRedCard: NOT NULL

matchReferee(refereeId, matchId, role)
refereeId: foreign key referencing Referee, NOT NULL
matchId: foreign key referencing Match, NOT NULL
role: NOT NULL

playingCountry(matchId, country)
matchId: foreign key referencing match, NOT NULL
country: foreign key referencing the team, NOT NULL

Seat(stadiumName, seatNumber, section)
stadiumName: foreign key referencing Stadium, NOT NULL
satNumber: key to differentiate seats in the same Stadium, NOT NULL

Goal(matchId, occurrence, country, memberId, time_stamp, isPenalty)
matchId: foreign key referencing Match, NOT NULL
occurrence: NOT NULL
country: foreign key for Team NOT NULL
memberId: foreign key for Player NOT NULL
isPenalty: NOT NULL

**Application Interaction**

(a)
i. Run a query in the database that shows match information about ALL matches, including the participating countries if already known.

```sql
SELECT A.COUNTRY1, A.COUNTRY2, A.DATE, A.ROUND, B.goals1, C.goals2, D.SALE
FROM (SELECT M.MATCHID, PC.COUNTRY1, PC.COUNTRY2, M.DATE, M.ROUND
      FROM (SELECT c1.MATCHID, c1.COUNTRY as COUNTRY1, c2.COUNTRY as COUNTRY2
            FROM PLAYINGCOUNTRY c1
                 JOIN PLAYINGCOUNTRY c2 on (c1.MATCHID=c2.MATCHID AND c1.COUNTRY NOT
LIKE c2.COUNTRY AND c1.COUNTRY < c2.COUNTRY)) PC
                 RIGHT OUTER JOIN MATCH M on M.MATCHID = PC.MATCHID
      ORDER BY M.DATE) as A
         LEFT OUTER JOIN (SELECT g.MATCHID, g.COUNTRY, COUNT(*) as goals1
                          FROM GOAL g
                          group by g.MATCHID, g.COUNTRY) as B on B.MATCHID =
A.MATCHID and B.COUNTRY = A.COUNTRY1
         LEFT OUTER JOIN (SELECT g.MATCHID, g.COUNTRY, COUNT(*) as goals2
                          FROM GOAL g
                          group by g.MATCHID, g.COUNTRY) as C on C.MATCHID =
A.MATCHID and C.COUNTRY = A.COUNTRY2
         LEFT OUTER JOIN (SELECT t.MATCHID as MATCHID, COUNT(*) as SALE
                          FROM TICKET t
                          WHERE EMAIL IS NOT NULL
                          GROUP BY MATCHID) as D on D.MATCHID = A.MATCHID
ORDER BY A.DATE;
```

```
db2 => SELECT A.COUNTRY1, A.COUNTRY2, A.DATE, A.ROUND, B.goals1, C.goals2, D.SALE
FROM (SELECT M.MATCHID, Pdb2 (cont.) => C.COUNTRY1, PC.COUNTRY2, M.DATE, M.ROUND
     FROMdb2 (cont.) =>  (SELECT c1.MATCHID, c1.COUNTRY as COUNTRY1, c2.COUNTRY as COUNTRY2
          FROM PLAYINGCOUNTRY cdb2 (cont.) => 1
              JOIN PLAYINGCOUNTRY c2 on (c1.MATdb2 (cont.) => CHID=c2.MATCHID AND c1.COUNTRY NOT LIKE c2.COUNTRY AND c1.COUNTRY < c2.COUNTRY)) PC
          RIdb2 (cont.) => GHT OUTER JOIN MATCH M on M.MATCHID = PC.MATCHID
  db2 (cont.) =>     ORDER BY M.DATE) as A
        LEFT OUTER JOIN db2 (cont.) => (SELECT g.MATCHID, g.COUNTRY, COUNT(*) as goals1
  db2 (cont.) =>               FROM GOAL g
          db2 (cont.) =>             group by g.MATCHID, g.COUNTRY) as B on B.MATCHID = A.MATCHID and B.COUNTRY = A.COUNTRY1
  db2 (cont.) =>         LEFT OUTER JOIN (SELECT g.MATCHID, g.COUNTRY, COUNT(*) as goals2
                  FROdb2 (cont.) => M GOAL g
                  group by g.MATCHdb2 (cont.) => ID, g.COUNTRY) as C on C.MATCHID = A.MATCHID and C.COUNTRY = A.COUNTRY2
        LEFT OUTER JOIN (SELdb2 (cont.) => ECT t.MATCHID as MATCHID, COUNT(*) as SALE
     db2 (cont.) =>             FROM TICKET t
          db2 (cont.) =>        WHERE EMAIL IS NOT NULL
              db2 (cont.) =>    GROUP BY MATCHID) as D on D.MATCHID = A.MATCHID
ORDER BY A.DATE;db2 (cont.) =>
```

| COUNTRY1 | COUNTRY2 | DATE | ROUND | GOALS1 | GOALS2 | SALE |
|----------|----------|------|-------|--------|--------|------|
| Canada | Japan | 03/08/2023 | group | 3 | - | 2 |
| England | France | 03/09/2023 | group | 2 | 1 | 1 |
| Australia | Nigeria | 03/10/2023 | group | - | 2 | 1 |
| Egypt | Spain | 03/10/2023 | group | - | 1 | 1 |
| Brazil | Croatia | 03/11/2023 | group | 1 | - | - |
| Denmark | Poland | 03/11/2023 | group | 1 | - | - |
| Canada | Peru | 03/12/2023 | group | 3 | 2 | 4 |
| Canada | Russia | 03/13/2023 | group | - | - | - |
| Japan | Morocco | 03/13/2023 | group | - | - | |

| COUNTRY1 | COUNTRY2 | DATE | ROUND | GOALS1 | GOALS2 | SALE |
|----------|----------|------|-------|--------|--------|------|
| Canada | Japan | 03/08/2023 | group | 3 | - | 2 |
| England | France | 03/09/2023 | group | 2 | 1 | 1 |
| Australia | Nigeria | 03/10/2023 | group | - | 2 | 1 |
| Egypt | Spain | 03/10/2023 | group | - | 1 | 1 |
| Brazil | Croatia | 03/11/2023 | group | 1 | - | - |
| Denmark | Poland | 03/11/2023 | group | 1 | - | - |
| Canada | Peru | 03/12/2023 | group | 3 | 2 | 4 |
| Canada | Russia | 03/13/2023 | group | - | - | - |
| Japan | Morocco | 03/13/2023 | group | - | - | - |
| Belgium | Italy | 03/14/2023 | group | - | - | - |
| Mexico | United States | 03/14/2023 | group | - | - | - |
| Japan | Peru | 03/15/2023 | group | - | - | - |
| - | - | 03/15/2023 | group | - | - | - |
| - | - | 04/11/2023 | quarterfinals | - | - | 6 |
| - | - | 04/19/2023 | semifinals | - | - | - |
| - | - | 05/01/2023 | final | - | - | - |

```
  16 record(s) selected.
```

ii. Start the application, choose the first item of the main menu and enter a country for which there are at least 2 matches in the result of the previous query.

```
Soccer Main Menu
        1. List information of matches of a country
        2. Insert initial player information for a match
        3. Insert goal
        4. Exit application
Please Enter Your Option:
1
1. List information of matches of a country
Please enter a country
Canada
Canada          Japan           2023-03-08      group           3               0               2
Canada          Peru            2023-03-12      group           3               2               4
Canada          Russia          2023-03-13      group           0               0               0
Enter [A] to find matches of another country, [P] to go to the previous menu:
```

iii. Go back to the previous menu.

```
Soccer Main Menu
        1. List information of matches of a country
        2. Insert initial player information for a match
        3. Insert goal
        4. Exit application
Please Enter Your Option:
1
1. List information of matches of a country
Please enter a country
Canada
Canada          Japan           2023-03-08      group           3               0               2
Canada          Peru            2023-03-12      group           3               2               4
Canada          Russia          2023-03-13      group           0               0               0
Enter [A] to find matches of another country, [P] to go to the previous menu:
P
Soccer Main Menu
        1. List information of matches of a country
        2. Insert initial player information for a match
        3. Insert goal
        4. Exit application
Please Enter Your Option:
```

(b)

i. Run a query in the database that shows information about ALL matches that take place within 3 days of the date the query is posed including any matches that might not yet the countries determined.

```sql
SELECT M.MATCHID, PC.COUNTRY1, PC.COUNTRY2, M.DATE, M.STARTTIME, M.ROUND
FROM (SELECT c1.MATCHID, c1.COUNTRY as COUNTRY1, c2.COUNTRY as COUNTRY2
      FROM PLAYINGCOUNTRY c1
              JOIN PLAYINGCOUNTRY c2 on c1.MATCHID=c2.MATCHID AND c1.COUNTRY NOT
LIKE c2.COUNTRY AND c1.COUNTRY < c2.COUNTRY) PC
        RIGHT OUTER JOIN MATCH M on M.MATCHID = PC.MATCHID
WHERE timestamp(m.DATE, m.STARTTIME) < CURRENT TIMESTAMP + 3 DAYS AND
timestamp(m.DATE, m.STARTTIME) > CURRENT TIMESTAMP
ORDER BY M.DATE;
```

```
db2 => SELECT M.MATCHID, PC.COUNTRY1, PC.COUNTRY2, M.DATE, M.STARTTIME, M.ROUND
FROM (SELECT c1.MATCHID, c1db2 (cont.) => .COUNTRY as COUNTRY1, c2.COUNTRY as COUNTRY2
     db2 (cont.) => FROM PLAYINGCOUNTRY c1
          JOIN PLAYINGCdb2 (cont.) => OUNTRY c2 on c1.MATCHID=c2.MATCHID AND c1.COUNTRY NOT LIKE c2.COUNTRY AND c1.COUNTRY < c2.COUNTRY) PC
     RIGHT OUTER JOIN MATCH M on M.MATCHID = db2 (cont.) => PC.MATCHID
WHERE timestamp(m.DATE, m.STARTTIME) < db2 (cont.) => CURRENT TIMESTAMP + 3 DAYS AND timestamp(m.DATE, m.STARTTIME) > CURRENT TIMESTAMP
ORDER BY M.DATE;db2 (cont.) =>

MATCHID      COUNTRY1                                      COUNTRY2                                        DATE        STARTTIME ROUND
-----------  --------------------------------------------  ----------------------------------------------  ----------  --------- --------------
        10 Canada                                         Russia                                          03/13/2023 14:00:00  group
        11 Japan                                          Morocco                                         03/13/2023 17:00:00  group
        12 Belgium                                        Italy                                           03/14/2023 17:00:00  group
        13 Mexico                                         United States                                   03/15/2023 14:00:00  group
        14 Japan                                          Peru                                            03/15/2023 17:00:00  group

  5 record(s) selected.
```

ii. Then run a query in the database that shows for one of the matches M in the previous query and one of the countries C of this match all the players of this country that play in the match. The result should be empty.

```sql
SELECT p.MNAME, p.DOB, p.SHIRTNUMBER, mp.POSITION, p.COUNTRY
FROM Player p
JOIN matchPlayer mp ON p.memberId = mp.memberId
JOIN playingCountry pc ON mp.matchId = pc.matchId AND p.country = pc.country
WHERE mp.matchId = 11 AND pc.country = 'Morocco';
```

```
db2 => SELECT p.MNAME, p.DOB, p.SHIRTNUMBER, mp.POSITION, p.COUNTRY
FROM Player p
JOIN matchPlayer mp ON p.db2 (cont.) => db2 (cont.) => memberId = mp.memberId
JOIN playingCountry pc ON mdb2 (cont.) => p.matchId = pc.matchId AND p.country = pc.country
db2 (cont.) => WHERE mp.matchId = 11 AND pc.country = 'Morocco';

MNAME                                             DOB        SHIRTNUMBER POSITION            COUNTRY
------------------------------------------------- ---------- ----------- ------------------- ------------------------------------------------

  0 record(s) selected.
```

iii. Run another query that shows all the players of the team of country C. For better visibility, it should have around 5 players.

```sql
SELECT p.MNAME, p.DOB, p.SHIRTNUMBER, p.GENERALPOSITION, p.COUNTRY
FROM PLAYER P
WHERE COUNTRY LIKE 'Morocco';
```

```
db2 => SELECT p.MNAME, p.DOB, p.SHIRTNUMBER, p.GENERALPOSITION, p.COUNTRY
FROM PLAYER P
WHERE COUNTRY LIKE db2 (cont.) => db2 (cont.) => 'Morocco';

MNAME                                             DOB        SHIRTNUMBER GENERALPOSITION     COUNTRY
------------------------------------------------- ---------- ----------- ------------------- ------------------------------------------------
Asmaa Boulti                                      02/23/1997          14 Forward             Morocco
Ghizlane Chebbak                                  05/15/1993           3 Defender            Morocco
Meryem Hajri                                      11/07/1995           6 Midfielder          Morocco
Amina Salam                                       05/12/1998           9 Forward             Morocco
Nadia Khadija                                     09/20/1997          17 Midfielder          Morocco

  5 record(s) selected.
```

iv. In the application, choose the second item of the main menu.

```
Soccer Main Menu
        1. List information of matches of a country
        2. Insert initial player information for a match
        3. Insert goal
        4. Exit application
Please Enter Your Option:
2
2. Insert initial player information for a match
CURRENT TIME: 2023-03-13T10:06:42.777
Matches:
        10              Canada          Russia          2023-03-13      group
        11              Japan           Morocco         2023-03-13      group
        12              Belgium         Italy           2023-03-14      group
        13              Mexico          United States   2023-03-14      group
        14              Japan           Peru            2023-03-15      group
Please input match identifier for insert, or [P] to go to the previous menu
```

v. Enter the same match id M and country C that you used for the second of the above database queries.

```
Soccer Main Menu
        1. List information of matches of a country
        2. Insert initial player information for a match
        3. Insert goal
        4. Exit application
Please Enter Your Option:
2
2. Insert initial player information for a match
CURRENT TIME: 2023-03-13T10:06:42.777
Matches:
        10              Canada          Russia          2023-03-13      group
        11              Japan           Morocco         2023-03-13      group
        12              Belgium         Italy           2023-03-14      group
        13              Mexico          United States   2023-03-14      group
        14              Japan           Peru            2023-03-15      group
Please input match identifier for insert, or [P] to go to the previous menu
11
Please input match Country for insert, or [P] to go to the previous menu
Morocco
The following players from Morocco are already entered for match 11:
Possible players from Morocco not yet selected:
        1  Asmaa Boulti            14    Forward
        2  Ghizlane Chebbak        3     Defender
        3  Meryem Hajri            6     Midfielder
        4  Amina Salam             9     Forward
        5  Nadia Khadija           17    Midfielder
Enter the number of the player you want to insert or [P] to go to the previous menu
```

vi. Show the result as indicated in the task.

```
Soccer Main Menu
        1. List information of matches of a country
        2. Insert initial player information for a match
        3. Insert goal
        4. Exit application
Please Enter Your Option:
2
2. Insert initial player information for a match
CURRENT TIME: 2023-03-13T10:06:42.777
Matches:
        10              Canada        Russia          2023-03-13      group
        11              Japan         Morocco         2023-03-13      group
        12              Belgium       Italy           2023-03-14      group
        13              Mexico        United States   2023-03-14      group
        14              Japan         Peru            2023-03-15      group
Please input match identifier for insert, or [P] to go to the previous menu
11
Please input match Country for insert, or [P] to go to the previous menu
Morocco
The following players from Morocco are already entered for match 11:
Possible players from Morocco not yet selected:
        1  Asmaa Boulti            14    Forward
        2  Ghizlane Chebbak        3     Defender
        3  Meryem Hajri            6     Midfielder
        4  Amina Salam             9     Forward
        5  Nadia Khadija           17    Midfielder
Enter the number of the player you want to insert or [P] to go to the previous menu
```

vii. In your application program select one of the available players and show the result.

```
2. Insert initial player information for a match
CURRENT TIME: 2023-03-13T10:06:42.777
Matches:
        10              Canada        Russia          2023-03-13      group
        11              Japan         Morocco         2023-03-13      group
        12              Belgium       Italy           2023-03-14      group
        13              Mexico        United States   2023-03-14      group
        14              Japan         Peru            2023-03-15      group
Please input match identifier for insert, or [P] to go to the previous menu
11
Please input match Country for insert, or [P] to go to the previous menu
Morocco
The following players from Morocco are already entered for match 11:
Possible players from Morocco not yet selected:
        1  Asmaa Boulti            14    Forward
        2  Ghizlane Chebbak        3     Defender
        3  Meryem Hajri            6     Midfielder
        4  Amina Salam             9     Forward
        5  Nadia Khadija           17    Midfielder
Enter the number of the player you want to insert or [P] to go to the previous menu
1
Enter the player's position
Striker
The following players from Morocco are already entered for match 11:
        Asmaa Boulti            14    Striker               from minute 00:00:00 to minute Null        0    0
Possible players from Morocco not yet selected:
        1  Ghizlane Chebbak        3     Defender
        2  Meryem Hajri            6     Midfielder
        3  Amina Salam             9     Forward
        4  Nadia Khadija           17    Midfielder
Enter the number of the player you want to insert or [P] to go to the previous menu
```

viii. In your program set the maximum number of players of a team for a match to two or three (just for testing) and show an example execution where you reach this limit. Your program should not allow further inserts.

```
2. Insert initial player information for a match
CURRENT TIME: 2023-03-13T10:13:01.523
Matches:
        10              Canada          Russia          2023-03-13      group
        11              Japan           Morocco         2023-03-13      group
        12              Belgium         Italy           2023-03-14      group
        13              Mexico          United States   2023-03-14      group
        14              Japan           Peru            2023-03-15      group
Please input match identifier for insert, or [P] to go to the previous menu
11
Please input match Country for insert, or [P] to go to the previous menu
Morocco
The following players from Morocco are already entered for match 11:
        Asmaa Boulti            14    Striker                   from minute 00:00:00 to minute Null         0     0
Possible players from Morocco not yet selected:
        1  Ghizlane Chebbak        3     Defender
        2  Meryem Hajri            6     Midfielder
        3  Amina Salam             9     Forward
        4  Nadia Khadija           17    Midfielder
Enter the number of the player you want to insert or [P] to go to the previous menu
1
Enter the player's position
Center Back
The following players from Morocco are already entered for match 11:
        Ghizlane Chebbak        3     Center Back               from minute 00:00:00 to minute Null         0     0
        Asmaa Boulti            14    Striker                   from minute 00:00:00 to minute Null         0     0
Possible players from Morocco not yet selected:
        1  Meryem Hajri            6     Midfielder
        2  Amina Salam             9     Forward
        3  Nadia Khadija           17    Midfielder
Maximum number of player for Morocco reached. Press any key to return to previous menu
```

ix. Go back to the main menu and from there exit the application.

```
Center Back
The following players from Morocco are already entered for match 11:
        Ghizlane Chebbak        3     Center Back               from minute 00:00:00 to minute Null         0     0
        Asmaa Boulti            14    Striker                   from minute 00:00:00 to minute Null         0     0
Possible players from Morocco not yet selected:
        1  Meryem Hajri            6     Midfielder
        2  Amina Salam             9     Forward
        3  Nadia Khadija           17    Midfielder
Maximum number of player for Morocco reached. Press any key to return to previous menu
s
CURRENT TIME: 2023-03-13T10:14:17.199
Matches:
        10              Canada          Russia          2023-03-13      group
        11              Japan           Morocco         2023-03-13      group
        12              Belgium         Italy           2023-03-14      group
        13              Mexico          United States   2023-03-14      group
        14              Japan           Peru            2023-03-15      group
Please input match identifier for insert, or [P] to go to the previous menu
P
Soccer Main Menu
        1. List information of matches of a country
        2. Insert initial player information for a match
        3. Insert goal
        4. Exit application
Please Enter Your Option:
4
4. Exit application
Exiting application
cs421g111@winter2023-comp421:~/p2/COMP421P3/src$
```

x.

```
db2 => SELECT p.MNAME, p.DOB, p.SHIRTNUMBER, mp.POSITION, p.COUNTRY
FROM Player p
JOIN matchPlayer mp ON p.db2 (cont.) => db2 (cont.) => memberId = mp.memberId
JOIN playingCountry pc ON mdb2 (cont.) => p.matchId = pc.matchId AND p.country = pc.country
db2 (cont.) => WHERE mp.matchId = 11 AND pc.country = 'Morocco';

MNAME                                                  DOB        SHIRTNUMBER POSITION       COUNTRY
------------------------------------------------------ ---------- ----------- -------------- ----------------------------------------------
Asmaa Boulti                                           02/23/1997          14 Striker        Morocco
Ghizlane Chebbak                                       05/15/1993           3 Center Back    Morocco

  2 record(s) selected.
```

(c)

Description: This menu item allows users to add goals. At every step, users have the option to type [P] and return to the previous menu. The program will first ask for a match id. It will then display the current goals and the match players already registered for the match. The user will then be able to select a user from the list to add a goal. The system will then ask if it is a penalty kick. If it is, the goal will be added as a penalty kick. Otherwise the system will ask for the goal timestamp and then add it as a regular goal. Goals must be added in order, since they are identified by their occurrence.

i. Run a query to show all goals.

```
SELECT G.MATCHID, G.COUNTRY, G.OCCURRENCE, P.MNAME, G.TIME_STAMP, G.ISPENALTY
FROM GOAL G
JOIN PLAYER P on P.MEMBERID = G.MEMBERID
ORDER BY G.MATCHID, G.OCCURRENCE;
```

```
db2 => SELECT G.MATCHID, G.COUNTRY, G.OCCURRENCE, P.MNAME, G.TIME_STAMP, G.ISPENALTY
FROM GOAL G
JOIN PLAYEdb2 (cont.) => db2 (cont.) => R P on P.MEMBERID = G.MEMBERID
ORDER BY G.MATCHID,db2 (cont.) =>  G.OCCURRENCE;

MATCHID     COUNTRY                                               OCCURRENCE  MNAME                                                  TIME_STAMP ISPENALTY
----------- -------------------------------------------------    ----------- -------------------------------------------------     ---------- ---------
          1 Canada                                                         1 Christine Sinclair                                     00:15:44           0
          1 Canada                                                         2 Chloe Martin                                          00:40:00           0
          1 Canada                                                         3 Christine Sinclair                                     00:50:12           0
          2 England                                                        1 Ellen White                                          00:11:52           0
          2 France                                                         2 Marie-Antoinette Katoto                              01:00:13           1
          2 England                                                        3 Lucy Bronze                                          01:12:13           0
          3 Nigeria                                                        1 Asisat Oshoala                                       00:30:22           1
          3 Nigeria                                                        2 Asisat Oshoala                                       00:51:52           0
          4 Spain                                                          1 Amanda Sampedro                                      00:23:12           0
          5 Denmark                                                        1 Nadia Nadim                                          00:17:59           0
          6 Brazil                                                         1 Marta Vieira da Silva                                00:12:12           1
          9 Canada                                                         1 Christine Sinclair                                     00:09:39           0
          9 Canada                                                         2 Emma Davis                                           00:28:27           0
          9 Peru                                                           3 Fiorella Quispe                                      00:32:18           0
          9 Canada                                                         4 Jade Lee                                             00:46:55           0
          9 Peru                                                           5 Nicole Pérez                                         01:24:09           0

  16 record(s) selected.
```

ii. Run a query to show all the goals for one of the matches M in the previous query.

```
SELECT G.MATCHID, G.COUNTRY, G.OCCURRENCE, P.MNAME, G.TIME_STAMP, G.ISPENALTY
FROM GOAL G
JOIN PLAYER P on P.MEMBERID = G.MEMBERID
WHERE MATCHID = 1
ORDER BY G.OCCURRENCE;
```

```
db2 => SELECT G.MATCHID, G.COUNTRY, G.OCCURRENCE, P.MNAME, G.TIME_STAMP, G.ISPENALTY
FROM GOAL G
JOIN PLAYEdb2 (cont.) => db2 (cont.) => R P on P.MEMBERID = G.MEMBERID
WHERE MATCHID = 1
Odb2 (cont.) => db2 (cont.) => RDER BY G.OCCURRENCE;

MATCHID     COUNTRY                                               OCCURRENCE  MNAME                                                  TIME_STAMP ISPENALTY
----------- -------------------------------------------------    ----------- -------------------------------------------------     ---------- ---------
          1 Canada                                                         1 Christine Sinclair                                     00:15:44           0
          1 Canada                                                         2 Chloe Martin                                          00:40:00           0
          1 Canada                                                         3 Christine Sinclair                                     00:50:12           0

  3 record(s) selected.
```

iii. In the application, choose the third item of the main menu.

iv. Enter the same match id as match M.

v. Show the result.

```
Soccer Main Menu
        1. List information of matches of a country
        2. Insert initial player information for a match
        3. Insert goal
        4. Exit application
Please Enter Your Option:
3
3. Insert goal
Input match identifier for insert, or [P] to go to the previous menu
1
Current goals:
        1  Canada           Christine Sinclair       00:15:44
        2  Canada           Chloe Martin             00:40:00
        3  Canada           Christine Sinclair       00:50:12
Match player for match 1:
        1  Canada           Chloe Martin
        2  Canada           Christine Sinclair
        3  Canada           Janine Beckie
        4  Canada           Sophia Jones
        5  Japan            Maya Ishida
        6  Japan            Nao Yamamoto
Select player for insert or [P] to go to the previous menu
```

vi. Select a player, add a non-penalty goal with a valid timestamp and show the result.

```
Input match identifier for insert, or [P] to go to the previous menu
1
Current goals:
        1  Canada           Christine Sinclair       00:15:44
        2  Canada           Chloe Martin             00:40:00
        3  Canada           Christine Sinclair       00:50:12
Match player for match 1:
        1  Canada           Chloe Martin
        2  Canada           Christine Sinclair
        3  Canada           Janine Beckie
        4  Canada           Sophia Jones
        5  Japan            Maya Ishida
        6  Japan            Nao Yamamoto
Select player for insert or [P] to go to the previous menu
5
Was it a penalty kick? [Y/N] or [P] to go to the previous menu
Y
Current goals:
        1  Canada           Christine Sinclair       00:15:44
        2  Canada           Chloe Martin             00:40:00
        3  Canada           Christine Sinclair       00:50:12
        4  Japan            Maya Ishida              Penalty kick
Match player for match 1:
        1  Canada           Chloe Martin
        2  Canada           Christine Sinclair
        3  Canada           Janine Beckie
        4  Canada           Sophia Jones
        5  Japan            Maya Ishida
        6  Japan            Nao Yamamoto
Select player for insert or [P] to go to the previous menu
```

vii. Select another player, add another goal, penalty this time and show the result.

```
Current goals:
        1  Canada          Christine Sinclair        00:15:44
        2  Canada          Chloe Martin              00:40:00
        3  Canada          Christine Sinclair        00:50:12
        4  Canada          Christine Sinclair        01:13:19
Match player for match 1:
        1  Canada          Chloe Martin
        2  Canada          Christine Sinclair
        3  Canada          Janine Beckie
        4  Canada          Sophia Jones
        5  Japan           Maya Ishida
        6  Japan           Nao Yamamoto
Select player for insert or [P] to go to the previous menu
2
Was it a penalty kick? [Y/N] or [P] to go to the previous menu
Y
Current goals:
        1  Canada          Christine Sinclair        00:15:44
        2  Canada          Chloe Martin              00:40:00
        3  Canada          Christine Sinclair        00:50:12
        4  Canada          Christine Sinclair        01:13:19
        5  Canada          Christine Sinclair        Penalty kick
Match player for match 1:
        1  Canada          Chloe Martin
        2  Canada          Christine Sinclair
        3  Canada          Janine Beckie
        4  Canada          Sophia Jones
        5  Japan           Maya Ishida
        6  Japan           Nao Yamamoto
Select player for insert or [P] to go to the previous menu
```

viii. Go back to the main menu and from there exit the application.

```
Match player for match 1:
        1  Canada          Chloe Martin
        2  Canada          Christine Sinclair
        3  Canada          Janine Beckie
        4  Canada          Sophia Jones
        5  Japan           Maya Ishida
        6  Japan           Nao Yamamoto
Select player for insert or [P] to go to the previous menu
2
Was it a penalty kick? [Y/N] or [P] to go to the previous menu
Y
Current goals:
        1  Canada          Christine Sinclair       00:15:44
        2  Canada          Chloe Martin             00:40:00
        3  Canada          Christine Sinclair       00:50:12
        4  Canada          Christine Sinclair       01:13:19
        5  Canada          Christine Sinclair       Penalty kick
Match player for match 1:
        1  Canada          Chloe Martin
        2  Canada          Christine Sinclair
        3  Canada          Janine Beckie
        4  Canada          Sophia Jones
        5  Japan           Maya Ishida
        6  Japan           Nao Yamamoto
Select player for insert or [P] to go to the previous menu
P
Soccer Main Menu
        1. List information of matches of a country
        2. Insert initial player information for a match
        3. Insert goal
        4. Exit application
Please Enter Your Option:
4
4. Exit application
Exiting application
```

ix. Run a query in the database that shows the goals for M.

```
db2 => SELECT G.MATCHID, G.COUNTRY, G.OCCURRENCE, P.MNAME, G.TIME_STAMP, G.ISPENALTY
FROM GOAL G
JOIN PLAYEdb2 (cont.) => db2 (cont.) => R P on P.MEMBERID = G.MEMBERID
WHERE MATCHID = 1
Odb2 (cont.) => db2 (cont.) => RDER BY G.OCCURRENCE;

MATCHID     COUNTRY                                         OCCURRENCE  MNAME                                              TIME_STAMP ISPENALTY
----------- ----------------------------------------------- ----------- -------------------------------------------------- ---------- ---------
          1 Canada                                                    1 Christine Sinclair                                 00:15:44           0
          1 Canada                                                    2 Chloe Martin                                       00:40:00           0
          1 Canada                                                    3 Christine Sinclair                                 00:50:12           0
          1 Canada                                                    4 Christine Sinclair                                 01:13:19           0
          1 Canada                                                    5 Christine Sinclair                                 -                  1

  5 record(s) selected.
```
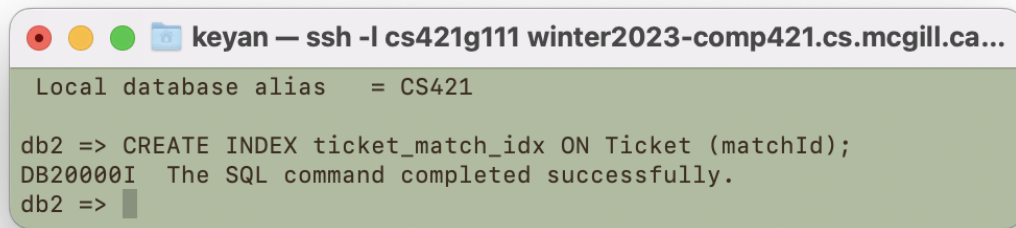
**Indexing**



```
keyan — ssh -l cs421g111 winter2023-comp421.cs.mcgill.ca...

 Local database alias     = CS421

db2 => CREATE INDEX ticket_match_idx ON Ticket (matchId);
DB20000I  The SQL command completed successfully.
db2 => ▌
```

We decided to index the TICKET table over MATCHID. The ticket table can become very large since the stadiums have a high capacity, and every match's seat will need a ticket. Tickets will also need to be queried by match often, for example, when displaying the tickets available for a particular match or counting the number of tickets sold for a particular match. The index will make these operations much faster.

An index on the ticket table's matchId attribute would be useful for queries that involve selecting tickets based on their match. This is because querying the ticket table based on the matchId attribute without an index would require a full table scan, which would be inefficient for large datasets.

The SQL query to create this index would be:

```
CREATE INDEX ticket_match_idx ON Ticket (matchId);
```
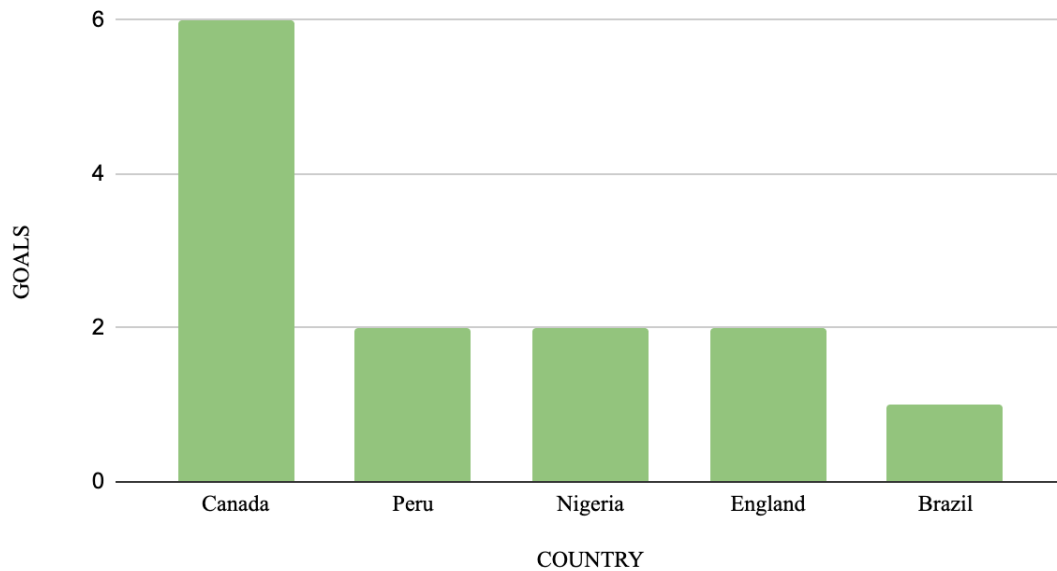
This index would help speed up queries that filter tickets based on their match. For example, the following query would benefit from this index:

```
SELECT * FROM Ticket WHERE matchId = 57;
```

With the index in place, the database could use the index to quickly find all the tickets for the specified match rather than scanning the entire ticket table.

**Data Analytics**

# Top 5 Countries with the Most Group Round Goals



```
db2 => SELECT G.COUNTRY, COUNT(*) as GOALS
FROM GOAL G
JOIN MATCH M on G.MATCHID = M.MATCHID
WHERE ROUND LIKE 'group'
group by G.COUNTRY
ORDER BY GOALS DESC
LIMIT 5;db2 (cont.) => db2 (cont.) => db2 (cont.) => db2 (cont.) => db2
(cont.) => db2 (cont.) =>

COUNTRY                                              GOALS
--------------------------------------------------- -----------
Canada                                                      6
England                                                     2
Peru                                                        2
Nigeria                                                     2
Brazil                                                      1

   5 record(s) selected.

db2 =>
```

```sql
SELECT G.COUNTRY, COUNT(*) as GOALS
FROM GOAL G
JOIN MATCH M on G.MATCHID = M.MATCHID
```

```sql
WHERE ROUND LIKE 'group'
group by G.COUNTRY
ORDER BY GOALS DESC
LIMIT 5;
```

```
keyan — ssh -l cs421g111 winter2023-comp421.cs.mcgill.ca — 77×10

NT(*) as GOALS FROM GOAL G JOIN MATCH M on G.MATCHID = M.MATCHID WHERE ROUND
LIKE 'group' group by G.COUNTRY ORDER BY GOALS DESC LIMIT 5;
SQL3104N  The Export utility is beginning to export data to file "goals.csv".

SQL3105N  The Export utility has finished exporting "5" rows.


Number of rows exported: 5

db2 =>
```