# **CPSC 304 Project Cover Page**

Milestone #: 2

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**Group Number: 3** 

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By typing our names and student numbers in the above table, we certify that the work in the attached assignment was performed solely by those whose names and student IDs are included above. (In the case of Project Milestone 0, the main purpose of this page is for you to let us know your e-mail address, and then let us assign you to a TA for your project supervisor.)

In addition, we indicate that we are fully aware of the rules and consequences of plagiarism, as set forth by the Department of Computer Science and the University of British Columbia

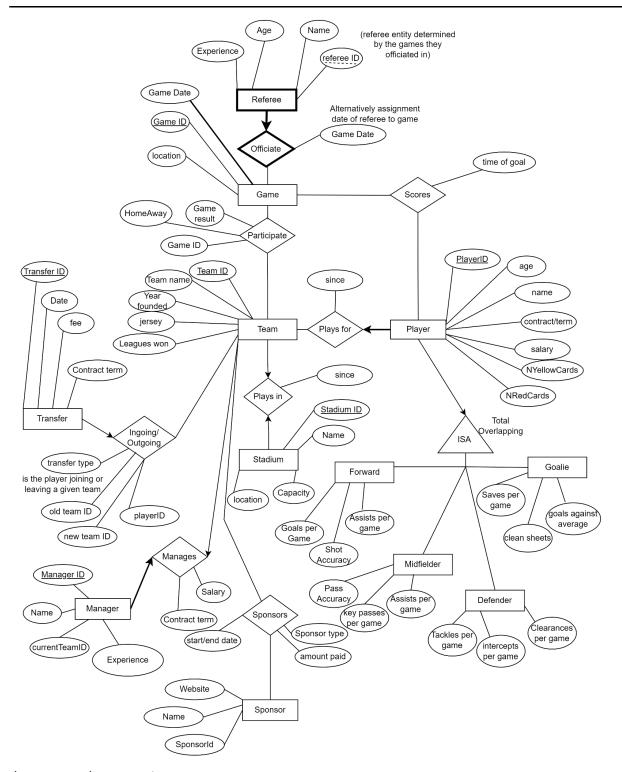
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2. A brief (~2-3 sentences) summary of your project. Many of your TAs are managing multiple projects so this will help them remember details about your project.

Our project is a football team/soccer player tracking database that will keep various statistics on players and their teams such as player match history, team info, other player statistics, etc. The project aims to model the various relationships and functionality that we can observe in football teams from both football and partly administrative perspectives. The league in particular that this database will cover is the 2021/2022 Premier League.

3. The ER diagram you are basing your item #3 (below) on. This ER diagram may be the same as your milestone 1 submission or it might be different. If you have made changes from the version submitted in milestone 1, attach a note indicating what changes have been made and why.

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### changes made to ER Diagram:

- ISA constraints added to the right of the ISA hierarchy (total and overlapping)
- Weak Entity Partial Key modified to be a referee ID such that the primary key (refereeID, GameID) uniquely identifies a referee.

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4. The schema derived from your ER diagram (above). For the translation of the ER diagram to the relational model, follow the same instructions as in your lectures. The process should be reasonably straightforward. For each table:

a. List the table definition (e.g., Table1(attr1: domain1, attr2: domain2, ...)). Make sure to include the domains for each attribute.

b. Specify the primary key (PK), candidate key, (CK) foreign keys (FK), and other constraints (e.g., not null, unique, etc.) that the table must maintain.

Referee\_Officiate(GameID: INT(255) PK FK, GameDate: date FK, RefereeID: INT(255) PK, Experience: INT(11), Age: INT(11), Name: CHAR(20))

Game(GameID: INT(255) PK, Location: CHAR(30), MinutesPlayed: time, GameDate: date)

Participate(TeamID: INT(255) PK FK, GameID: INT(255) PK FK, GameResult: CHAR(1), HomeAway: CHAR(1), Date: date FK)

Team(TeamID: INT(255) PK, Name: VARCHAR(255), YearFounded: YEAR, Jersey: image, LeaguesWon: INT(255))

Scores(PlayerID: INT(255) PK FK, GameID: INT(255) PK FK, TimeOfGoal: time)

Sponsor(Website: VARCHAR(511), Name: CHAR(20), SponsorID: INT(255) PK)

Sponsors(SponsorID: INT(255) PK FK, TeamID: INT(255) PK FK, SponsorType: VARCHAR(8), AmountPaid: INT(27), StartDate: date, EndDate: date)

Manager(ManagerID: INT(255) PK, Name: CHAR(20), CurrentTeamID: INT(255) CK FK, Experience: INT(7), Salary: INT(27), ContractStart: date, ContractEnd: date)

Transfer\_IngoingOutgoing(TransferID: INT(255) PK, Date: date, Fee: INT(28), ContractTerm: date, transferType: CHAR(1), oldTeamID: INT(255) PK, newTeamID: INT(255))

Player(PlayerID: INT(255) PK, Name: VARCHAR(26), Age: INT(6), ContractTermStart: date, ContractTermEnd: date, Salary: INT(20), YellowCards: INT(4), RedCards: INT(4), TeamID: INT(255) FK, Since: date)

Forward(PlayerID: INT(255) PK FK, GoalsPerGame: DOUBLE(4,3), AssistsPerGame: DOUBLE(4,3), ShotAccuracy: DOUBLE(4,3))

Midfielder(PlayerID: INT(255) PK FK, AssistsPerGame: DOUBLE(4,3), PassAccuracy: DOUBLE(4,3), KeyPassesPerGame: DOUBLE(4,3))

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Defender(PlayerID: INT(255) PK FK, TacklesPerGame : DOUBLE(4,3), InterceptsPerGame: DOUBLE(4,3), ClearancesPerGame: DOUBLE(4,3))

Goalie(PlayerID: INT(255) PK FK, SavesPerGame : DOUBLE(4,3), GoalsAgainstAverage: DOUBLE(4,3), CleanSheets: INT(6))

PlaysInStadium(StadiumID: INT(255) PK, Name: CHAR(20), Location: CHAR(40), Capacity: INT(18), TeamID: INT(255) FK CK, PlaysSince: date)

### 5. Functional Dependencies (FDs)

a. Identify the functional dependencies in your relations, including the ones involving all candidate keys (including the primary key).

### Referee Officiate

- GameID -> GameDate
- Refereeld -> Experience, Age, Name

#### Game

- GameID -> Location, MinutesPlayed, GameDate

#### **Participate**

- TeamID -> HomeAway
- GameID -> GameResult

#### Team

- TeamID -> Name, YearFounded, Jersey, LeaguesWon

### Scores

- PlayerID, GameID -> TimeOfGoal

### Sponsor

- SponsorID -> Website, Name

#### Sponsors

- SponsorID, TeamID -> SponsorType, AmountPaid, StartDate, EndDate

#### Manager

- ManagerID -> Name, Salary, Experience, ContractStart, ContractEnd
- CurrentTeamID -> ContractStart, ContractEnd

### Transfer IngoingOutgoing

- TransferID -> Date, ContractTerm

#### Player

- PlayerID -> Name, Age, ContractTerm, YellowCards, RedCards, CurrentTeamID, Since

#### Forward

- PlayerID -> GoalsPerGame, AssistsPerGame, ShotAccuracy

### Midfielder

- PlayerID -> AssistsPerGame, PassAccuracy, KeyPassesPerGame

#### Defender

- PlayerID -> TacklesPerGame, InterceptsPerGame, ClearancesPerGame

#### Goalie

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- PlayerID -> SavesPerGame, CleanSheets,GoalsAgainstAvg PlaysInStadium
  - StadiumID -> TeamID, Name, Location, Capacity, PlaysSince
  - TeamID -> Name, Location, Capacity, PlaysSince

PKs and CKs are considered functional dependencies and should be included in the list of FDs. You do not need to include trivial FDs such as  $A \rightarrow A$ .

Note: In your list of FDs, there must be some kind of valid FD other those identified by a PK or CK. If you observe that no relations have FDs other than the PK and CK(s), then you will have to intentionally add some (meaningful) attributes to show valid FDs. We want you to get a good normalization exercise. Your design must go through a normalization process.

#### 6. Normalization

a. Normalize each of your tables to be in 3NF or BCNF. Give the list of tables, their primary keys, their candidate keys, and their foreign keys after normalization. You should show the steps taken for the decomposition. Should there be errors, and no work is shown, no partial credit can be awarded without steps shown.

The format should be the same as Step 3, with tables listed similar to Table1(attr1:domain1, attr2:domain2, ...). ALL Tables must be listed, not only the ones post normalization.

Referee Data(RefereeID: INT(255) PK, Experience: INT(11), Age: INT(11), Name: CHAR(20))

Referee GameLink(GameID: INT(255) PK FK, GameDate: date)

Referee LeftOver(GameDate: date, Experience: INT(11), Age: INT(11), Name: CHAR(20))

Game(GameID: INT(255) PK, Location: CHAR(30), MinutesPlayed: time, GameDate: date)

Participate Team(TeamID: INT(255) PK FK, HomeAway: CHAR(1))

Participate\_Game(GameID: INT(255) PK FK, GameResult: CHAR(1))

Participate Rest(GameResult: CHAR(1), HomeAway: CHAR(1))

Team(TeamID: INT(255) PK, Name: VARCHAR(255), YearFounded: YEAR, Jersey: image,

LeaguesWon: INT(255))

Scores(PlayerID: INT(255) PK FK, GameID: INT(255) PK FK, TimeOfGoal: time)

Sponsor(Website: VARCHAR(511), Name: CHAR(20), SponsorID: INT(255) PK)

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Sponsors(SponsorID: INT(255) PK FK, TeamID: INT(255) PK FK, SponsorType: VARCHAR(8), AmountPaid: INT(27), StartDate: date, EndDate: date)

ManagerData(ManagerID: INT(255) PK, Name: CHAR(20), Experience: INT(7), ContractStart: date, ContractEnd: date)

ManagerTeamLink(CurrentTeamID: INT(255) PK FK, Salary: INT(27), ContractStart: date, ContractEnd: date)

ManagerRest(Name: CHAR(20), Experience: INT(7), Salary: INT(27), ContractStart: date, ContractEnd: date)

Transfer\_IngoingOutgoing(TransferID: INT(255) PK, Date: date, Fee: INT(28), ContractTerm: date, transferType: CHAR(1), oldTeamID: INT(255) PK FK, newTeamID: INT(255) PK FK)

Player(PlayerID: INT(255) PK, Name: VARCHAR(26), Age: INT(6), ContractTermStart: date, ContractTermEnd: date, Salary: INT(20), YellowCards: INT(4), RedCards: INT(4), TeamID: INT(255) FK, Since: date)

Forward(PlayerID: INT(255) PK FK, GoalsPerGame: DOUBLE(4,3), AssistsPerGame: DOUBLE(4,3), ShotAccuracy: DOUBLE(4,3))

Midfielder(PlayerID: INT(255) PK FK, AssistsPerGame: DOUBLE(4,3), PassAccuracy: DOUBLE(4,3), KeyPassesPerGame: DOUBLE(4,3))

Defender(PlayerID: INT(255) PK FK, TacklesPerGame : DOUBLE(4,3), InterceptsPerGame: DOUBLE(4,3), ClearancesPerGame: DOUBLE(4,3))

Goalie(PlayerID: INT(255) PK FK, SavesPerGame : DOUBLE(4,3), GoalsAgainstAverage: DOUBLE(4,3), CleanSheets: INT(6))

PlaysInStadium(StadiumID: INT(255) PK, Name: CHAR(20), Location: CHAR(40), Capacity: INT(18), TeamID: INT(255) FK CK, PlaysSince: date)

7. The SQL DDL statements required to create all the tables from item #6. The statements should use the appropriate foreign keys, primary keys, UNIQUE constraints, etc.

Create Table Referee\_Data(
RefereeID: INT(255),
Experience: INT(11),
Age: INT(11),
Name: CHAR(20),

PRIMARY KEY(GameID, RefereeID),

```
FOREIGNKEY(GameID) REFERENCES Game)
 )
Create Table Referee GameLink(
 GameID: INT(255),
 GameDate: date),
 PRIMARYKEY(GameID),
 FOREIGNKEY(GameID) REFERENCES Game
 )
Create Table Referee LeftOver(
 GameDate: date,
 Experience: INT(11),
 Age: INT(11),
 Name: CHAR(20),
 )
Create Table Game(
 GameID: INT(255),
 Location: CHAR(30),
 MinutesPlayed: time,
 GameDate: date,
 PRIMARY KEY(GameID)
 )
Create Table Participate Team(
 TeamID: INT(255),
 HomeAway: CHAR(1)
 PRIMARY KEY(TeamID),
 FOREIGNKEY(TEAMID) REFERENCES Team
 )
Create Table Participate Game(
 GameID: INT(255),
 GameResult: CHAR(1)
 PRIMARY KEY(GameID),
 FOREIGNKEY(GameID) REFERENCES Game
 )
Create Table Participate_Rest(
 GameResult: CHAR(1),
 HomeAway: CHAR(1)
```

```
Create Table Team(
 TeamID: INT(255),
 Name: VARCHAR(255),
 YearFounded: YEAR,
 Jersey: image,
 LeaguesWon: INT(255)
 PRIMARY KEY(TeamID),
 )
Create Table Scores(
 PlayerID: INT(255)
 GameID: INT(255)
 TimeOfGoal: time)
 PRIMARY KEY(PlayerID, GameID),
 FOREIGNKEY(PlayerID) REFERENCES Player,
 FOREIGNKEY(GameID) REFERENCES Game
 )
Create Table Sponsor(
 Website: VARCHAR(511),
 Name: CHAR(20)
 SponsorID: INT(255))
 PRIMARY KEY(SponsorID)
 )
Create Table Sponsors(
 SponsorID: INT(255)
 TeamID: INT(255)
 SponsorType: VARCHAR(8),
 AmountPaid: INT(27),
 StartDate: date,
 EndDate: date)
 PRIMARY KEY(SponsorID, TeamID),
 FOREIGNKEY(SponsorID) REFERENCES Sponsor,
 FOREIGNKEY(TeamID) REFERENCES Team
 )
Create Table ManagerData(
 ManagerID: INT(255)
 Name: CHAR(20),
 Experience: INT(7),
 ContractStart: date,
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ContractEnd: date)
  PRIMARY KEY(ManagerID),
Create Table ManagerTeamLink(
  CurrentTeamID: INT(255) CK
  Salary: INT(27),
  ContractStart: date,
  ContractEnd: date)
  PRIMARY KEY(CurrentTeamID),
  FOREIGNKEY(CurrentTeamID) REFERENCES Team
  )
Create Table ManagerRest(
  Name: CHAR(20),
  Experience: INT(7),
  Salary: INT(27),
  ContractStart: date,
  ContractEnd: date)
Create Table Transfer IngoingOutgoing(
  TransferID: INT(255)
  Date: date,
  Fee: INT(28),
  ContractTerm: date,
  transferType: CHAR(1),
  oldTeamID: INT(255)
  newTeamID: INT(255)
  PRIMARY KEY(TransferID, oldTeamID, newTeamID),
  FOREIGNKEY(oldTeamID, newTeamID) REFERENCES Team
  )
Create Table Player(
  PlayerID: INT(255)
  Name: VARCHAR(26),
  Age: INT(6),
  ContractTermStart: date,
  ContractTermEnd: date,
  Salary: INT(20),
  YellowCards: INT(4),
  RedCards: INT(4),
  TeamID: INT(255)
```

```
Since: date)
  PRIMARY KEY(PlayerID),
  FOREIGNKEY(TeamID) REFERENCES Team
Create Table Forward(
  PlayerID: INT(255)
  GoalsPerGame: DOUBLE(4,3),
  AssistsPerGame: DOUBLE(4,3),
  ShotAccuracy: DOUBLE(4,3)
  PRIMARY KEY(PlayerID),
  FOREIGNKEY(PlayerID) REFERENCES Player
  )
Create Table Midfielder(
  PlayerID: INT(255)
  AssistsPerGame: DOUBLE(4,3),
  PassAccuracy: DOUBLE(4,3),
  KeyPassesPerGame: DOUBLE(4,3)
  PRIMARY KEY(PlayerID),
  FOREIGNKEY(PlayerID) REFERENCES Player
  )
Create Table Defender(
  PlayerID: INT(255)
  TacklesPerGame: DOUBLE(4,3),
  InterceptsPerGame: DOUBLE(4,3),
  ClearancesPerGame: DOUBLE(4,3)
  PRIMARY KEY(PlayerID),
  FOREIGNKEY(PlayerID) REFERENCES Player
  )
Create Table Goalie(
 PlayerID: INT(255) PK FK,
 SavesPerGame: DOUBLE(4,3),
 GoalsAgainstAverage: DOUBLE(4,3),
 CleanSheets: INT(6)
 PRIMARY KEY(PlayerID),
 FOREIGN KEY(PlayerID) References Player)
Create Table PlaysInStadium(
StadiumID: INT(255) PK,
```

INSERT INTO Participate\_Team(TeamID,HomeAway)

VALUES (200001, H),

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Name: CHAR(20),
Location: CHAR(40),
Capacity: INT(18),
TeamID: INT(255) FK CK,
PlaysSince: date
PRIMARY KEY(StadiumID)
UNIQUE(TeamID)
FOREIGN KEY(TeamID) References Team)
8. INSERT statements to populate each table with at least 5 tuples. You will likely want to have
more than 5 tuples so that you can have meaningful queries later on.
INSERT INTO Referee_Data(RefereeID, Experience, Age, Name)
VALUES (600001, 4, 30, Michael Oliver),
VALUES (600002, 10, 49, Jarred Gillett),
VALUES (600003, 6, 42, Andre Marriner),
VALUES (600004, 7, 36, Stuart Attwell),
VALUES (600005, 15, 51, Paul Tierney);
INSERT INTO Referee GameLink(GameID, GameDate)
VALUES (500001, 1.3.2021),
VALUES (500002, 3.5.2022),
VALUES (500003, 2.2.2021),
VALUES (500004, 1.3.2022),
VALUES (500005, 5.6.2021);
INSERT INTO Referee LeftOver(GameDate, Experience, Age, Name)
VALUES (1.3.2021, 4, 30, Michael Oliver),
VALUES (3.5.2022, 10, 49, Jarred Gillett),
VALUES (2.2.2021, 6, 42, Andre Marriner),
VALUES (1.3.2022, 7, 36, Stuart Attwell),
VALUES (5.6.2021, 15, 51, Paul Tierney);
INSERT INTO Game(GameID, Location, MinutesPlayed, GameDate)
VALUES (500001, London England, 60, 1.3.2021),
VALUES (500002, Fulham, 60, 3.5.2022),
VALUES (500003, Burnley England, 75, 2.2.2021),
VALUES (500004, Stretford England, 90, 1.3.2022),
VALUES (500005, Manchester England, 75, 5.6.2021);
```

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VALUES (200002, H),
VALUES (200003, A),
VALUES (200004, A),
VALUES (200005, H);
INSERT INTO Participate Game(GameID, GameResult)
VALUES (400001, W),
VALUES (400002, W),
VALUES (400003, W),
VALUES (400004, L),
VALUES (400005, W);
INSERT INTO Participate Rest(GameResult, HomeAway)
VALUES (W, H),
VALUES (L, H),
VALUES (W, H),
VALUES (W, H),
VALUES (W, H);
INSERT INTO Team(TeamID, Name, YearFounded, Jersey, LeaguesWon)
VALUES (200002, Chelsea, 1905, img, 5),
VALUES (200001, Arsenal, 1886, img, 3),
VALUES (200003, Burnley, 1882, img, 0),
VALUES (200004, Manchester United, 1878, img, 13),
VALUES (200005, Manchester City, 1880, img, 6);
INSERT INTO Scores(PlayerID, GameID, TimeOfGoal)
VALUES (100001, 300001, 00:12:00),
VALUES (100002, 300002, 00;13:43),
VALUES (100003, 300003, 00:21:11),
VALUES (100004, 300004, 00;52:11),
VALUES (100005, 300005, 00:33:87);
INSERT INTO Sponsor(Website, Name, SponsorID)
VALUES (https://www.adidas.com/, Adidas, 800001),
VALUES (https://www.teamviewer.com/, TeamViewer, 800002),
VALUES (https://www.etihad.com/, Etihad Airways, 800003),
VALUES (https://www.cadbury.co.uk/, Cadbury, 800004),
VALUES (https://www.papajohns.com/,Papa John's, 800005);
INSERT INTO Sponsors(SponsorID, TeamID, SponsorType, AmountPaid, StartDate,EndDate)
VALUES (800001, 200001, Jersey, null, null, null),
VALUES (800002, 200004, Jersey, null, null, null),
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VALUES (800003, 200005, Jersey, null, null, null
VALUES (800004, 200002, OfficialPartner, null, null, null),
VALUES (800005, 200003, OfficialPartner, null, null, null);
INSERT INTO ManagerData(ManagerID, Name, Experience, ContractStart, ContractEnd)
VALUES (1300001, Pep Guardiola, 14, null, null),
VALUES (1300002, Ole Gunnar Solskjaer, 13, null, null),
VALUES (1300003, Sean Dyche, 10, null, null),
VALUES (1300004, Mikel Arteta, 2, null, null),
VALUES (1300005, Graham Potter, 11, null, null);
INSERT INTO ManagerTeamLink(CurrentTeamID, Salary, ContractStart, ContractEnd)
VALUES (200001, null, null, null),
VALUES (200002, null, null, null),
VALUES (200003, null, null, null),
VALUES (200004, null, null, null),
VALUES (200005, null, null, null);
INSERT INTO ManagerRest(Name, Experience, Salary, ContractStart, ContractEnd)
VALUES (Pep Guardiola, 14, null, null, null),
VALUES (Ole Gunnar Solskjaer, 13, null, null),
VALUES (Sean Dyche, 10, null, null, null),
VALUES (Mikel Arteta, 2, null, null, null),
VALUES (Graham Potter, 11, null, null);
INSERT INTO Create, Table Transfer IngoingOutgoing(TransferID, Date, Fee, ContractTerm,
transferType, oldTeamID, newTeamID)
VALUES (500001, 12.8.2021, 113000000, null, Ingoing, null, 200002),
VALUES (500002, 30.7.2021, 58500000, null, Ingoing, null, 200001),
VALUES (500003, 26.6.2021, 17500000, null, Ingoing, null, 200003),
VALUES (500004, 27.8.2021, 17000000, null, Ingoing, null, 200004),
VALUES (500005, 1.7.2021, 1000000, null, Ingoing, null, 200004);
INSERT INTO Player(PlayerID, Name, Age, ContractTermStart, ContractTermEnd, Salary,
YellowCards, RedCards, TeamID, Since)
VALUES (100001, Romelu Lukaku, 28, 12.8.2021, 12.7.2026, 16900000, 1, 0, 200002, 2021),
VALUES (100002, Ben White, 25, 30.7.2021, 30.6.2024, 6240000, 4, 0, 200001, 2021),
VALUES (100003, Wout Weghorst, 29, 26.6.2018, 25.6.2022, 3200000, 0, 0, 200003, 2021),
VALUES (100004, Cristiano Ronaldo, 36, 27.8.2021,27.8.2023, 31000000, 0, 0, 200004, 2021),
VALUES (100005, David de Gea, 32, 1.7.2011, 30.6.2023, 12000000, 0, 0, 200004, 2023);
INSERT INTO Forward(PlayerID, GoalsPerGame, AssistsPerGame, ShotAccuracy)
VALUES (100004, 1, 0,33%),
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VALUES (100003, 0, 1, 7%),
VALUES (100002, 0, 2,4%),
VALUES (100001, 2, 1,7%),
VALUES (100010, 1,0,10%);
INSERT INTO Midfielder(PlayerID, AssistsPerGame, PassAccuracy, KeyPassesPerGame)
VALUES (100011, 2, 73%, 2),
VALUES (100012, 1, 57%, 0),
VALUES (100013, 3, 81%, 1),
VALUES (100014, 1, 69%, 1),
VALUES (100015, 2, 87%, 2);
INSERT INTO Defender(PlayerID, TacklesPerGame, InterceptsPerGame, ClearancesPerGame)
VALUES (100016, 2, 1, 2),
VALUES (100017, 4, 2, 0),
VALUES (100018, 3, 1, 0),
VALUES (100019, 2, 0, 0),
VALUES (100020, 1, 0, 1);
INSERT INTO Goalie(PlayerID, SavesPerGame, GoalsAgainstAvg, CleanSheets)
VALUES (100005, 3, 1.5, 26),
VALUES (100006, 2, 2.2,13),
VALUES (100007, 1, 1.4,12),
VALUES (100008, 2, 3.3,17),
VALUES (100009, 3, 1.2,14);
INSERT INTO PlaysInStadium(StadiumID, Name, Location, Capacity, TeamID, PlaysSince)
VALUES (90001, Emirates Stadium, London England, 60704, 200001, 2006),
VALUES (90002, Stamford Bridge, Fulham, 40341, 200002, 1877),
VALUES (90003, Turf Moor, Burnley UK, 21944, 200003,1833),
VALUES (90004, Old Trafford, Stretford UK, 74310, 200004,1910),
VALUES (90005, Etihad Stadium, Manchester England, 53400, 200005, 2003);
```