CTU training solutions

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Signature

SUBJECT NAME: Business Programming
SUBJECT CODE: PRG522

FORMATIVE ASSESSMENT

Duration: Mar 15 – 05 Apr

Date 05 April 2024

Total Marks: 70

Total pages: 18

Examiner: Junior Manganyi
Moderator: Faith Muwishi

Student number

2	0	2	3	2	7	5	9	

Surname: Poponi	**Initials**: M.P	/	%

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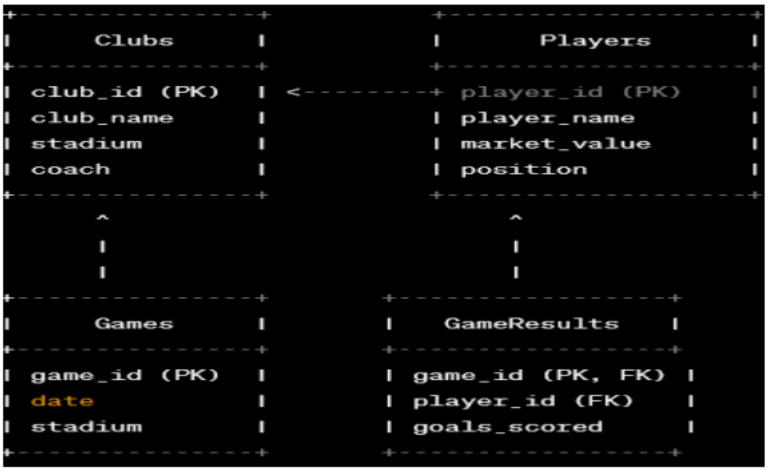
Project Question(s)

Question 1

Project Description:

In this project, you will develop an Oracle database for managing a football league. The database will store information about football clubs, players, games, and game results. The ER diagram below provides an overview of the entities and their relationships in the system.

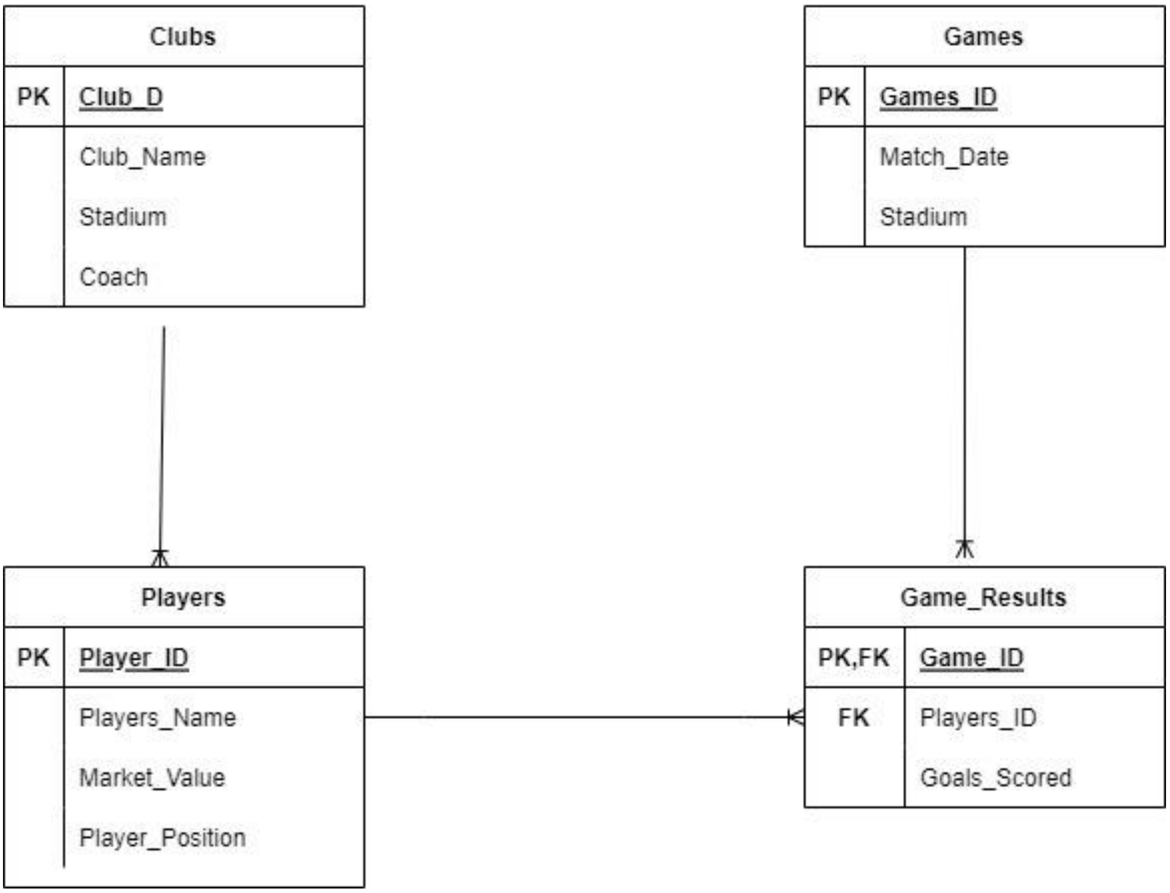


```
+---------------+          +---------------------+
|     Clubs     |          |       Players       |
+---------------+          +---------------------+
| club_id (PK)  | <--------+ player_id (PK)      |
| club_name     |          | player_name         |
| stadium       |          | market_value        |
| coach         |          | position            |
+---------------+          +---------------------+
      ^                            ^
      |                            |
      |                            |
+---------------+       +-------------------+
|     Games     |       |    GameResults    |
+---------------+       +-------------------+
| game_id (PK)  |       | game_id (PK, FK)  |
| date          |       | player_id (FK)    |
| stadium       |       | goals_scored      |
+---------------+       +-------------------+
```

Task 1: Database Design and Normalization

Transform the conceptual design (ER diagram) into the relational model by converting the entities and relationships into appropriate tables. Check if your tables are normalized using the 1st, 2nd, and 3rd normal forms.

Tables



Clubs table:

- Club_id (PK)
- Club_name
- Stadium
- Coach

This table is in the first normal form (1NF). All attribute are atomic, and there are no repeating groups. Each column contains only a single value.

Players Table:

- Player_id (PK)
- Player_name

- Market_value
- Position

This table appears to be in the first normal form (1NF). All attribute are atomic, and there are no repeating groups.

Games Table:

- Game_id (PK)
- Date
- Stadium

This table also seems to be in the first normal form (1NF). All attribute are atomic, and there are no repeating groups.

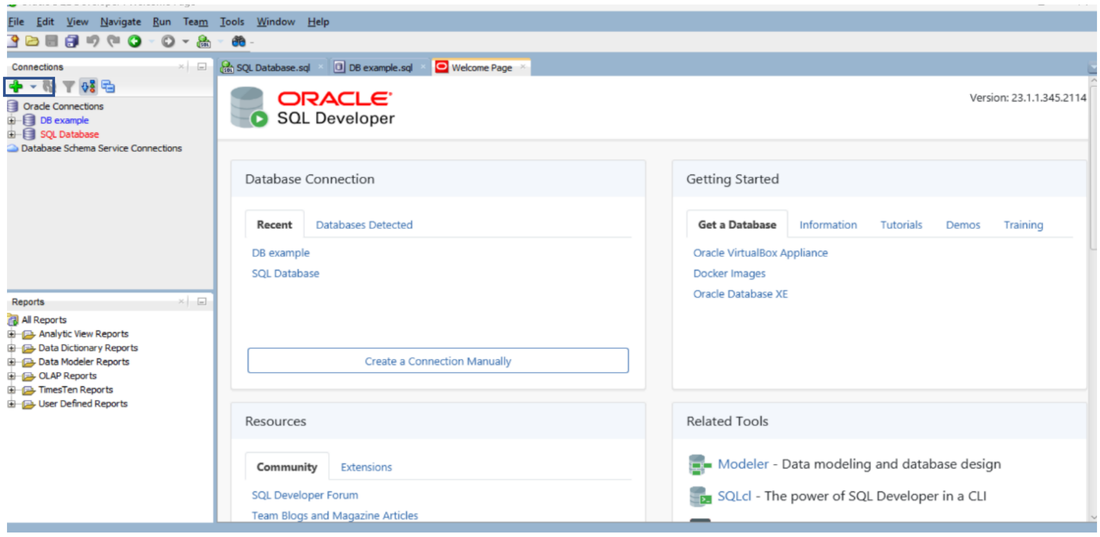
Games Result Table:

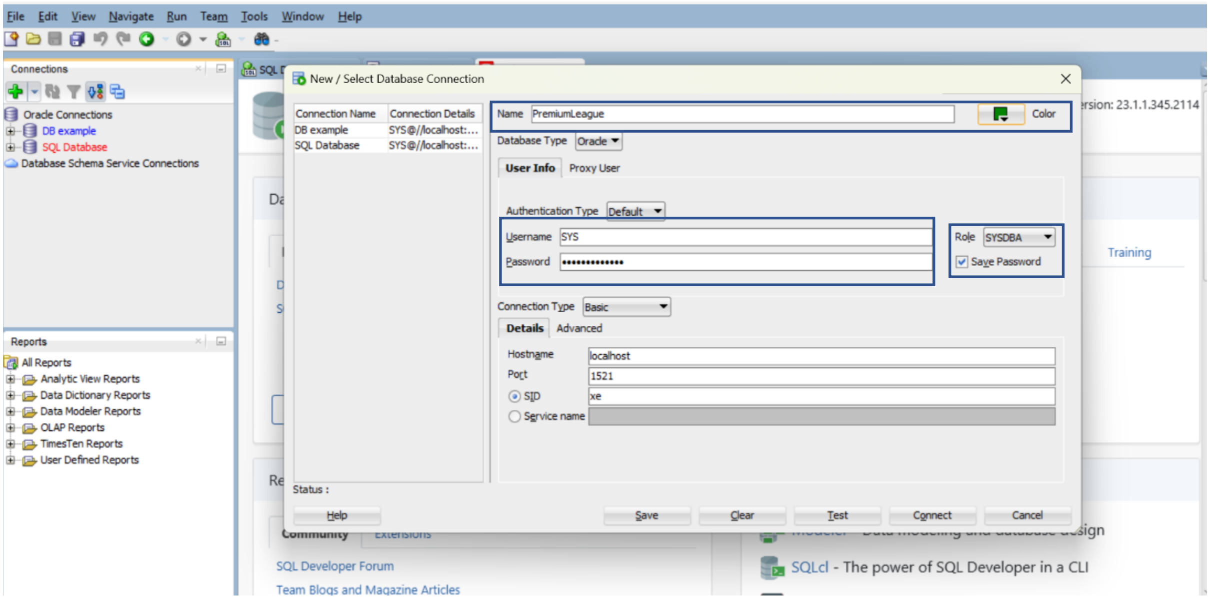
- Game_id (PK,FK)
- Player_id (FK)
- Goals_scored

This table is not in the first normal form (1NF) because there is a multivalued attribute (goals_scored) present. To adhere to the first normal form, the multivalued attribute should be separated into its own table.

Task 2: Database Creation and Data Population

I. In Oracle SQL Developer, create a database called "PremiumLeague."





Connection Name	Connection Details
DB example	SYS@//localhost:...
SQL Database	SYS@//localhost:...

Name: PremiumLeague Color

Database Type: Oracle

Authentication Type: Default

Username: SYS

Password: •••••••••••••

Role: SYSDBA

☑ Save Password

Connection Type: Basic

Hostname: localhost

Port: 1521

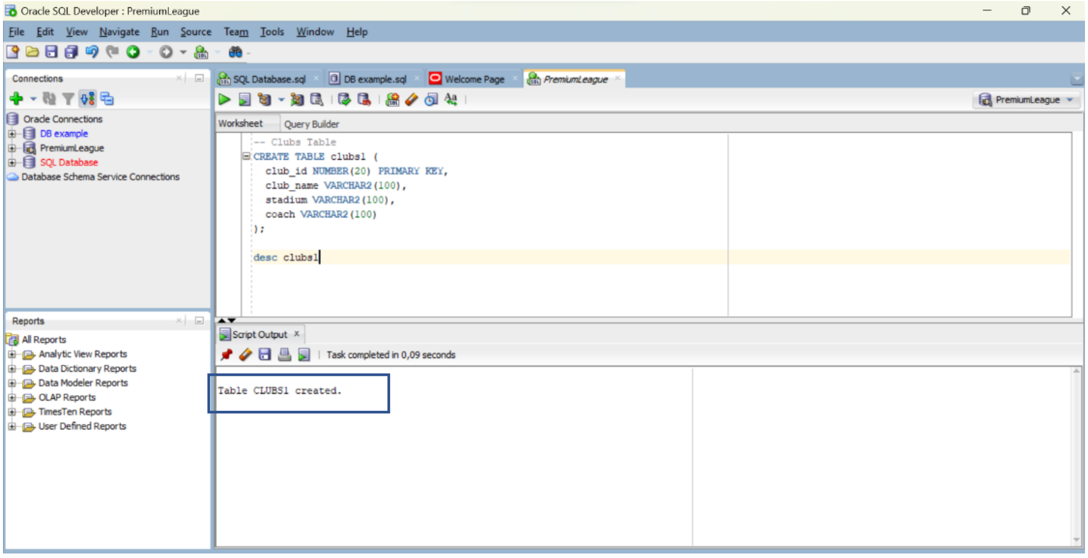
● SID: xe

○ Service name

Status :

ii. Implement the tables specified in Task 1 using DDL (Data Definition Language) commands. Choose the appropriate data types, primary and foreign keys for the attributes. Provide detailed assumptions for any of your design decisions.

```
-- Clubs Table
CREATE TABLE clubs1 (
  club_id NUMBER(20) PRIMARY KEY,
  club_name VARCHAR2(100),
  stadium VARCHAR2(100),
  coach VARCHAR2(100)
);
```

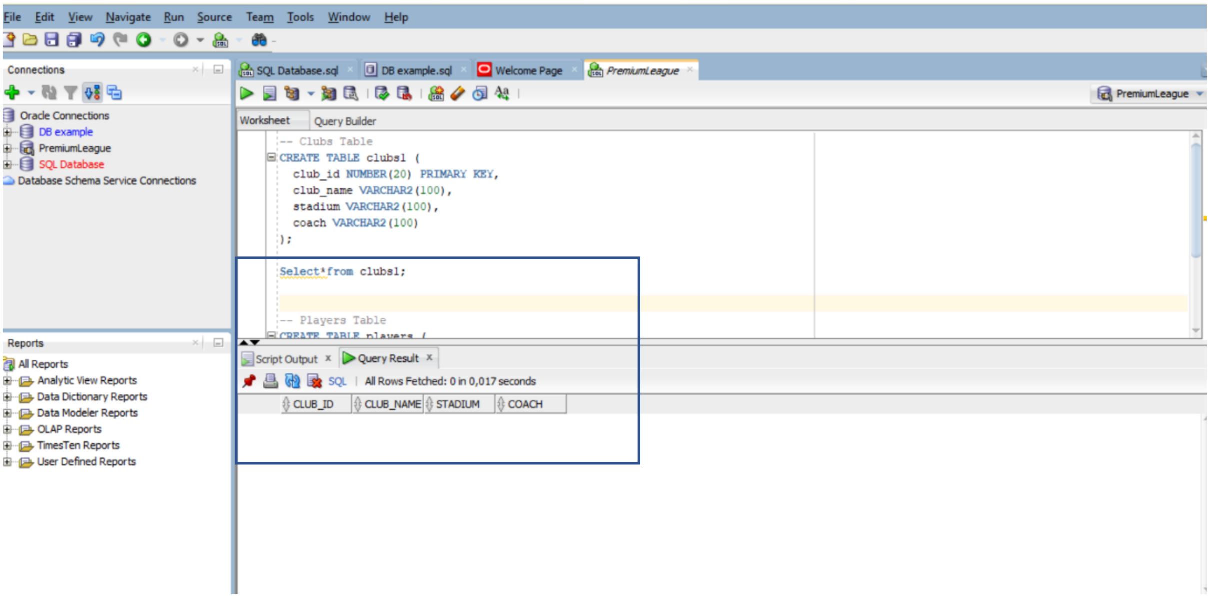


```
-- Clubs Table
CREATE TABLE clubs1 (
  club_id NUMBER(20) PRIMARY KEY,
  club_name VARCHAR2(100),
  stadium VARCHAR2(100),
  coach VARCHAR2(100)
);

desc clubs1
```

Task completed in 0,09 seconds

```
Table CLUBS1 created.
```

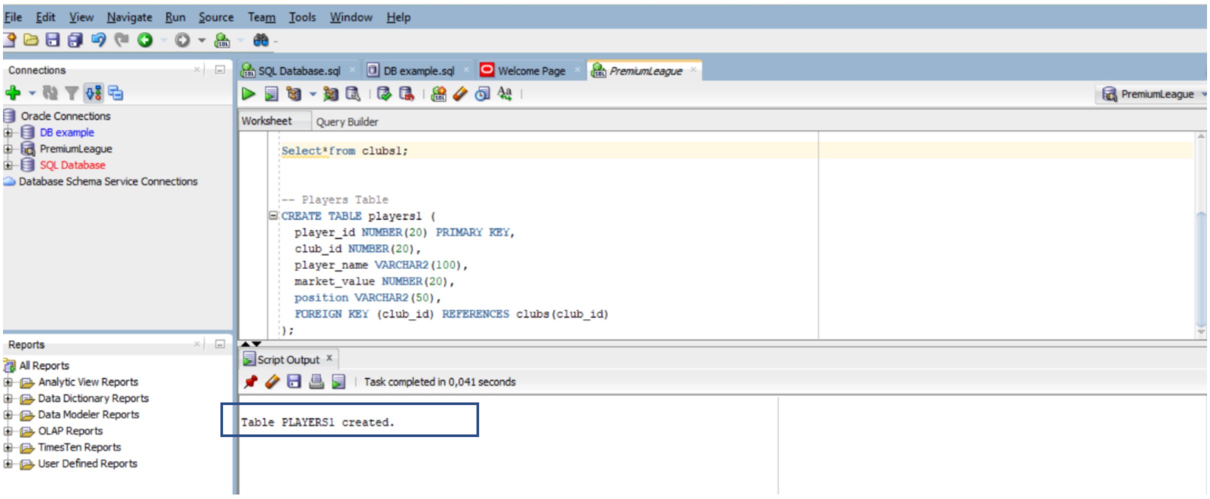
```
Select*from clubs1;
```



```
-- Clubs Table
CREATE TABLE clubs1 (
  club_id NUMBER(20) PRIMARY KEY,
  club_name VARCHAR2(100),
  stadium VARCHAR2(100),
  coach VARCHAR2(100)
);

Select*from clubs1;

-- Players Table
CREATE TABLE players (
```

```
All Rows Fetched: 0 in 0,017 seconds
CLUB_ID   CLUB_NAME   STADIUM   COACH
```

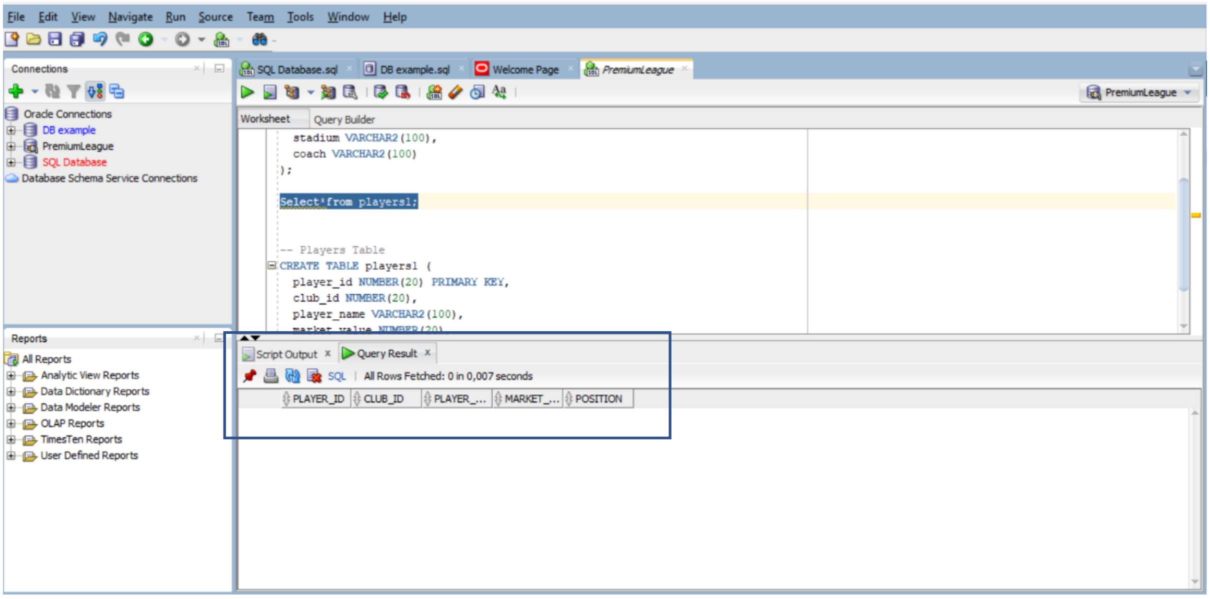
```
-- Players Table
CREATE TABLE players1 (
  player_id NUMBER(20) PRIMARY KEY,
  club_id NUMBER(20),
  player_name VARCHAR2(100),
  market_value NUMBER(20),
  position VARCHAR2(50),
  FOREIGN KEY (club_id) REFERENCES clubs(club_id)
);
```



```
Select*from clubs1;

-- Players Table
CREATE TABLE players1 (
  player_id NUMBER(20) PRIMARY KEY,
  club_id NUMBER(20),
  player_name VARCHAR2(100),
  market_value NUMBER(20),
  position VARCHAR2(50),
  FOREIGN KEY (club_id) REFERENCES clubs(club_id)
);
```

```
Task completed in 0,041 seconds

Table PLAYERS1 created.
```

```
Select*from players1;
```

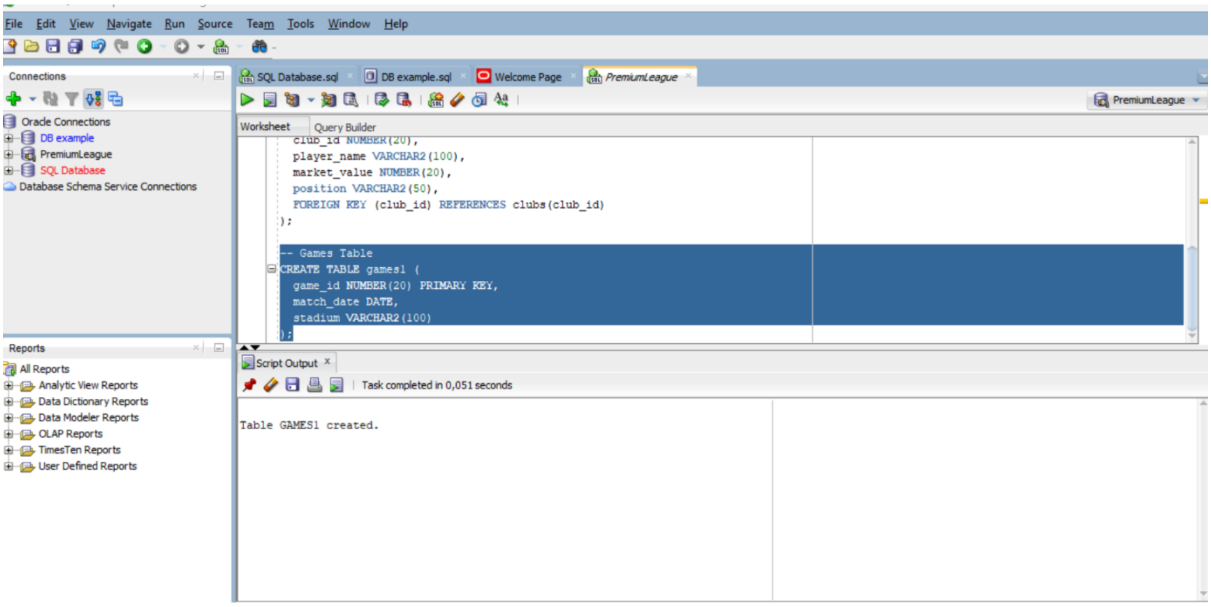


```
  stadium VARCHAR2(100),
  coach VARCHAR2(100)
);

Select*from players1;


-- Players Table
CREATE TABLE players1 (
  player_id NUMBER(20) PRIMARY KEY,
  club_id NUMBER(20),
  player_name VARCHAR2(100),
  market_value NUMBER(20),
```

All Rows Fetched: 0 in 0,007 seconds

PLAYER_ID	CLUB_ID	PLAYER_...	MARKET_...	POSITION

```
-- Games Table
CREATE TABLE games1 (
  game_id NUMBER(20) PRIMARY KEY,
  match_date DATE,
  stadium VARCHAR2(100)
);
```

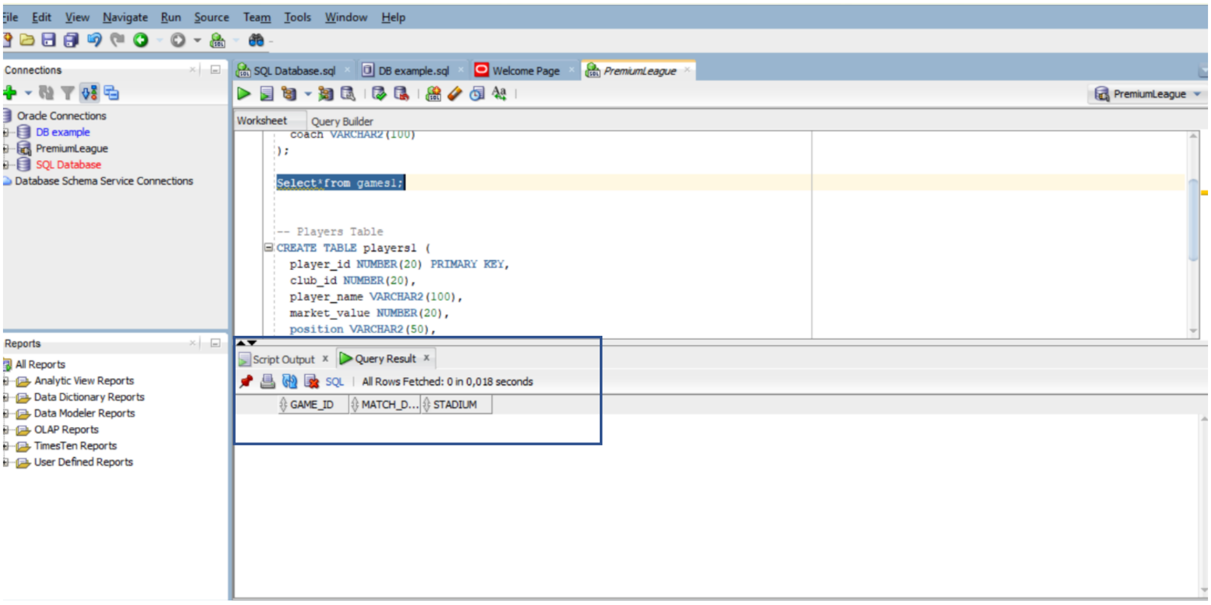


```
  club_id NUMBER(20),
  player_name VARCHAR2(100),
  market_value NUMBER(20),
  position VARCHAR2(50),
  FOREIGN KEY (club_id) REFERENCES clubs(club_id)
);

-- Games Table
CREATE TABLE games1 (
  game_id NUMBER(20) PRIMARY KEY,
  match_date DATE,
  stadium VARCHAR2(100)
);
```

Task completed in 0,051 seconds

```
Table GAMES1 created.
```

```
Select*from games1;
```

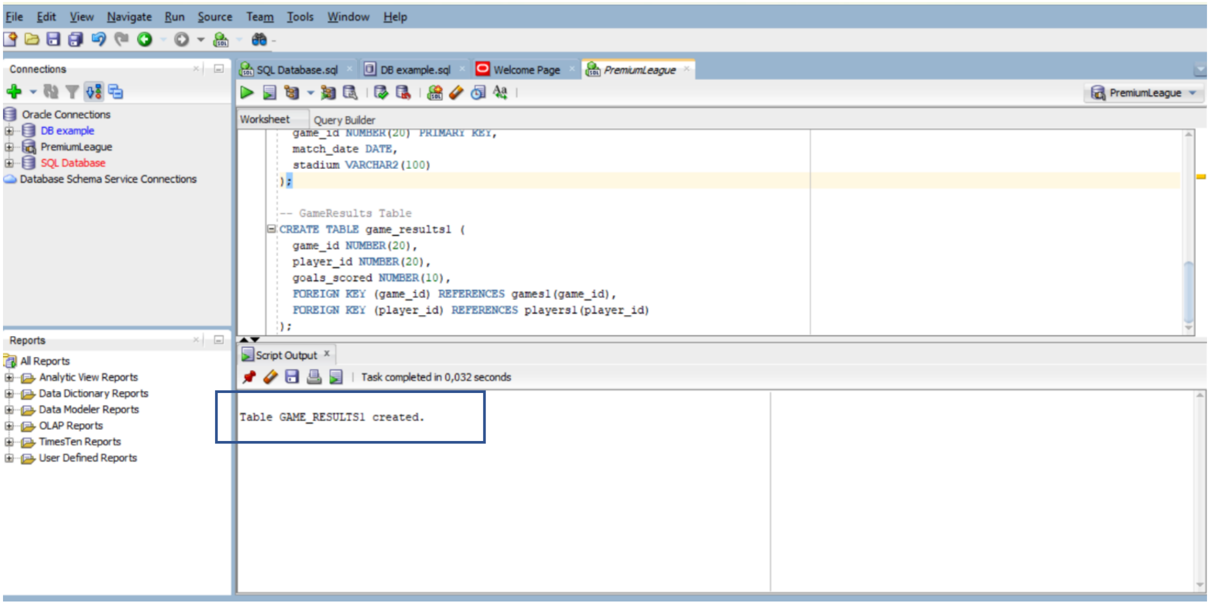


```
  coach VARCHAR2(100)
);

Select*from games1;


-- Players Table
CREATE TABLE players1 (
  player_id NUMBER(20) PRIMARY KEY,
  club_id NUMBER(20),
  player_name VARCHAR2(100),
  market_value NUMBER(20),
  position VARCHAR2(50),
```

All Rows Fetched: 0 in 0,018 seconds

GAME_ID	MATCH_D...	STADIUM

```
-- GameResults Table
CREATE TABLE game_results1 (
  game_id NUMBER(20),
  player_id NUMBER(20),
  goals_scored NUMBER(10),
  FOREIGN KEY (game_id) REFERENCES games1(game_id),
  FOREIGN KEY (player_id) REFERENCES players1(player_id)
);
```

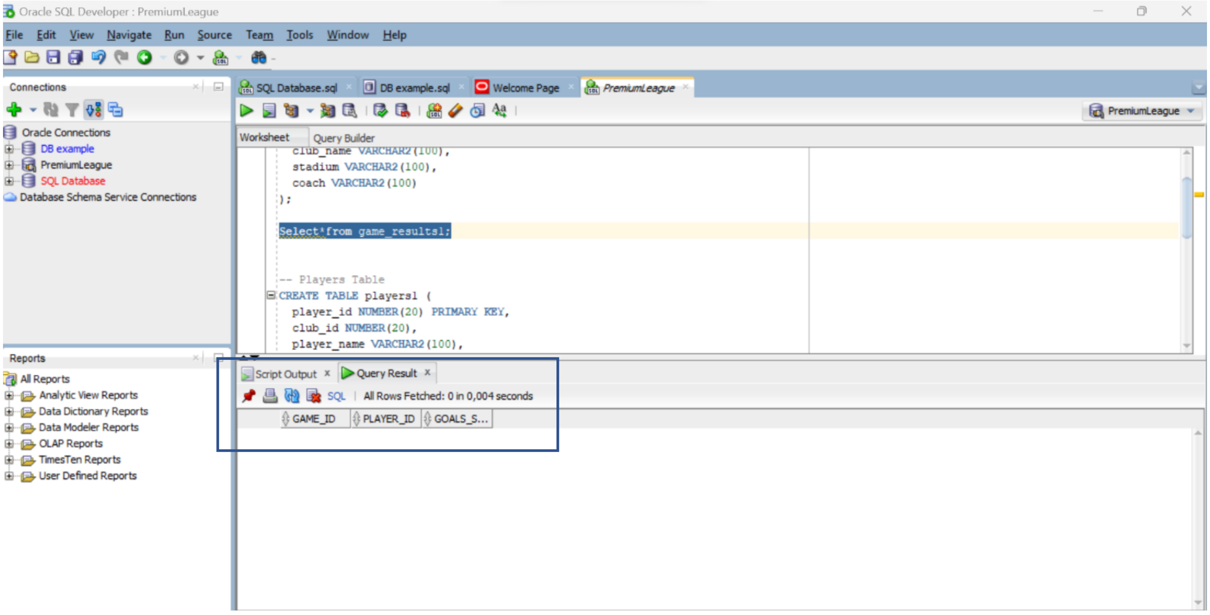


```
  game_id NUMBER(20) PRIMARY KEY,
  match_date DATE,
  stadium VARCHAR2(100)
);

-- GameResults Table
CREATE TABLE game_results1 (
  game_id NUMBER(20),
  player_id NUMBER(20),
  goals_scored NUMBER(10),
  FOREIGN KEY (game_id) REFERENCES games1(game_id),
  FOREIGN KEY (player_id) REFERENCES players1(player_id)
);
```

Task completed in 0,032 seconds

```
Table GAME_RESULTS1 created.
```

```
Select*from game_results1;
```



```
  club_name VARCHAR2(100),
  stadium VARCHAR2(100),
  coach VARCHAR2(100)
);

Select*from game_results1;


-- Players Table
CREATE TABLE players1 (
  player_id NUMBER(20) PRIMARY KEY,
  club_id NUMBER(20),
  player_name VARCHAR2(100),
```

All Rows Fetched: 0 in 0,004 seconds

GAME_ID	PLAYER_ID	GOALS_S...

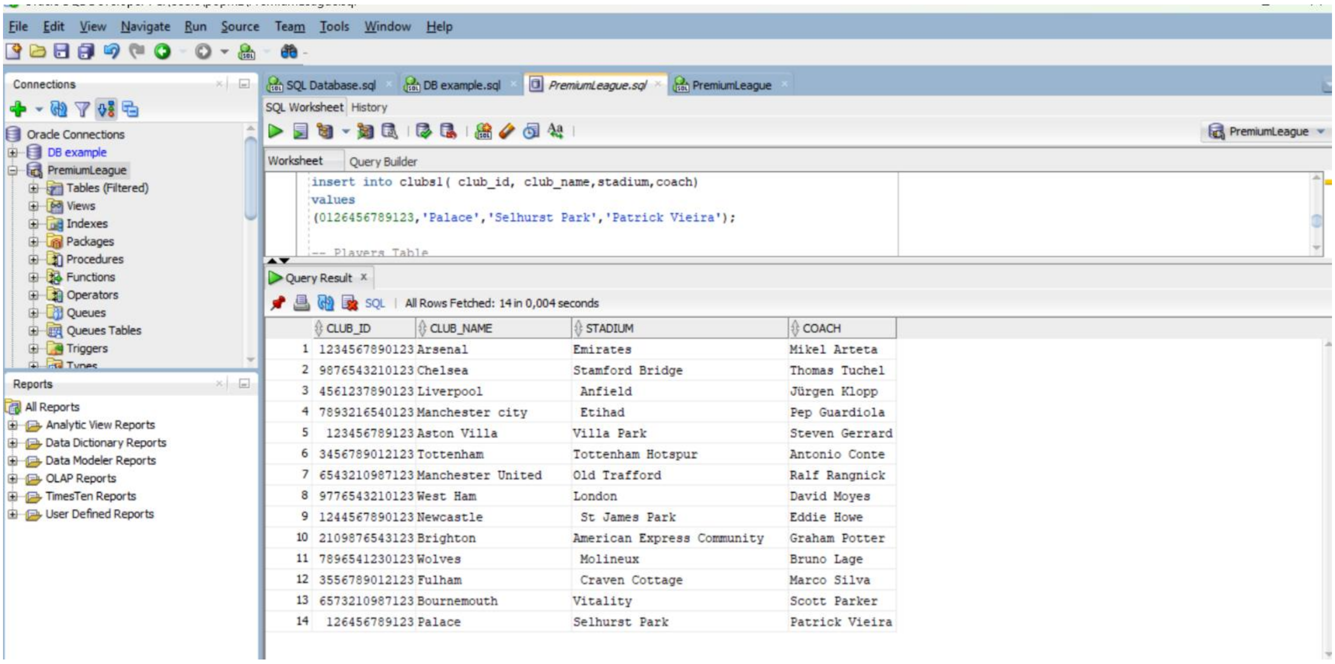
For the **Clubs table**, you would have attributes like club_id, club_name, stadium, and coach. The club_id would be the primary key.

For the **Players table**, you would have attributes like player_id, player_name, market_value, and position. The player_id would be the primary key.

For the **Games table**, you would have attributes like game_id and date, with game_id as the primary key.

For the **GameResults table**, you would have attributes like game_id, player_id, and goals_scored. Here, game_id and player_id together would form a composite primary key, and they would also be foreign keys referencing the Games and Players tables, respectively iii.Generate some data to populate your tables to simulate real-world scenarios.

```
Select*from clubs1;

insert into clubs1( club_id, club_name,stadium,coach)
values
(1234567890123,'Arsenal','Emirates','Mikel Arteta');
insert into clubs1( club_id, club_name,stadium,coach)
values
(9876543210123,'Chelsea','Stamford Bridge','Thomas Tuchel ');
insert into clubs1( club_id, club_name,stadium,coach)
values
(4561237890123,'Liverpool',' Anfield','Jürgen Klopp');
insert into clubs1( club_id, club_name,stadium,coach)
values
(7893216540123,'Manchester city',' Etihad','Pep Guardiola');
insert into clubs1( club_id, club_name,stadium,coach)
values
(0123456789123,'Aston Villa','Villa Park','Steven Gerrard');
insert into clubs1( club_id, club_name,stadium,coach)
values
(3456789012123,'Tottenham','Tottenham Hotspur','Antonio Conte');
insert into clubs1( club_id, club_name,stadium,coach)
values
( 6543210987123,'Manchester United','Old Trafford','Ralf Rangnick');
insert into clubs1( club_id, club_name,stadium,coach)
values
(9776543210123,'West Ham','London','David Moyes');
insert into clubs1( club_id, club_name,stadium,coach)
values
(1244567890123,'Newcastle',' St James Park','Eddie Howe ');
insert into clubs1( club_id, club_name,stadium,coach)
values
(2109876543123,'Brighton','American Express Community','Graham Potter');
insert into clubs1( club_id, club_name,stadium,coach)
values
(7896541230123,'Wolves',' Molineux ','Bruno Lage');
insert into clubs1( club_id, club_name,stadium,coach)
values
(3556789012123,'Fulham',' Craven Cottage','Marco Silva');
insert into clubs1( club_id, club_name,stadium,coach)
values
(6573210987123,'Bournemouth','Vitality','Scott Parker ');
insert into clubs1( club_id, club_name,stadium,coach)
values
(0126456789123,'Palace','Selhurst Park','Patrick Vieira');
```



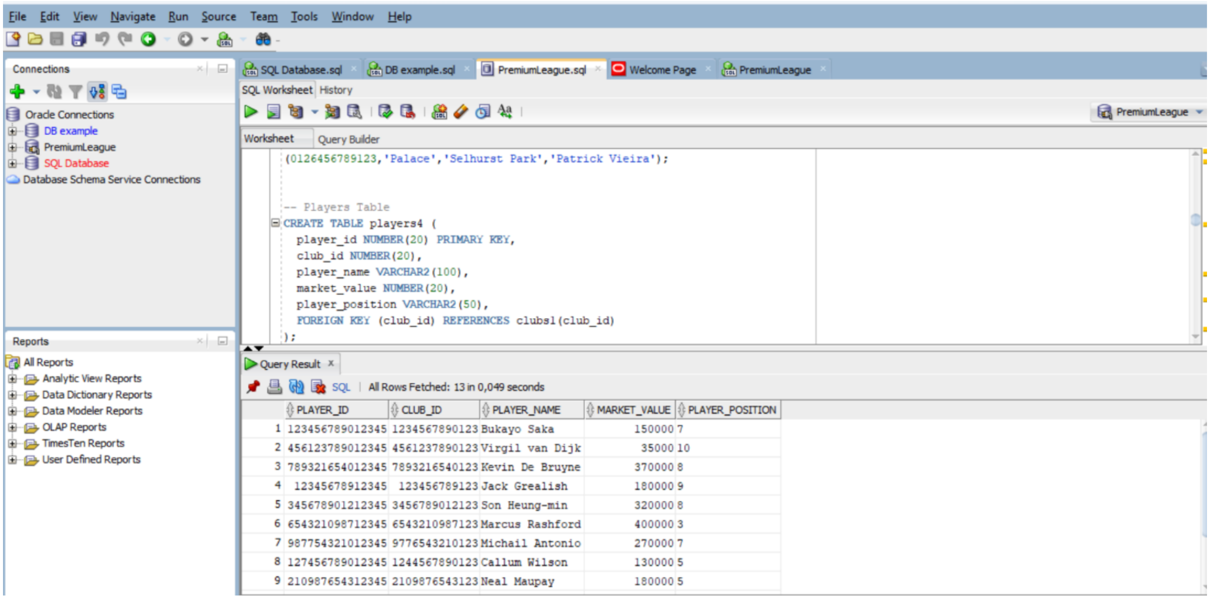
```
insert into clubs1( club_id, club_name,stadium,coach)
values
(0126456789123,'Palace','Selhurst Park','Patrick Vieira');

-- Players Table
```

All Rows Fetched: 14 in 0,004 seconds

	CLUB_ID	CLUB_NAME	STADIUM	COACH
1	1234567890123	Arsenal	Emirates	Mikel Arteta
2	9876543210123	Chelsea	Stamford Bridge	Thomas Tuchel
3	4561237890123	Liverpool	Anfield	Jürgen Klopp
4	7893216540123	Manchester city	Etihad	Pep Guardiola
5	123456789123	Aston Villa	Villa Park	Steven Gerrard
6	3456789012123	Tottenham	Tottenham Hotspur	Antonio Conte
7	6543210987123	Manchester United	Old Trafford	Ralf Rangnick
8	9776543210123	West Ham	London	David Moyes
9	1244567890123	Newcastle	St James Park	Eddie Howe
10	2109876543123	Brighton	American Express Community	Graham Potter
11	7896541230123	Wolves	Molineux	Bruno Lage
12	3556789012123	Fulham	Craven Cottage	Marco Silva
13	6573210987123	Bournemouth	Vitality	Scott Parker
14	126456789123	Palace	Selhurst Park	Patrick Vieira

```
select*from players4;

INSERT INTO players4 (player_id, club_id, player_name,
market_value,player_position)
VALUES (123456789012345, 1234567890123, 'Bukayo Saka', 150000,7);

insert into
player4(player_id,club_id,player_name,market_value,player_position)
values
(987654321012345,9876543210123,'Mason Mount',200000,4);
insert into
players4(player_id,club_id,player_name,market_value,player_position)
values
(456123789012345,4561237890123,'Virgil van Dijk',35000,10);
insert into
players4(player_id,club_id,player_name,market_value,player_position)
values
(789321654012345,7893216540123,'Kevin De Bruyne',370000,8);
insert into
players4(player_id,club_id,player_name,market_value,player_position)
values
(012345678912345,0123456789123,'Jack Grealish',180000,9);
insert into
players4(player_id,club_id,player_name,market_value,player_position)
values
(345678901212345,3456789012123,'Son Heung-min',320000,8);
insert into
players4(player_id,club_id,player_name,market_value,player_position)
values
```

```
( 654321098712345,6543210987123,'Marcus Rashford',400000,3);
insert into
players4(player_id,club_id,player_name,market_value,player_position)
values
(987754321012345,9776543210123,'Michail Antonio',270000,7);
insert into
players4(player_id,club_id,player_name,market_value,player_position)
values
(127456789012345,1244567890123,'Callum Wilson',130000,5);
insert into
players4(player_id,club_id,player_name,market_value,player_position)
values
(210987654312345,2109876543123,'Neal Maupay',180000,5);
insert into
players4(player_id,club_id,player_name,market_value,player_position)
values
(789754123012345,7896541230123,'Raul Jimenez',200000,6);
insert into
players4(player_id,club_id,player_name,market_value,player_position)
values
(345679901212345,3556789012123,'Harry Wilson',160000,11);
insert into
players4(player_id,club_id,player_name,market_value,player_position)
values
(654341098712345,6573210987123,'Lloyd Kelly',230000,11);
insert into
players4(player_id,club_id,player_name,market_value,player_position)
values
( 012355678912345,0126456789123,'Wilfried Zaha',330000,3);
```

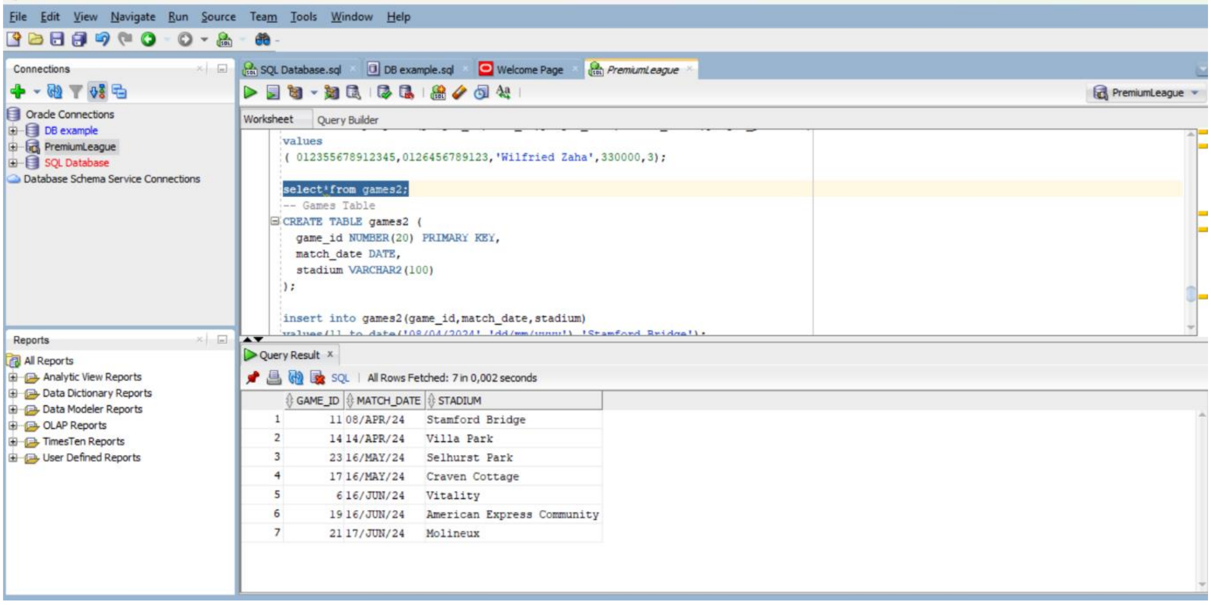


```
(0126456789123,'Palace','Selhurst Park','Patrick Vieira');


-- Players Table
CREATE TABLE players4 (
  player_id NUMBER(20) PRIMARY KEY,
  club_id NUMBER(20),
  player_name VARCHAR2(100),
  market_value NUMBER(20),
  player_position VARCHAR2(50),
  FOREIGN KEY (club_id) REFERENCES clubs1(club_id)
);
```

All Rows Fetched: 13 in 0,049 seconds

	PLAYER_ID	CLUB_ID	PLAYER_NAME	MARKET_VALUE	PLAYER_POSITION
1	123456789012345	1234567890123	Bukayo Saka	150000	7
2	456123789012345	4561237890123	Virgil van Dijk	35000	10
3	789321654012345	7893216540123	Kevin De Bruyne	370000	8
4	12345678912345	123456789123	Jack Grealish	180000	9
5	345678901212345	3456789012123	Son Heung-min	320000	8
6	654321098712345	6543210987123	Marcus Rashford	400000	3
7	987754321012345	9776543210123	Michail Antonio	270000	7
8	127456789012345	1244567890123	Callum Wilson	130000	5
9	210987654312345	2109876543123	Neal Maupay	180000	5

```
select*from games2;
-- Games Table
CREATE TABLE games2  (
  game_id NUMBER(20) PRIMARY KEY,
  match_date DATE,
  stadium VARCHAR2(100)
);

insert into games2(game_id,match_date,stadium)
values(11,to_date('08/04/2024','dd/mm/yyyy'),'Stamford Bridge');
insert into games2(game_id,match_date,stadium)
values(14,to_date('14/04/2024','dd/mm/yyyy'),'Villa Park');
insert into games2(game_id,match_date,stadium)
values(23,to_date('16/05/2024','dd/mm/yyyy'),'Selhurst Park');
insert into games2(game_id,match_date,stadium)
values(17,to_date('16/05/2024','dd/mm/yyyy'),'Craven Cottage');
insert into games2(game_id,match_date,stadium)
values(06,to_date('16/06/2024','dd/mm/yyyy'),'Vitality');
insert into games2(game_id,match_date,stadium)
values(19,to_date('16/06/2024','dd/mm/yyyy'),'American Express Community');
insert into games2(game_id,match_date,stadium)
values(21,to_date('17/06/2024','dd/mm/yyyy'),'Molineux ');
```

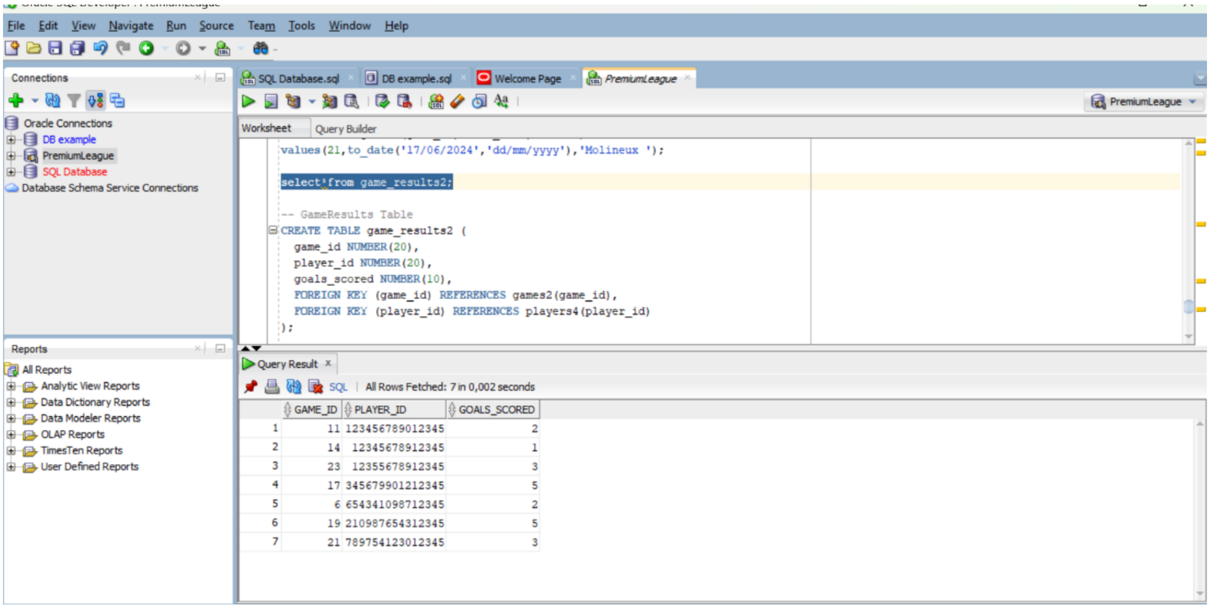


```
values
( 012355678912345,012645678 9123,'Wilfried Zaha',330000,3);

select*from games2;
-- Games Table
CREATE TABLE games2 (
  game_id NUMBER(20) PRIMARY KEY,
  match_date DATE,
  stadium VARCHAR2(100)
);

insert into games2(game_id,match_date,stadium)
values(11,to_date('08/04/2024','dd/mm/yyyy'),'Stamford Bridge');
```

All Rows Fetched: 7 in 0,002 seconds

```
     GAME_ID  MATCH_DATE  STADIUM
1         11  08/APR/24   Stamford Bridge
2         14  14/APR/24   Villa Park
3         23  16/MAY/24   Selhurst Park
4         17  16/MAY/24   Craven Cottage
5          6  16/JUN/24   Vitality
6         19  16/JUN/24   American Express Community
7         21  17/JUN/24   Molineux
```

```
select*from game_results2;

-- GameResults Table
CREATE TABLE game_results2 (
  game_id NUMBER(20),
  player_id NUMBER(20),
  goals_scored NUMBER(10),
  FOREIGN KEY (game_id) REFERENCES games2(game_id),
  FOREIGN KEY (player_id) REFERENCES players4(player_id)
);

insert into game_results2(game_id,player_id,goals_scored)
values(11,123456789012345,2);
insert into game_results2(game_id,player_id,goals_scored)
values(14,012345678912345,1);
insert into game_results2(game_id,player_id,goals_scored)
values(23,012355678912345,3);
insert into game_results2(game_id,player_id,goals_scored)
values(17,345679901212345,5);
insert into game_results2(game_id,player_id,goals_scored)
values(06,654341098712345,2);
insert into game_results2(game_id,player_id,goals_scored)
values(19,210987654312345,5);
insert into game_results2(game_id,player_id,goals_scored)
values(21,789754123012345,3);
```



```
values(21,to_date('17/06/2024','dd/mm/yyyy'),'Molineux ');

select*from game_results2;

-- GameResults Table
CREATE TABLE game_results2 (
  game_id NUMBER(20),
  player_id NUMBER(20),
  goals_scored NUMBER(10),
  FOREIGN KEY (game_id) REFERENCES games2(game_id),
  FOREIGN KEY (player_id) REFERENCES players4(player_id)
);
```

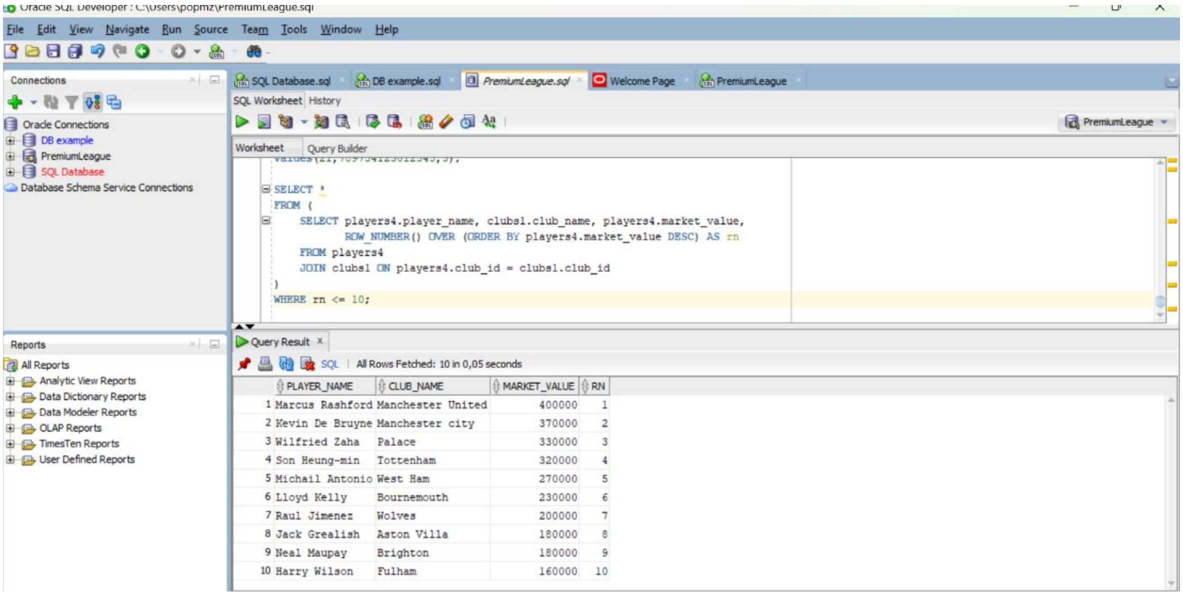
All Rows Fetched: 7 in 0,002 seconds

	GAME_ID	PLAYER_ID	GOALS_SCORED
1	11	123456789012345	2
2	14	12345678912345	1
3	23	12355678912345	3
4	17	345679901212345	5
5	6	654341098712345	2
6	19	210987654312345	5
7	21	789754123012345	3

Task 3: SQL Queries

i. Write an SQL query that returns the top 10 players in terms of market value and the clubs they play for.

```
SELECT *
FROM (
    SELECT players4.player_name, clubs1.club_name, players4.market_value,
           ROW_NUMBER() OVER (ORDER BY players4.market_value DESC) AS rn
    FROM players4
    JOIN clubs1 ON players4.club_id = clubs1.club_id
)
WHERE rn <= 10;
```



```
SELECT *
FROM (
    SELECT players4.player_name, clubs1.club_name, players4.market_value,
           ROW_NUMBER() OVER (ORDER BY players4.market_value DESC) AS rn
    FROM players4
    JOIN clubs1 ON players4.club_id = clubs1.club_id
)
WHERE rn <= 10;
```

All Rows Fetched: 10 in 0,05 seconds

	PLAYER_NAME	CLUB_NAME	MARKET_VALUE	RN
1	Marcus Rashford	Manchester United	400000	1
2	Kevin De Bruyne	Manchester city	370000	2
3	Wilfried Zaha	Palace	330000	3
4	Son Heung-min	Tottenham	320000	4
5	Michail Antonio	West Ham	270000	5
6	Lloyd Kelly	Bournemouth	230000	6
7	Raul Jimenez	Wolves	200000	7
8	Jack Grealish	Aston Villa	180000	8
9	Neal Maupay	Brighton	180000	9
10	Harry Wilson	Fulham	160000	10

Task 4: Database Security and Access Control

i. Discuss the use of database roles and privileges to secure a database system.

Answer:

Database roles are predefined categories that group together certain database privileges. A privilege is a type of permission to perform a particular action on a database object. For example, a user with the role of 'administrator' might have privileges to create, modify, and delete data, while a 'guest' role might only have read access. This helps to secure the database by ensuring that users can only perform actions that are appropriate to their role. (Geeks for geeks, .nd)

ii. Discuss the available grant options and how they enable the database administrator to control access. Provide examples of granting permissions on the database created in Tasks 1 and 2.

Answer:

Grant options are commands that a database administrator can use to give or revoke access to the database. For example, the GRANT SELECT command allows a user to read data from a database, while the GRANT INSERT command allows a user to add data. These commands can be used to control access to the database at a granular level, ensuring that users can only perform the actions they need to. (IBM, 2022)

iii. Discuss the role of views in controlling database access

Answer:

Views in a database are like virtual tables based on the result-set of an SQL statement. They can be used to provide a user with access to specific data, without giving them access to the entire database. This can be useful for restricting access to sensitive data. For example, a view could be created that only shows customer names and email addresses, but not their credit card details. This way, a customer service representative could access the information they need to do their job, without being able to see sensitive financial data. (Chapple, 2020)

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