

Homework Assignment (Due date Sunday August 4th 2019)

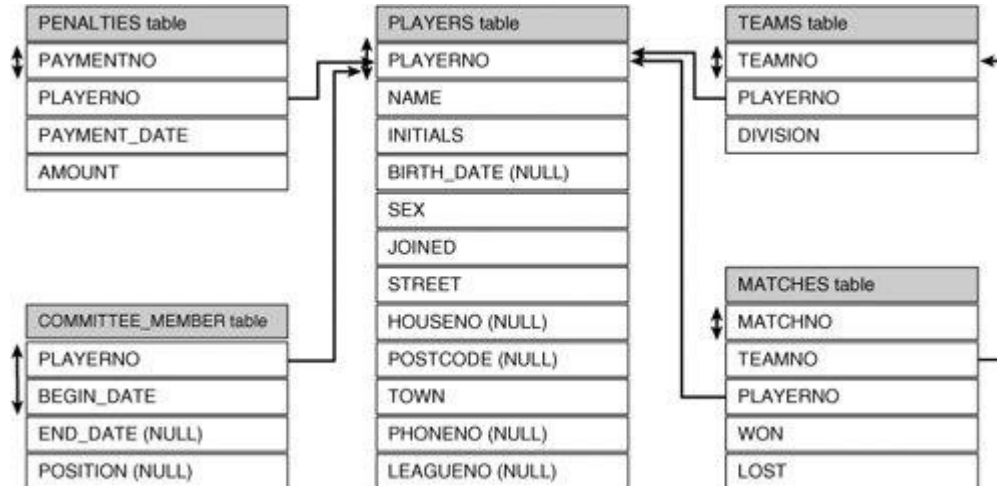
Question 1

In this homework assignment, you will create tennis club database named “tennis” and write SQL statements to create database tables, load data to the tables, and run MySQL queries.

The tennis database consists of the following tables:

PLAYERS, TEAMS, MATCHES, PENALTIES, COMMITTEE_MEMBERS

The tennis club database schema is shown in the following Figure.



A double-headed arrow at the side of a column (or combination of columns) indicates the primary key of each table based on our UoD (Universe of Discourse).

- PLAYERNO of PLAYERS
- TEAMNO of TEAMS
- MATCHNO of MATCHES
- PAYMENTNO of PENALTIES
- PLAYERNO plus BEGIN_DATE of COMMITTEE_MEMBERS

There are several foreign keys as you can see from the schema diagram, but we do not consider referential integrity constraints for creating database tables for this assignment. In the next assignment, we will study how to create database and populate database tables with foreign key constraints.

The columns in each of the tables are described below.

PLAYERS table

PLAYERNO Unique player number assigned by the club.

NAME	Surname of the player, without initials.
INITIALS	Initials of the player. No full stops or spaces are used.
BIRTH_DATE	Date on which the player was born.
SEX	Sex of the player: M(ale) or F(emale).
JOINED	Year in which the player joined the club. This value cannot be smaller than 1970, the year in which the club was founded.
STREET	Name of the street on which the player lives.
HOUSENO	Number of the house.
POSTCODE	Post code.
TOWN	Town or city in which the player lives. We assume in this example that place names are unique for town or cities or, in other words, there can never be two towns with the same name.
PHONENO	Area code followed by a hyphen and then the subscriber's number.
LEAGUENO	League number assigned by the league; a league number is unique.

TEAMS table

TEAMNO	Unique team number assigned by the club.
PLAYERNO	Player number of the player who captains the team. In principle, a player may captain several teams.
DIVISION	Division in which the league has placed the team.

MATCHES table

MATCHNO	Unique match number assigned by the club
TEAMNO	Number of the team
PLAYERNO	Number of the player
WON	Number of sets that the player won in the match
LOST	Number of sets that the player lost in the match

PENALTIES table

PAYMENTNO	Unique number for each penalty the club has paid. This number is assigned by the club.
PLAYERNO	Number of the player who has incurred the penalty.
PAYMENT_DATE	Date on which the penalty was paid. The year of this date should not be earlier than 1970, the year in which the club

was founded.

AMOUNT Amount in dollars incurred for the penalty.

COMMITTEE MEMBERS table

PLAYERNO The number of the player.

BEGIN_DATE Date on which the player became an active member of the committee. This date should not be earlier than January 1, 1990, because this is the date on which the club started to record this data.

END_DATE Date on which the player resigned his position in the committee. This date should not be earlier than the BEGIN_DATE but can be absent.

POSITION Name of the position.

The current database state (data populated) is shown below.

The PLAYERS table:

PLAYERNO	NAME	INIT	BIRTH_DATE	SEX	JOINED	STREET	...
2	Everett	R	1948-09-01	M	1975	Stoney Road	...
6	Parmenter	R	1964-06-25	M	1977	Haseltine Lane	...
7	Wise	GWS	1963-05-11	M	1981	Edgecombe Way	...
8	Newcastle	B	1962-07-08	F	1980	Station Road	...
27	Collins	DD	1964-12-28	F	1983	Long Drive	...
28	Collins	C	1963-06-22	F	1983	Old Main Road	...
39	Bishop	D	1956-10-29	M	1980	Eaton Square	...
44	Baker	E	1963-01-09	M	1980	Lewis Street	...
57	Brown	M	1971-08-17	M	1985	Edgecombe Way	...
83	Hope	PK	1956-11-11	M	1982	Magdalene Road	...
95	Miller	P	1963-05-14	M	1972	High Street	...
100	Parmenter	P	1963-02-28	M	1979	Haseltine Lane	...
104	Moorman	D	1970-05-10	F	1984	Stout Street	...
112	Bailey	IP	1963-10-01	F	1984	Vixen Road	...

The PLAYERS table (continued):

PLAYERNO	...	HOUSENO	POSTCODE	TOWN	PHONENO	LEAGUENO
2	...	43	3575NH	Stratford	070-237893	2411
6	...	80	1234KK	Stratford	070-476537	8467
7	...	39	9758VB	Stratford	070-347689	?
8	...	4	6584RO	Inglewood	070-458458	2983
27	...	804	8457DK	Eltham	079-234857	2513
28	...	10	1294QK	Midhurst	071-659599	?
39	...	78	9629CD	Stratford	070-393435	?
44	...	23	4444LJ	Inglewood	070-368753	1124
57	...	16	4377CB	Stratford	070-473458	6409
83	...	16A	1812UP	Stratford	070-353548	1608

95 ... 33A	57460P	Douglas	070-867564 ?
100 ... 80	1234KK	Stratford	070-494593 6524
104 ... 65	9437AO	Eltham	079-987571 7060
112 ... 8	6392LK	Plymouth	010-548745 1319

The TEAMS table:

TEAMNO	PLAYERNO	DIVISION
-----	-----	-----
1	6	first
2	27	second

The MATCHES table:

MATCHNO	TEAMNO	PLAYERNO	WON	LOST
-----	-----	-----	---	----
1	1	6	3	1
2	1	6	2	3
3	1	6	3	0
4	1	44	3	2
5	1	83	0	3
6	1	2	1	3
7	1	57	3	0
8	1	8	0	3
9	2	27	3	2
10	2	104	3	2
11	2	112	2	3
12	2	112	1	3
13	2	8	0	3

The PENALTIES table:

PAYMENTNO	PLAYERNO	PAYMENT_DATE	AMOUNT
-----	-----	-----	-----
1	6	1980-12-08	100.00
2	44	1981-05-05	75.00
3	27	1983-09-10	100.00
4	104	1984-12-08	50.00
5	44	1980-12-08	25.00
6	8	1980-12-08	25.00
7	44	1982-12-30	30.00
8	27	1984-11-12	75.00

The COMMITTEE_MEMBERS table:

PLAYERNO	BEGIN_DATE	END_DATE	POSITION
-----	-----	-----	-----
2	1990-01-01	1992-12-31	Chairman
2	1994-01-01	?	Member
6	1990-01-01	1990-12-31	Secretary
6	1991-01-01	1992-12-31	Member

6	1992-01-01	1993-12-31	Treasurer
6	1993-01-01	?	Chairman
8	1990-01-01	1990-12-31	Treasurer
8	1991-01-01	1991-12-31	Secretary
8	1993-01-01	1993-12-31	Member
8	1994-01-01	?	Member
27	1990-01-01	1990-12-31	Member
27	1991-01-01	1991-12-31	Treasurer
27	1993-01-01	1993-12-31	Treasurer
57	1992-01-01	1992-12-31	Secretary
95	1994-01-01	?	Treasurer
112	1992-01-01	1992-12-31	Member
112	1994-01-01	?	Secretary

Step 1: Write createTennisDB.sql which contains the following statements as shown below:

```
source players.sql      /* to create players table */
source teams.sql       /* to create teams table */
source matches.sql     /* to create matches table */
source penalties.sql   /* to create penalties table */
source committee_members.sql /* to create committee_members
table */
source load_players.sql /* to import data to the table */
source load_teams.sql  /* to import data to the table */
source load_matches.sql /* to import data to the table */
source load_penalties.sql /* to import data to the table */
source load_committee_members.sql /* to import data to the table
*/
```

In each SQL file for creating a table add “drop table if exists table_name” SQL statement to delete table if you created before.

Step 2: Make data files each of which contains the data to be populated in the target table. You need to have five data files: players.dat, teams.dat, matches.dat, penalties.dat, and committee_members.dat

For example, two CSV (comma separated value) data are in teams.dat file.

```
"1","6","first"
"2","27","second"
```

Data are imported to two rows in the teams table by load_teams.sql as shown below.

```
load_teams.sql

LOAD DATA LOCAL INFILE "teams.dat"
INTO TABLE team
FIELDS ENCLOSED BY "\"\" TERMINATED BY ","
;
```

After logging in to MySQL server, you will need to create new database “tennis” and select the database for use as shown below. If tennis database exists, delete the database to create a fresh new tennis database.

Let us assume your SQL and data files are in the folder /home/myDB (C:\home\myDB).

```
$cd /home/myDB
```

```
$mysql --local-infile -u <username> -p
```

```
-----
```

```
mysql> drop database if exists tennis;
```

```
mysql> create database `tennis`;
```

```
/* you do not need to use back tick */
```

```
mysql> use tennis;
```

```
mysql> source createTennisDB.sql
```

```
//In Linux, you need to open MySQL command shell in
```

```
//order to bypass security problem caused by bulk loading using infile
```

```
//$mysql --local-infile -u accountName -p
```

```
//Passwd: enter password
```

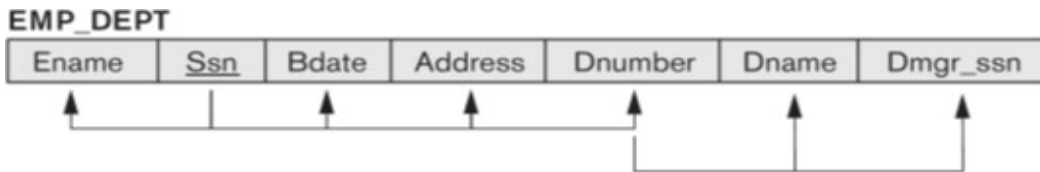
```
//source source.sql
```

Step 3: Write SQL statements which perform the following tasks.

1. Get the numbers, names, and initials of all players whose name and initials are equal to that of the player 6 or of the player 27.
2. Get all the different town names from the PLAYERS table.
3. For each town, find the number of players.
4. For each team, get the team number, the number of matches that has been played for that team, and the total number of sets won.
5. For each team that is captained by a player resident in “Eltham”, get the team number and the number of matches that has been played for that team.
6. Get each different penalty amount, followed by the number of times that the amount occurs, in the PENALTIES table, and also show the result of that amount multiplied by the number.
7. Get the player number of each player whose last penalty was incurred in 1984.
8. For each player who has incurred more than \$150 worth of penalties in total, find the player number and the total amount of penalties.
9. For each match, get the player number, team number, and difference between the number of sets won and the number of sets lost; order the result in ascending order on the difference.
10. Get all the different town names from the PLAYERS table.
11. For each town, find the number of players. 3. For each team, get the team number, the number of matches that has been played for that team, and the total number of sets won.
12. For each team that is captained by a player resident in “Eltham”, get the team number and the number of matches that has been played for that team.
13. Get each different penalty amount, followed by the number of times that the amount occurs, in the PENALTIES table, and also show the result of that amount multiplied by the number.
14. For each player who has ever incurred at least one penalty, get the player number, the name, and the total amount in penalties incurred.
15. Get the player number of each player whose last penalty was incurred in 1984.
16. For each player who has incurred more than \$150 worth of penalties in total, find the player number and the total amount of penalties.
17. For each player who is a captain and who has incurred more than \$80 worth of penalties in total, find the player number and the total amount of penalties.

18. Get the player number and the total amount of penalties for the player with the highest penalty total.
19. For each match, get the player number, team number, and difference between the number of sets won and the number of sets lost; order the result in ascending order on the difference.
20. Create a view that holds all town names from the PLAYERS table and show the virtual contents of this new view.
21. Create a view that holds the player numbers and league numbers of all players who have a league number, and show the virtual contents of this view

[Q.2] Answer the following questions based on the relation (table) schema EMP_DEPT



- (a) Explain insertion anomaly with an example
- (b) Explain deletion anomaly with an example
- (c) Explain update (modification) anomaly with an example

[Q.2] Answer the following questions

- (a) Consider the universal relation $R = \{A, B, C, D, E, F, G, H, I, J\}$ and the set of functional dependencies $F = \{ \{A, B\} \rightarrow \{C\}, \{A\} \rightarrow \{D, E\}, \{B\} \rightarrow \{F\}, \{F\} \rightarrow \{G, H\}, \{D\} \rightarrow \{I, J\} \}$.
 1. Derive the key for R.
 2. Decompose R into 2NF, then 3NF relations.
- (b) Consider the universal relation $R(A, B, C, D, E, F, G)$ and the set of functional dependencies $A \twoheadrightarrow B, B \twoheadrightarrow \{A, C, E\}, C \twoheadrightarrow \{B, F, D\}, F \twoheadrightarrow \{D, G\}$
Derive the key for R
- (c) Consider the relation $R = \{A, B, C, D, E, F, G, H, I, J\}$ and the set of functional dependencies F as follows;
 $F = \{ AB \rightarrow C, BD \rightarrow EF, AD \rightarrow GH, A \rightarrow I, H \rightarrow J \}$.
 Find the key of relation R.

Question 3

Explain the difference between 3NF and BCNF