DATABASE MANAGEMENT SYSTEMS

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TOPIC-FOOTBALL WORLD CUP

Project Name: Football World Cup

INTRODUCTION:

Our DBMS project is based on Football World Cup Management. It provides various information about the various teams participating in the World Cup, in which all the major countries participate. It also provides us with information about the various players participating in the tournament. The database contains details of the following tables:

teams, players, captain, coaches, referees, managers, match and spectators.

DATA REQUIREMENTS:*

ENTITIES:

1)**Team** is an entity type which has the following attributes-
Country (pk) , Group, Number of losses, Number of wins, Number of draws, Team Ranking.

2) **Players** is an entity type which has the following attributes-

Player Id (pk) , Name (First and Last), Age, Country (foreign Key referencing Team), Number of matches played, Number of goals, Rating, Man of the match, Experience.

3) **Referee** is an entity type which has the following attributes-
Referee Name (First and Last), Referee Id (pk) , Number of Matches, Country_of_origin, Age, Sex.

4) **Coach** is an entity type which has the following attributes-
Name (First and Last), Country_team(foreign key referencing Team), Country_of_origin, Experience, Age . country of origin + age = composite key

5) **Manager** is a weak entity type which has the following attributes-
First Name partial key, Last Name, Age, Sex, Country (Foreign Key referencing Team)

6) **Matches** is an entity type which has the following attributes-
Date, Time, Referee Id(foreign key referencing Referee),Team1, Team2, Stadium,Match_Id pk

7) **Spectators** is an entity type which has the following attributes-
Age,sex,seat number pk, mobile , email , name (first and last)

8)**Captain** is an entity type which has the following attributes-
Captain Id pk, Years of Captaincy, win percentage, Country (Foreign key referencing Team).

RELATIONSHIPS:

1. **Team plays in Match (M: N)**
Many Teams can play many matches and a match can be played by many teams. The cardinality of this relationship is M: N.

2. **Team Consists of Players(N:1)**
A team can have N players and 1 player can only belong to 1 Team. So, the cardinality will be N:1.

3. **Team coached by Coach(N:1)**
A team can have N coaches and 1 coach can only coach 1 Team. So, the cardinality will be N:1.

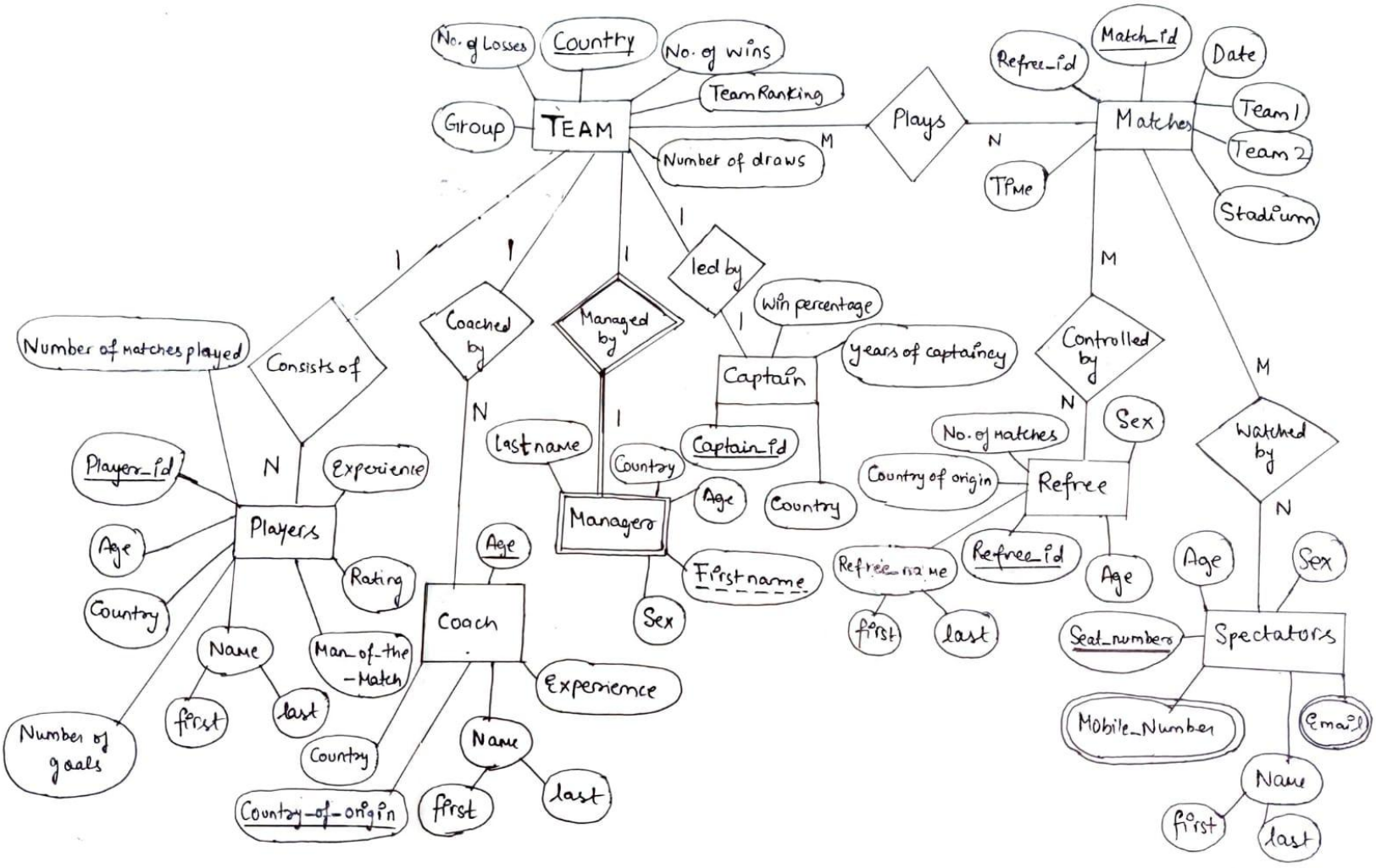
4. **Team is managed by Manager (1:1)**
A team can have 1 manager and 1 manager can only belong to 1 team. So, the cardinality will be 1:1. Manager will be in total participation with the entity 'Team'.

5. **Matches is Controlled by Referee (M: N)**
1 Referee can control many matches and 1 match can be Controlled by more than 1 referee. So, the cardinality of this relationship is M: N.

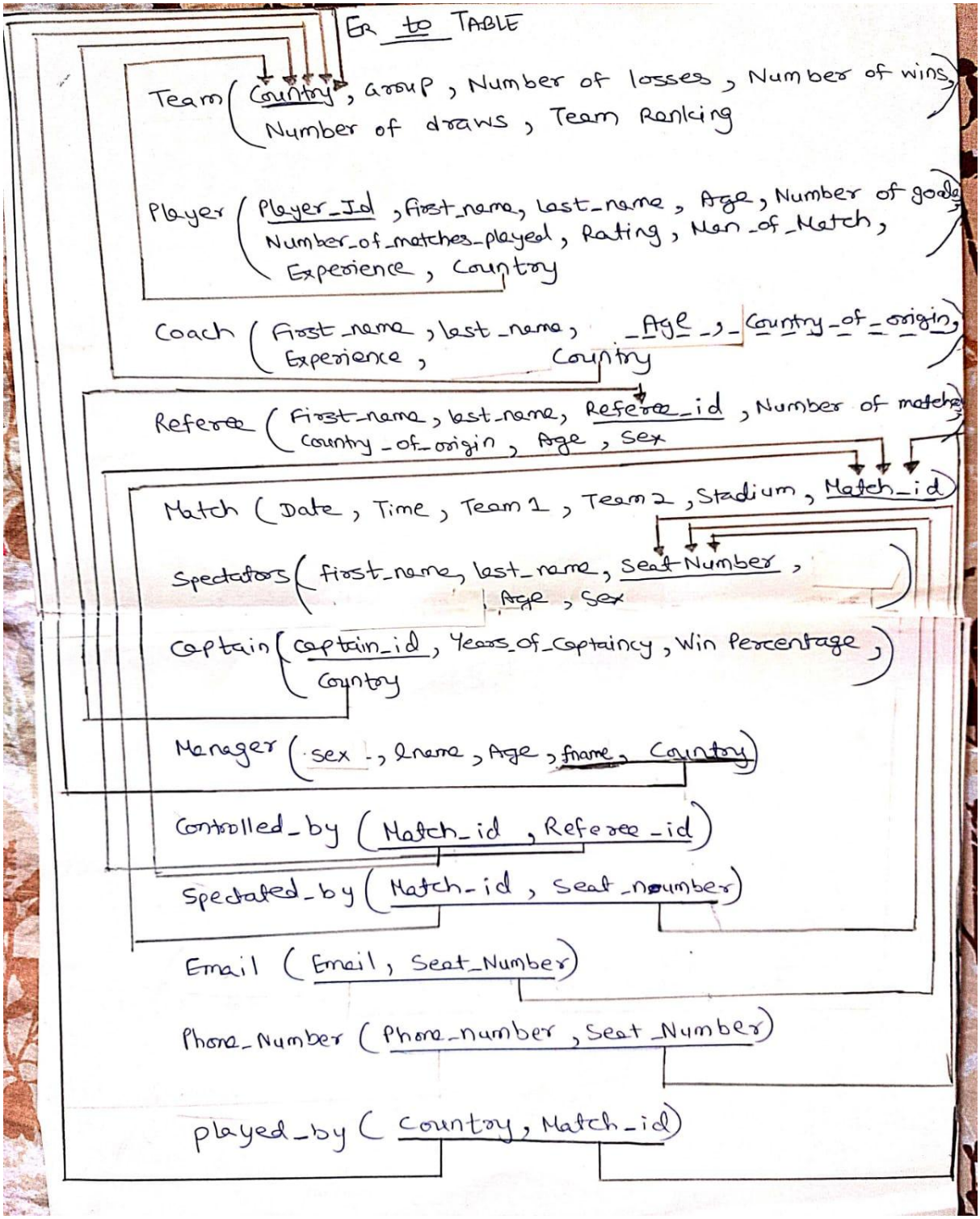
6. **Match is watched by Spectators (M: N)**
1 Match can be watched by many spectators and 1 spectator can watch many matches. So, the cardinality of this relationship is M: N

7. **Team is led by Captain (1:1)**
1 Team will have 1 Captain and 1 player will be leading only one team and hence the cardinality of the relationship will be 1:1.

ER DIAGRAM


No. of Losses
Country
No. of wins
Team Ranking
Group
TEAM
Number of draws
Plays
Refree_id
Match_id
Date
Team 1
Team 2
Stadium
TIME
Matches
M
N
1
Led by
Win percentage
years of captaincy
Captain
Captain_id
Country
Age
Coached by
Managed by
Consists of
Number of matches played
Player_id
Experience
Players
Age
Country
Rating
Name
first
last
Number of goals
Man_of_the_Match
Coach
Age
Experience
Name
first
last
Country
Country_of_origin
Last name
Country
Age
Managers
First name
Sex
Controlled by
No. of matches
Sex
Country of origin
Refree
Refree_name
first
last
Refree_id
Age
Watched by
Age
Sex
Seat_numbers
Spectators
Mobile_Number
Email
Name
first
last

ER TO TABLE


ER to TABLE
Team (Country , Group , Number of losses , Number of wins , Number of draws , Team Ranking
Player (Player_Id , first_name , last_name , Age , Number of goals , Number_of_matches_played , Rating , Man_of_Match , Experience , Country
Coach (First_name , last_name , Age , Country_of_origin , Experience , Country
Referee (First_name , last_name , Referee_id , Number of matches , Country_of_origin , Age , Sex
Match (Date , Time , Team 1 , Team 2 , Stadium , Match_id
Spectators (first_name , last_name , Seat Number , Age , Sex
Captain (captain_id , Years_of_Captaincy , Win Percentage , Country
Manager (sex , lname , Age , fname , Country
Controlled_by (Match_id , Referee_id
Spectated_by (Match_id , Seat_number
Email (Email , Seat_Number
Phone_Number (Phone_number , Seat_Number
played_by (Country , Match_id

NORMALISATION

Functional dependencies:
{Number_of_wins→Team_ranking, Age→Experience
,Number_of_goals→Man_of_the_Match}

TEAM

Country	Group	Number_of _losses	Number_of_ wins	Number_of_ draws	Team_ranking

R= (Country, Group, Number_of_losses, Number_of_wins, Number_of_draws, Team_Ranking)

Functional dependencies:
Number_of_wins→Team_ranking

The multivalued attributes present in the Relation have already been taken care of in the design phase. All the multivalued attributes are mapped into single valued attributes during ER to table conversion .The relation contains only atomic attributes, therefore the relation is in **1NF.**

The relation is already in 1NF and there are no partial functional dependencies present in the relation, hence the relation R is in **2NF.**

To convert the relation R into **3NF** we get rid of the transitive functional dependencies.

In this relation we have **Number_of_wins→Team_ranking** as a transitive functional dependency, to remove it we **decompose** the relation R into R1 and R2 respectively

R1: (Number_of_wins,Team_ranking)

Number_of_wins	Team_ranking

R2: (Country,Group,Number_of_losses,Number_of_wins,Number_of_draws)

Country	Group	Number_of_losses	Number_of_wins	Number_of_draws

COACH

First Name	Last Name	Country _team	Country_of _origin	Experience	Age

R= (First Name, Last Name, Country_team, Country_of_origin, Experience, Age)

FUNCTIONAL DEPENDENCIES

Age→Experience

The multivalued attributes present in the Relation have already been taken care of in the design phase. All the multivalued attributes are mapped into

single valued attributes during ER to table conversion .The relation contains only atomic attributes, therefore the relation is in **1NF.**

In this relation we have **Age→Experience** as a partial functional dependency, to remove it we **decompose** the relation R into R1 and R2 respectively

R1(Age, Experience):

Age	Experience

R2(First_name, Last_name, Country_team, Country_of_origin)

First_name	Last_name	Country_team,	Country_of_origin

The relation is now in 2NF

The relation is already in 2NF and there are no transitive functional dependencies present in the relation, hence the relation R is in **3NF.**

Hence, the table has now been normalized

CAPTAIN

captain_id	years_of_captaincy	win_percentage	Country

R=(Captain_Id, Years_of_Captaincy, win_percentage, Country)

The multivalued attributes present in the Relation have already been taken care of in the design phase. All the multivalued attributes are mapped into single valued attributes during ER to table conversion. The relation contains only atomic attributes , therefore the relation is in **1NF.**

The relation is already in 1NF and there are no partial functional dependencies present in the relation, hence the relation R is in **2NF.**

The Relation is already in 2NF and there are no transitive functional dependencies present in the relation , hence the relation R is in **3NF.**

MANAGER

First Name	Last Name	Age	Sex	Country

R=(First Name , Last Name, Age, Sex, Country)

The multivalued attributes present in the Relation have already been taken care of in the design phase. All the multivalued attributes are mapped into single valued attributes during ER to table conversion .The relation contains only atomic attributes, therefore the relation is in **1NF.**

The Relation is already in 1NF and there are no partial functional dependencies present in the relation , hence the relation R is in **2NF.**

The Relation is already in 2NF and there are no transitive functional dependencies present in the relation , hence the relation R is in **3NF.**

EMAIL

Email	Seat_number

R=(Email,Seat_number)

The multivalued attributes present in the Relation have already been taken care of in the design phase. All the multivalued attributes are mapped into single valued attributes during ER to table conversion. The relation contains only atomic attributes , therefore the relation is in **1NF.**

The relation is already in 1NF and there are no partial functional dependencies present in the relation, hence the relation R is in **2NF.**

The Relation is already in 2NF and there are no transitive functional dependencies present in the relation , hence the relation R is in **3NF.**

PHONE NUMBER

Phone_Number	Seat_number

R=(Phone_Number,Seat_number)
The multivalued attributes present in the Relation have already been taken care of in the design phase. All the multivalued attributes are mapped into single valued attributes during ER to table conversion. The relation contains only atomic attributes; therefore, the relation is in **1NF**.

The relation is already in **1NF** and there are no partial functional dependencies present in the relation, hence the relation R is in **2NF.**

The Relation is already in **2NF** and there are no transitive functional dependencies present in the relation, hence the relation R is in **3NF**.

PLAYER

FUNCTIONAL DEPENDENCIES

{Number_of_goals→Man_of_the_Match}

Player_id	First_ Name	Last_ Name	Age	Number_ of_goals	Number_of_ matches_played	Rating	Man_of_match	Experience	Country

R=(Player_id, First name, Last_name, Number_of_goals, Number_of_matches_played, Rating, Man of the match,Experience, Country)

The multivalued attributes present in the Relation have already been taken care of in the design phase. All the multivalued attributes are mapped into single valued attributes during ER to table conversion. The relation contains only atomic attributes; therefore, the relation is in **1NF**.

The relation is already in **1NF** and no composite primary keys, hence the table is in **2NF**
To convert the relation R into **3NF** we get rid of the transitive functional dependencies.

In this relation we have **Number_of_goals→Man_of_match** as a transitive functional dependency, to remove it we decompose the relation R into R1 and R2 respectively.
R1=(Number_of_goals,Man_of_match)

Number_of_goals	Man_of_match

R2= (Player_id, First name, Last_name, Number_of_matches_played, Rating, Experience, Country)

Player_id	First name	Last_name	Age	Number_of_ matches_played	Rating	Experience	Country

SPECTATED_BY

Match_ID	Seat_number

R=(Match_ID, Seat_number)

There are no multivalued attributes present in the table so it is already in 1NF

The relation is already in **1NF** and there are no partial functional dependencies, hence the table is in **2NF**.

The Relation is already in **2NF** and there are no transitive functional dependencies present in the relation, hence the relation R is in **3NF**

MATCH

Date	Time	Team1	Team2	Stadium	Match_id

R=(Date,time,Team1,Team2,stadium,match_id)

The multivalued attributes present in the Relation have already been taken care of in the design phase. All the multivalued attributes are mapped into

single valued attributes during ER to table conversion. The relation contains only atomic attributes , therefore the relation is in 1NF.

The relation is already in **1NF** and there are no partial functional dependencies present in the relation, hence the relation R is in **2NF**.

The Relation is already in **2NF** and there are no transitive functional dependencies present in the relation , hence the relation R is in **3NF.**

REFEREE

First	Last	Referee_Id	Number_of_matches	Country_of _Origin	Age	Sex

R=(Referee Name (First and Last), Referee Id, Number of Matches, Country_of_origin, Age, Sex.)

The multivalued attributes present in the Relation have already been taken care of in the design phase. All the multivalued attributes are mapped into single valued attributes during ER to table conversion .The relation contains only atomic attributes, therefore the relation is in **1NF.**

The relation is already in 1NF and there are no partial functional dependencies present in the relation, hence the relation R is in **2NF.**

To convert the relation R into **3NF** we get rid of the transitive functional dependencies.

SPECTATORS

first	Last	Seat_number	Mobile Number	Email	Sex	Age

R=(first,Last,Seat_Number,Mobile Number,Email,Sex,Age)

The multivalued attributes present in the Relation have already been taken care of in the design phase. All the multivalued attributes are mapped into single valued attributes during ER to table conversion. The relation contains only atomic attributes; therefore, the relation is in **1NF**.

The relation is already in **1NF** and there are no partial functional dependencies present in the relation, hence the relation R is in **2NF.**

The Relation is already in **2NF** and there are no transitive functional dependencies present in the relation, hence the relation R is in **3NF**.

CONTROLLED_BY

Match_Id	**Referee_Id**

R=(Match_Id,Referee_Id)

No multivalued attributes present so it is in 1NF

The relation is already in 1NF and no Partial functional dependencies are present, hence the table is in 2NF

The relation is already in 2NF and no TFD present, hence the table is in 3NF

PLAYED_BY

Match_Id	Country

R=(Match_Id,Country)

No multivalued attributes present so it is in 1NF

The relation is already in 1NF and no Partial functional dependencies are present, hence the table is in 2NF

The relation is already in 2NF and no TFD present, hence the table is in 3NF

SQL QUERIES

I) CREATE AND INSERT

Table Teams

```
use football;
 Create table Teams
(
    country varchar(20) primary key,
    pool varchar(10),
    Number_of_losses numeric(2),
    Number_of_wins numeric(2),
    Number_of_draws numeric(2),
    Team_Ranking numeric(1)
);

INSERT INTO Teams VALUES
('France',1,1,3,2,2),
('Germany',1,1,3,2,4),
('Spain',1,1,2,3,3),
('Argentina',2,0,4,2,1),
('Italy',2,3,1,2,5),
('Portugal',2,4,0,2,6);

Select*from Teams;
```

Result Grid | Filter Rows: | Edit: | Export/Import:

country	pool	Number_of_losses	Number_of_wins	Number_of_draws	Team_Ranking
Argentina	2	0	4	2	1
France	1	1	3	2	2
Germany	1	1	3	2	4
Italy	2	3	1	2	5
Portugal	2	4	0	2	6
Spain	1	1	2	3	3
NULL	NULL	NULL	NULL	NULL	NULL

Table Referee

```
Create table Referee
(
    first_name varchar(10),
    last_name varchar(10),
    Referee_id varchar(10) primary key,
    number_of_matches numeric(3),
    Country_of_origin varchar(20),
    Age numeric(2),
    sex varchar(8)
);
```

```
INSERT INTO Referee VALUES
('Josh','Jordan',1,9,'Germany',41,'male'),
('Sandy','Jackson',2,8,'Germany',37,'male'),
('Roman','Wood',3,8,'Germany',31,'male'),
('Kareena','Sanders',4,9,'Germany',29,'Female'),
 ('Dior','Santos',5,9,'Germany',34,'male');
```

Result Grid | Filter Rows: | Edit: | Export/Import: | Wrap

first_name	last_name	Referee_id	number_of_matches	Country_of_origin	Age	sex
Josh	Jordan	1	9	Germany	41	male
Sandy	Jackson	2	8	Germany	37	male
Roman	Wood	3	8	Germany	31	male
Kareena	Sanders	4	9	Germany	29	Female
Dior	Santos	5	9	Germany	34	male
NULL	NULL	NULL	NULL	NULL	NULL	NULL

Referee 2

Table players

```
create table players
(
player_id varchar(30),
first_name varchar(30),
last_name varchar(30),
age  numeric(2),
number_of_goals numeric(3),
number_of_matches_played numeric(3),
rating numeric(3),
man_of_match numeric(3),
experience numeric(2),
country varchar(20),
constraint players_pk primary key(player_id),
constraint players_fk foreign key(country) references teams(country)
);
```

```
INSERT INTO players VALUES
('13','Cristian','Ansaldi','26','37','47','83','7','6','Spain'),
('17','Federico','fazio','24','49','53','87','9','8','Spain'),
 ('78','gabrial','mercado','28','32','67','59','10','5','Spain'),
('99','marcos','Acuna','24','47','70','93','9','4','Spain'),
('67','marcos','rojo','28','5','47','87','10','6','Spain'),
('19','nicolas','otamendi','20','17','19','87','4','2','Argentina'),
 ('29','nicolas','tagiliafico','25','33','47','83','7','6','Argentina'),
 ('75','cristian','pavon','31','29','49','77','3','6','Argentina'),
 ('89','gonzalo','higuain','33','42','60','80','11','8','Argentina'),
 ('90','lionel','messi','30','77','87','95','25','5','Argentina'),
 ('83','Cristian','zain','22','17','27','83','2','2','Portugal'),
('20','R','patricio','26','37','47','83','7','5','Portugal'),
('15','diogo','costa','25','27','40','73','5','5','Portugal'),
 ('18','jose','sa','36','67','87','87','18','7','Portugal'),
 ('11','R','dias','28','27','47','69','4','4','Portugal'),
 ('14','j','fonte','37','60','100','75','11','5','France'),
 ('71','j','monte','29','27','57','63','7','4','France'),
 ('48','j','cenclao','22','17','22','83','8','5','France'),
('84','n','patricio','28','35','49','88','3','7','France'),
 ('42','R','navas','23','32','48','90','11','3','France'),
 ('27','R','janaoa','28','39','46','89','15','7','Germany'),
 ('98','i','jassas','29','35','49','80','10','4','Germany'),
 ('31','meast','ozil','25','39','46','89','15','3','Germany'),
('32','thomes','muller','22','19','26','81','9','3','Germany'),
 ('33','bastian','sch','24','27','46','85','11','4','Germany'),
 ('66','tony','kroos','28','52','70','82','17','3','Italy'),
 ('62','manuel','neueer','21','19','26','79','5','2','Italy'),
 ('59','timo','wernere','23','39','46','89','4','3','Italy'),
 ('58','franz','backen','31','29','40','70','9','2','Italy'),
 ('53','mario','gotzr','33','39','66','6','5','7','Italy');
```

esult Grid | Filter Rows: | Edit: | Export/Import: | Wrap Cell Content:

player_id	first_name	last_name	age	number_of_goals	number_of_matches_played	rating	man_of_match	experience	country
15	diogo	costa	25	27	40	73	5	5	Portugal
17	Federico	fazio	24	49	53	87	9	8	Spain
18	jose	sa	36	67	87	87	18	7	Portugal
19	nicolas	otamendi	20	17	19	87	4	2	Argentina
20	R	patricio	26	37	47	83	7	5	Portugal
27	R	janaoa	28	39	46	89	15	7	Germany
29	nicolas	tagiliafico	25	33	47	83	7	6	Argentina
31	meast	ozil	25	39	46	89	15	3	Germany
32	thomes	muller	22	19	26	81	9	3	Germany
33	bastian	sch	24	27	46	85	11	4	Germany
42	R	navas	23	32	48	90	11	3	France
48	j	cenclao	22	17	22	83	8	5	France
53	mario	gotzr	33	39	66	6	5	7	Italy
58	franz	backen	31	29	40	70	9	2	Italy
59	timo	wernere	23	39	46	89	4	3	Italy
62	manuel	neueer	21	19	26	79	5	2	Italy
66	tony	kroos	28	52	70	82	17	3	Italy
67	marcos	rojo	28	5	47	87	10	6	Spain
71	j	monte	29	27	57	63	7	4	France
75	cristian	pavon	31	29	49	77	3	6	Argentina
78	gabrial	mercado	28	32	67	59	10	5	Spain
83	Cristian	zain	22	17	27	83	2	2	Portugal
84	n	patricio	28	35	49	88	3	7	France
89	gonzalo	higuain	33	42	60	80	11	8	Argentina
90	lionel	messi	30	77	87	95	25	5	Argentina
98	i	jassas	29	35	49	80	10	4	Germany
99	marcos	Acuna	24	47	70	93	9	4	Spain
NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL

Table Manager

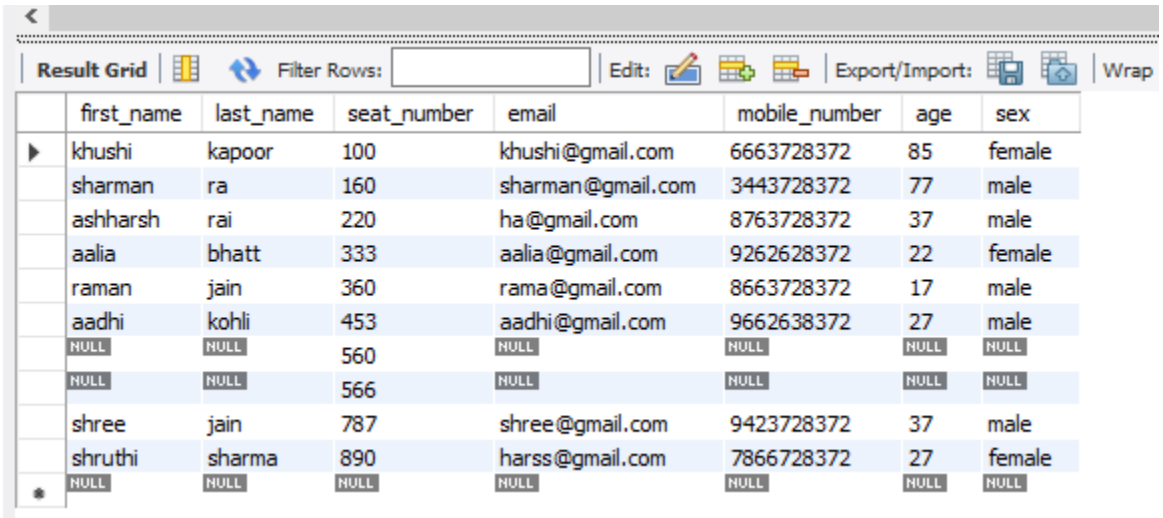
```
create table manager
(
first_name varchar(30) ,
last_name varchar(30),
age numeric(2),
sex varchar(7),
country varchar(20),
primary key(first_name,country),
constraint manager_fk foreign key(country) references teams(country)
);

INSERT INTO Manager VALUES
('Didier','Deschamps',53,'Male','France'),
('Lionel','Scaloni ',43,'Male','Argentina'),
('Roberto','Mancini',57,'Male','Italy'),
('Fernando','Santos',67,'Male','Portugal'),
('Luis','Enrique',53,'Male','Spain'),
 ('Joachim','Low',53,'Male','Germany');
```

Result Grid | Filter Rows: | Edit:

first_name	last_name	age	sex	country
Didier	Deschamps	53	Male	France
Fernando	Santos	67	Male	Portugal
Joachim	Low	53	Male	Germany
Lionel	Scaloni	43	Male	Argentina
Luis	Enrique	53	Male	Spain
Roberto	Mancini	57	Male	Italy
NULL	NULL	NULL	NULL	NULL

Table Spectators

```
create table spectators
(
first_name varchar(30),
last_name varchar(30),
seat_number varchar(10),
email varchar(30),
mobile_number numeric(10),
age numeric(2),
sex varchar(7),
constraint spectators_pk primary key(seat_number)
);

INSERT INTO spectators VALUES ('harsh','jain','560','har@gmail.com','9663728372','47','male'),
 ('shreya','sharma','566','shreya@gmail.com','9668928372','44','female'),
('shree','jain','787','shree@gmail.com','9423728372','37','male'),
 ('aadhi','kohli','453','aadhi@gmail.com','9662638372','27','male'),
 ('aalia','bhatt','333','aalia@gmail.com','9262628372','22','female'),
('ashharsh','rai','220','ha@gmail.com','8763728372','37','male'),
 ('raman','jain','360','rama@gmail.com','8663728372','17','male'),
('khushi','kapoor','100','khushi@gmail.com','6663728372','85','female'),
 ('sharman','ra','160','sharman@gmail.com','3443728372','77','male'),
 ('shruthi','sharma','890','harss@gmail.com','7866728372','27','female');
```



first_name	last_name	seat_number	email	mobile_number	age	sex
khushi	kapoor	100	khushi@gmail.com	6663728372	85	female
sharman	ra	160	sharman@gmail.com	3443728372	77	male
ashharsh	rai	220	ha@gmail.com	8763728372	37	male
aalia	bhatt	333	aalia@gmail.com	9262628372	22	female
raman	jain	360	rama@gmail.com	8663728372	17	male
aadhi	kohli	453	aadhi@gmail.com	9662638372	27	male
NULL	NULL	560	NULL	NULL	NULL	NULL
NULL	NULL	566	NULL	NULL	NULL	NULL
shree	jain	787	shree@gmail.com	9423728372	37	male
shruthi	sharma	890	harss@gmail.com	7866728372	27	female
NULL	NULL	NULL	NULL	NULL	NULL	NULL

Table matchs

```
 create table matchs
(
match_time timestamp,
team_1 varchar(15),
team_2 varchar(15),
stadium varchar(20),
match_id varchar(10) ,
Referee_id varchar(10),
constraint matchs_pk1  primary key(match_id),
constraint matchs_fk foreign key(Referee_id) references Referee(Referee_id)
);
INSERT INTO matchs VALUES
 ('2021-07-01 07:30:00','France','Germany','central sta Germany','1',1),
 ('2021-07-02 07:30:00','Spain','Argentina','middle sta Germany','2',2),
 ('2021-07-04 07:30:00','Italy','Portugal','main sta Germany','3',3),
 ('2021-07-05 07:30:00','France','Spain','central sta Germany','4',4),
 ('2021-07-06 07:30:00','Germany','Argentina','middle sta Germany','5',5),
 ('2021-07-08 07:30:00','Italy','Spain','main sta Germany','6',1),
 ('2021-07-09 07:30:00','Argentina','Portugal','central sta Germany','7',2),
 ('2021-07-11 07:30:00','france','Itely','middle sta Germany','8',3),
('2021-07-12 07:30:00','Portugal','Germany','central sta Germany','9',4),
('2021-07-14 07:30:00','Argentina','France','main sta Germany','10',5),
 ('2021-07-15 07:30:00','Italy','Germany','central sta Germany','11',1),
('2021-07-17 07:30:00','Portugal','Spain','middle sta Germany','12',2);
```

Result Grid | Filter Rows: | Edit: | Export/Import:

match_time	team_1	team_2	stadium	match_id	Referee_id
2021-07-01 07:30:00	France	Germany	central sta Germany	1	1
2021-07-14 07:30:00	Argentina	France	main sta Germany	10	5
2021-07-15 07:30:00	Italy	Germany	central sta Germany	11	1
2021-07-17 07:30:00	Portugal	Spain	middle sta Germany	12	2
2021-07-02 07:30:00	Spain	Argentina	middle sta Germany	2	2
2021-07-04 07:30:00	Italy	Portugal	main sta Germany	3	3
2021-07-05 07:30:00	France	Spain	central sta Germany	4	4
2021-07-06 07:30:00	Germany	Argentina	middle sta Germany	5	5
2021-07-08 07:30:00	Italy	Spain	main sta Germany	6	1
2021-07-09 07:30:00	Argentina	Portugal	central sta Germany	7	2
2021-07-11 07:30:00	france	Itely	middle sta Germany	8	3
2021-07-12 07:30:00	Portugal	Germany	central sta Germany	9	4
NULL	NULL	NULL	NULL	NULL	NULL

Table Coaches

```
Create table Coach
(
    first_name varchar(10),
    last_name varchar(10),
    Country_of_origin varchar(20),
    Experience numeric(2),
    Age numeric(2),
    country varchar(20),
    primary key(Country_of_origin,age)
);
```

```
INSERT INTO Coach VALUES ('Lionel','Scaloni','Argentina',15,43,'Argentina')
('Abraham','satr','England',21,55,'France'),
('Jupp','Heynckes','Germany',20,56,'Germany'),
 ('Leonardo','Jardim','Monaco',16,44,'Italy'),
 ('Roberto','Martinez','Belgium',5,34,'Spain'),
('Arsène','Wenger','England',16,46,'Portugal');

Select * from Coach;
```

first_name	last_name	Country_of_origin	Experience	Age	country
Lionel	Scaloni	Argentina	15	43	Argentina
Roberto	Martinez	Belgium	5	34	Spain
Arsène	Wenger	England	16	46	Portugal
Abraham	satr	England	21	55	France
Jupp	Heynckes	Germany	20	56	Germany
Leonardo	Jardim	Monaco	16	44	Italy
NULL	NULL	NULL	NULL	NULL	NULL

Table Captain

```
Create table Captain
(
    Captain_Id varchar(10),
    years_of_captaincy numeric(2),
    win_percentage numeric(2),
    country varchar(20)
);

INSERT INTO Captain values(19,4,57,'Argentina'),
(14,2,47,'France'),
(59,7,51,'Italy'),
(98,1,34,'Germany'),
(78,4,72,'Spain'),
(18,6,57,'Portugal');

Select * from Captain;
```

Captain_Id	years_of_captaincy	win_percentage	country
19	4	57	Argentina
14	2	47	France
59	7	51	Italy
98	1	34	Germany
78	4	72	Spain
18	6	57	Portugal

II) ALTER, DELETE and UPDATE

i) ADD A NEW COLUMN (TEAM_RANKING)IN TABLE(MANAGER) BY USING ALTER COMMAND.

```
Alter table Manager Add team_Ranking numeric;
```

Result Grid | Filter Rows: | Edit:

first_name	last_name	age	sex	country	team_Ranking
Didier	Deschamps	53	Male	France	NULL
Fernando	Santos	67	Male	Portugal	NULL
Joachim	Low	53	Male	Germany	NULL
Lionel	Scaloni	43	Male	Argentina	NULL
Luis	Enrique	53	Male	Spain	NULL
Roberto	Mancini	57	Male	Italy	NULL
NULL	NULL	NULL	NULL	NULL	NULL

ii) REMOVE COLUMN (TEAM_RANKING) FROM TABLE MANAGER BY USING ALTER COMMAND

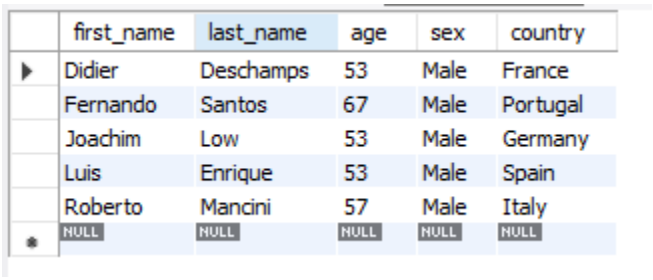
```
Alter table Manager drop team_Ranking;
Select * from Manager;
```

Result Grid | Filter Rows:

first_name	last_name	age	sex	country
Didier	Deschamps	53	Male	France
Fernando	Santos	67	Male	Portugal
Joachim	Low	53	Male	Germany
Lionel	Scaloni	43	Male	Argentina
Luis	Enrique	53	Male	Spain
Roberto	Mancini	57	Male	Italy
NULL	NULL	NULL	NULL	NULL

iii) DELETE THE MANAGER DATA WHERE FIRSTNAME=’LIONEL’

```
Delete from manager where first_name ="Lionel";
```



first_name	last_name	age	sex	country
Didier	Deschamps	53	Male	France
Fernando	Santos	67	Male	Portugal
Joachim	Low	53	Male	Germany
Luis	Enrique	53	Male	Spain
Roberto	Mancini	57	Male	Italy
NULL	NULL	NULL	NULL	NULL

iv) UPDATE THE TABLE MANAGER WHERE FIRST NAME=’LUIS’

```
UPDATE Manager set last_name="Aniston", Age=33 where first_name="Luis";
```

first_name	last_name	age	sex	country
Didier	Deschamps	53	Male	France
Fernando	Santos	67	Male	Portugal
Joachim	Low	53	Male	Germany
Luis	Aniston	33	Male	Spain
Roberto	Mancini	57	Male	Italy
NULL	NULL	NULL	NULL	NULL

III) <u>SELECT WITH WHERE CLAUSE</u>

```
Select * from Manager where country="Germany";
```

first_name	last_name	age	sex	country
Joachim	Low	53	Male	Germany
NULL	NULL	NULL	NULL	NULL

IV) ORDER BY CLAUSE

USE OF ORDER BY CLAUSE IN TABLE MANAGER FOR ARRANGING THE MANAGERS IN ORDER OF THEIR AGE.

```
Select * from Manager order by age;
```

first_name	last_name	age	sex	country
Luis	Aniston	33	Male	Spain
Didier	Deschamps	53	Male	France
Joachim	Low	53	Male	Germany
Roberto	Mancini	57	Male	Italy
Fernando	Santos	67	Male	Portugal
NULL	NULL	NULL	NULL	NULL

V) LIKE CLAUSE

USE OF LIKE CLAUSE IN TABLE MANAGER FOR SELECTING

COUNTRY OF THE MANAGER STARTING FROM ”F”.

```
Select * from manager where country like "F%";
```

Result Grid | Filter Rows: | Edit

first_name	last_name	age	sex	country
Didier	Deschamps	53	Male	France
NULL	NULL	NULL	NULL	NULL

VI) IS NULL/IS NOT NULL

Selecting the seats that have been booked using is not null

```
Select * from spectators Where first_name is not NULL;
```

first_name	last_name	seat_number	email	mobile_number	age	sex
khushi	kapoor	100	khushi@gmail.com	6663728372	85	female
sharman	ra	160	sharman@gmail.com	3443728372	77	male
ashharsh	rai	220	ha@gmail.com	8763728372	37	male
aalia	bhatt	333	aalia@gmail.com	9262628372	22	female
raman	jain	360	rama@gmail.com	8663728372	17	male
aadhi	kohli	453	aadhi@gmail.com	9662638372	27	male
shree	jain	787	shree@gmail.com	9423728372	37	male
shruthi	sharma	890	harss@gmail.com	7866728372	27	female
NULL	NULL	NULL	NULL	NULL	NULL	NULL

Selecting the seats that have not been booked using is null

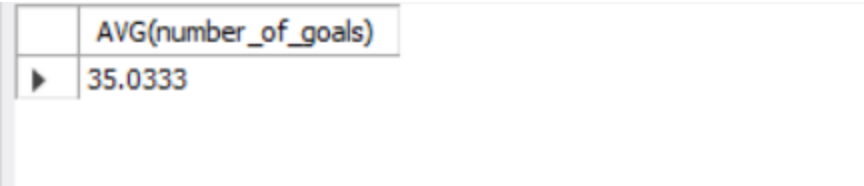
```
Select * from spectators Where first_name is NULL;
```

first_name	last_name	seat_number	email	mobile_number	age	sex
NULL	NULL	560	NULL	NULL	NULL	NULL
NULL	NULL	566	NULL	NULL	NULL	NULL

VII) AGGREGATE FUNCTIONS

a.To display the average goals scored by players in the tournament.

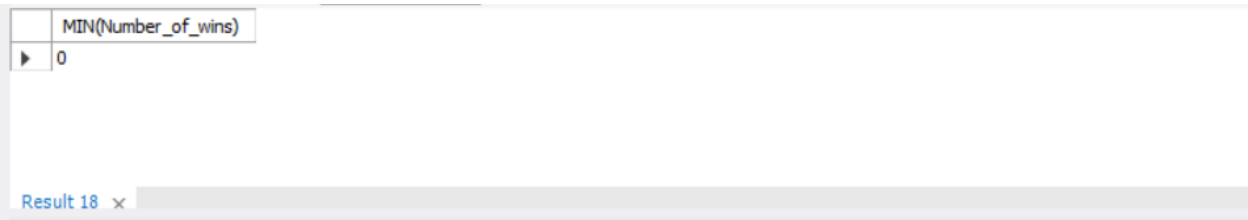
```
277 •   SELECT
278     AVG(number_of_goals)
279     FROM players;
280
```



	AVG(number_of_goals)
▶	35.0333

b.To display the minimum win by teams in the tournament.

```
SELECT
    MIN(Number_of_wins)
FROM
    Teams;
```



	MIN(Number_of_wins)
▶	0

Result 18 ×

c.To display the player with the highest rating in a team.

```
SELECT
    MAX(rating),first_name,country
FROM
    players group by country;
```

Result Grid | Filter Rows: | Export: | Wrap Cell Content:

MAX(rating)	first_name	country
95	nicolas	Argentina
90	j	France
89	R	Germany
89	mario	Italy
87	R	Portugal
93	Cristian	Spain

d.To display the total number of teams in the tournament.

```
295 •   SELECT
296         COUNT(*) as "number of teams"
297     FROM
298         teams;
299
```

number of teams
6

VIII) DATE FUNCTIONS

a.Delay the match time by one month.

```
300 •   SELECT DATE_ADD(match_time, INTERVAL 1 month)
301     from matchs;
302
```

DATE_ADD(match_time, INTERVAL 1 month)
2021-08-01 07:30:00
2021-08-14 07:30:00
2021-08-15 07:30:00
2021-08-17 07:30:00
2021-08-02 07:30:00
2021-08-04 07:30:00
2021-08-05 07:30:00
2021-08-06 07:30:00
2021-08-08 07:30:00
2021-08-09 07:30:00
2021-08-11 07:30:00
2021-08-12 07:30:00

b.To Find the month difference from the first match to the last match played in the tournament.

```
SELECT TIMESTAMPDIFF(MONTH, '2021-07-01', '2021-07-12');
```

Result Grid | Filter Rows: | Export: | Wrap Cell Content:

TIMESTAMPDIFF(MONTH, '2021-07-01', '2021-07-12')
0

c.Rounding of match time and display it.

```
304    Select round(match_time)
305    from matchs;
306
```

round(match_time)
20210701073000
20210714073000
20210715073000
20210717073000
20210702073000
20210704073000
20210705073000
20210706073000
20210708073000
20210709073000
20210711073000
20210712073000

d.Display the day of the month for every match and the teams played.

```
352
353 •   SELECT extract(day from match_time) as matchday,team_1,team_2
354     from matchs;
355
356
```

matchday	team_1	team_2
1	France	Germany
14	Argentina	France
15	Italy	Germany
17	Portugal	Spain
2	Spain	Argentina
4	Italy	Portugal
5	France	Spain
6	Germany	Argentina
8	Italy	Spain
9	Argentina	Portugal
11	france	Itely
12	Portugal	Germany

e.Display the match played on 17-07-2021.

```
306
307 •   SELECT * FROM matchs WHERE match_time='2021-07-17 07:30:00';
308
```

Result Grid | Filter Rows: | Export: | Wrap Cell Content:

match_time	team_1	team_2	stadium	match_id	Referee_id
2021-07-17 07:30:00	Portugal	Spain	middle sta Germany	12	2

IX) numeric functions.

A) exponential function of the number of goals scored.

```
325 •   select exp(number_of_goals)
326     from players;
327
```

exp(number_of_goals)
532048240601.7986
1.1719142372802612e16
1.1420073898156842e26
532048240601.7986
1.9073465724950998e21
1.2523631708422137e29
24154952.7535753
1.1719142372802612e16
8.659340042399374e16
214643579785916.06
8.659340042399374e16
178482300.96318725
532048240601.7986
78962960182680.69
24154952.7535753

B.square root of manager age.

```
328 •   select sqrt(age)
329     from manager;
330
```

	sqrt(age)
▶	7.280109889280518
	8.18535277187245
	7.280109889280518
	6.557438524302
	7.280109889280518
	7.54983443527075

c.Cos function of number of losses by a team.

```
331 •   select cos(number_of_losses)
332     from teams;
333
```

	cos(number_of_losses)
▶	1
	0.5403023058681398
	0.5403023058681398
	-0.9899924966004454
	-0.6536436208636119
	0.5403023058681398

X) <u>Any five string functions.</u>

A.Display first name of players in lower case.

```
339 •   select lower(first_name)
340     from players;
341
```

lower(first_name)
r
cristian
j
diogo
federico
jose
nicolas
r
r
nicolas
meast
thomes
bastian
r

B.Display last name of players in upper case.

```
341
342 •    select upper(last_name)
343      from players;
344
```

upper(last_name)
DIAS
ANSALDI
FONTE
COSTA
FAZIO
SA
OTAMENDI
PATRICIO
JANAOA
TAGILIAFICO
OZIL
MULLER
SCH
NAVAS

C.Print first name of players in reverse.

```
345 •   select REVERSE(first_name)
346     from players;
347
```

REVERSE(first_name)
R
naitsirC
j
ogoid
ociredeF
esoj
salocin
R
R
salocin
tsaem
semoht
naitsab
R

D.Find the ascii value of the first name of players.

```
348 •   select ascii(first_name)
349     from players;
350
```

ascii(first_name)
82
67
106
100
70
106
110
82
82
110
109
116
98
82
106

E.Find the length of the first name of players.

```
309
310 •   Select
311       length(first_name),first_name
312       From players;
313
```

	length(first_name)	first_name
▶	1	R
	8	Cristian
	1	j
	5	diogo
	8	Federico
	4	jose
	7	nicolas
	1	R
	1	R
	7	nicolas
	5	meast
	6	thomes
	7	bastian
	1	R

XI) Group by and having

A.To display the number of players in a country who have scored more than 4 goals.

```
316 •   SELECT COUNT(number_of_goals),first_name
317     FROM players
318     GROUP BY Country
319     HAVING COUNT(number_of_goals)> 4;
320
```

	COUNT(number_of_goals)	first_name
▶	5	nicolas
	5	j
	5	R
	5	mario
	5	R
	5	Cristian

XII) Join more than two tables.

A.Display the coach details for every player in a team along with the team ranking.

```
333
334 •   SELECT players.first_name,coach.first_name, Coach.last_name ,teams.Team_Ranking
335     FROM ((players
336     INNER JOIN coach ON players.country=coach.country)
337     INNER JOIN teams ON players.country =Teams.country);
```

	first_name	first_name	last_name	Team_Ranking
▶	nicolas	Lionel	Scaloni	1
	nicolas	Lionel	Scaloni	1
	cristian	Lionel	Scaloni	1
	gonzalo	Lionel	Scaloni	1
	lionel	Lionel	Scaloni	1
	j	Abraham	satr	2
	R	Abraham	satr	2
	j	Abraham	satr	2
	j	Abraham	satr	2
	n	Abraham	satr	2
	R	Jupp	Heynckes	4
	meast	Jupp	Heynckes	4
	thomes	Jupp	Heynckes	4
	bastian	Jupp	Heynckes	4

QUERY OPTIMIZATION

Query1:

SQL Query

Select country_of_origin,first_name

FROM coach,player,captain

WHERE

coach.country_of_origin=player.country

and coach.age>45

and Win Percentage>60

and coach.experience>Years_of_capitaincy

RA

$\pi_{\text{country\_of\_origin,first\_name}}$

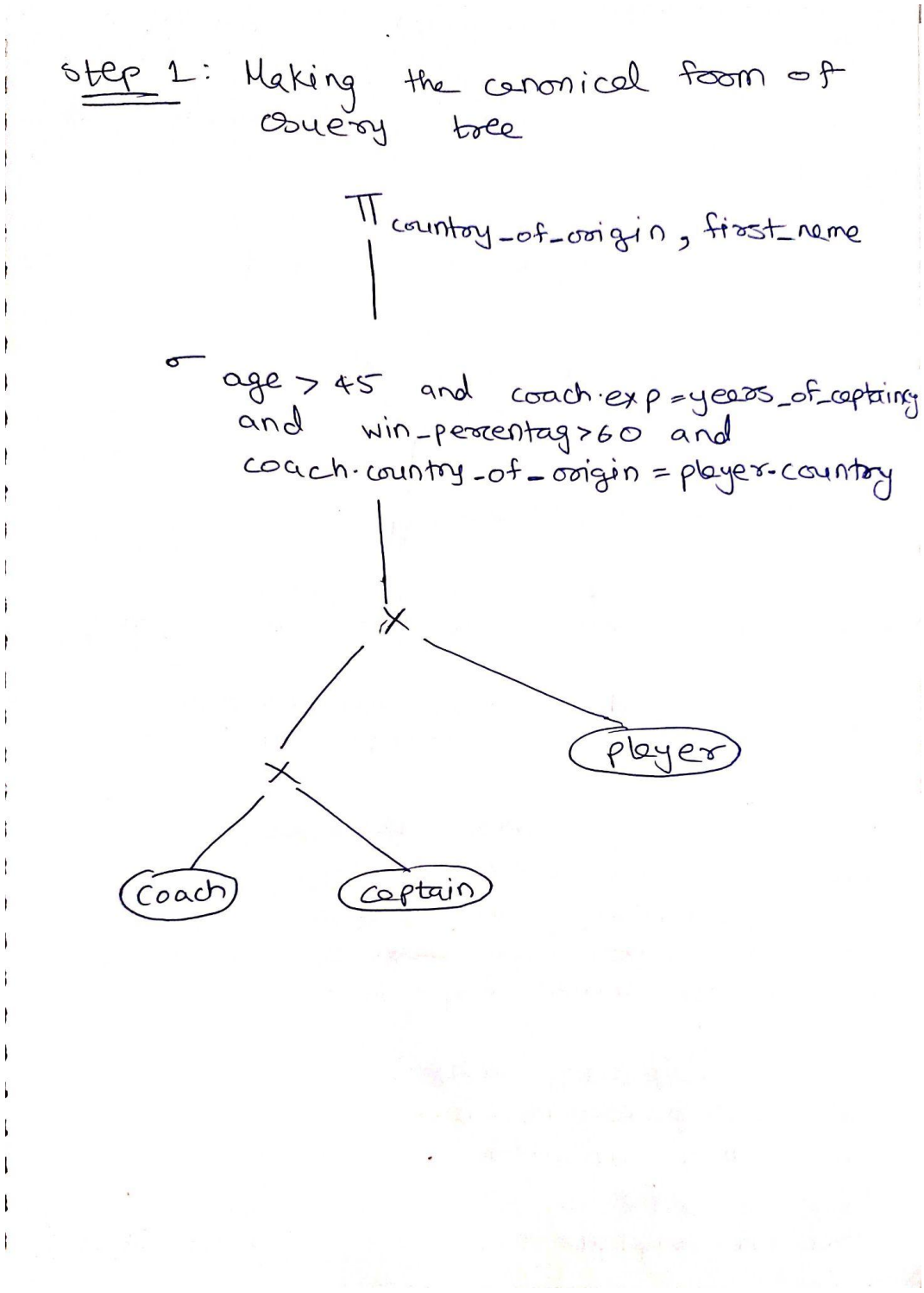
($\sigma_{\text{coach.country\_of\_origin=player.country}}$

and coach.age>45

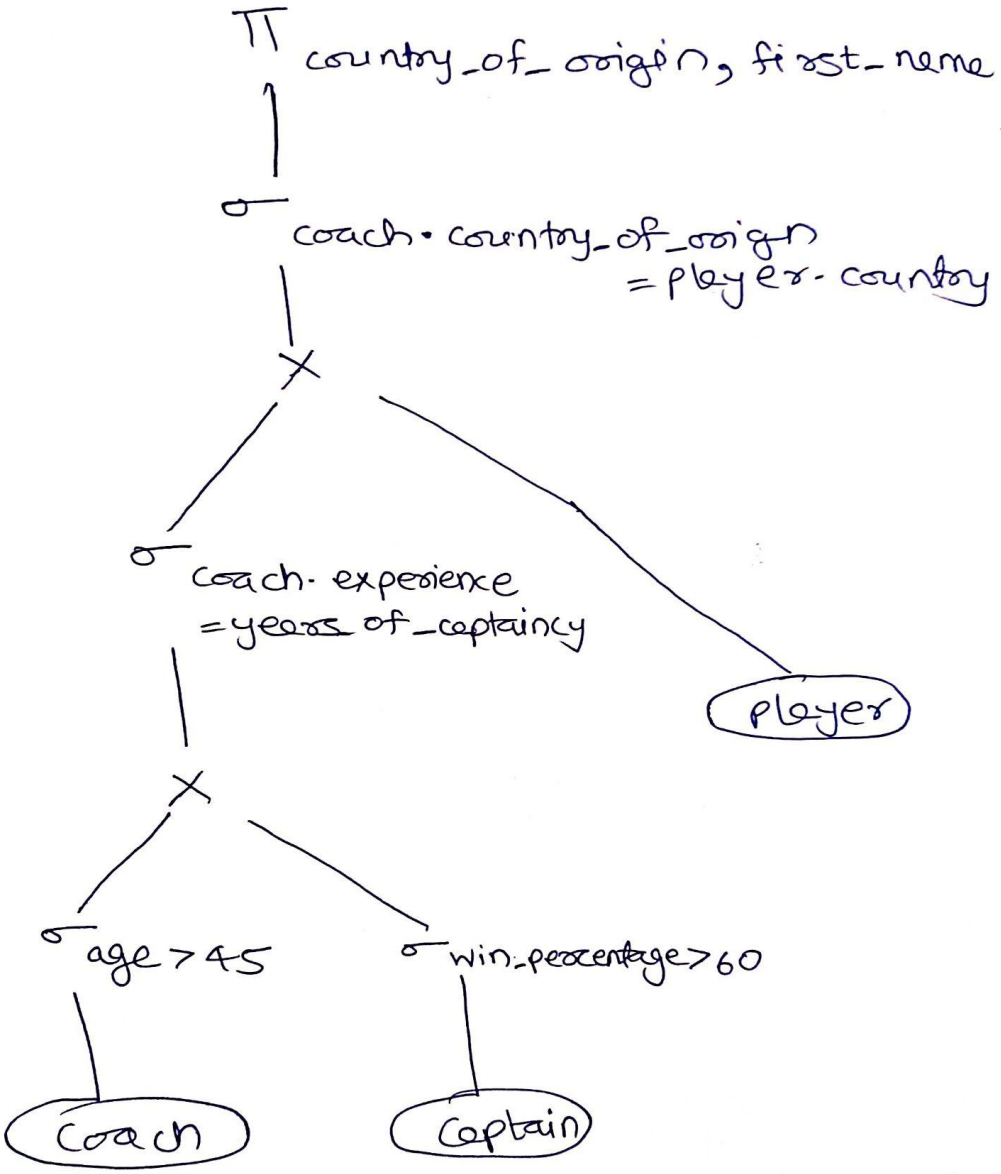
and Win Percentage>60

and coach.experience>Years_of_capitaincy(coach x player x captain))

Query Tree


step 1: Making the canonical form of query tree
Π country_of_origin, first_name
σ age > 45 and coach.exp = years_of_captaining and win_percentage > 60 and coach.country_of_origin = player.country
×
×
player
coach
captain

Step 2: Moving the select operations down the tree.

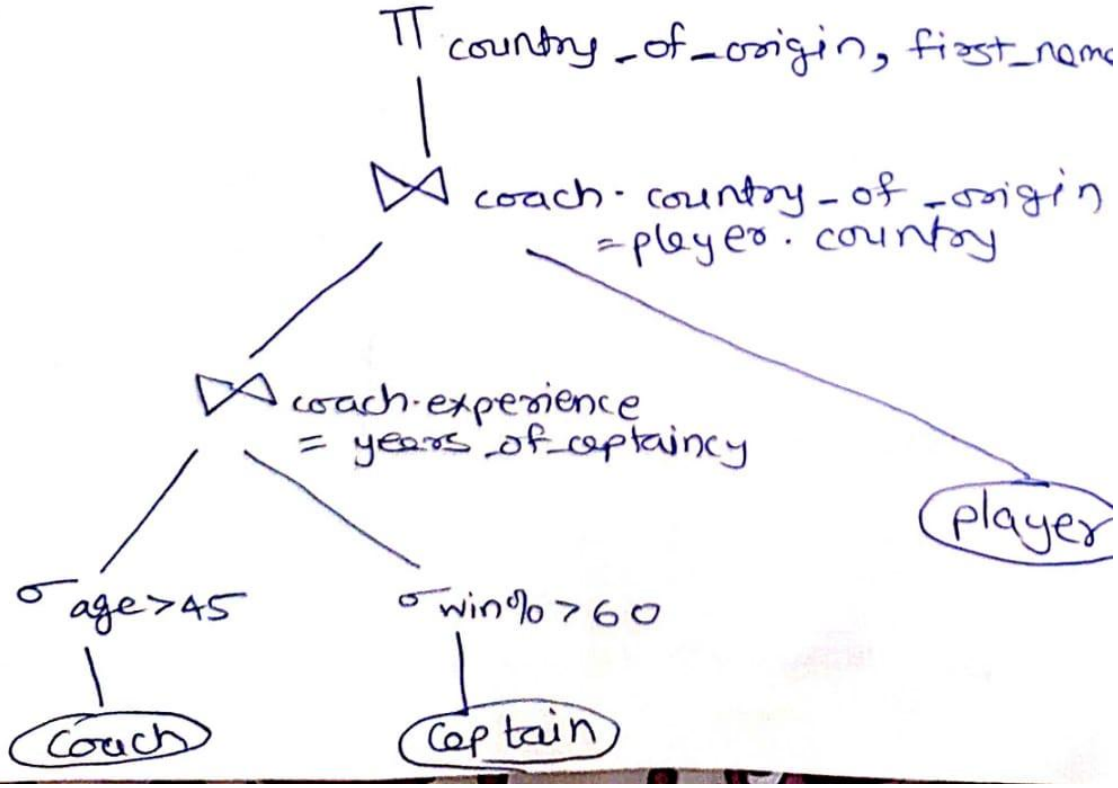


Step 3: Rearrange the entities in the query tree in such a way that the maximum number of rows are filtered out in the bottom itself.

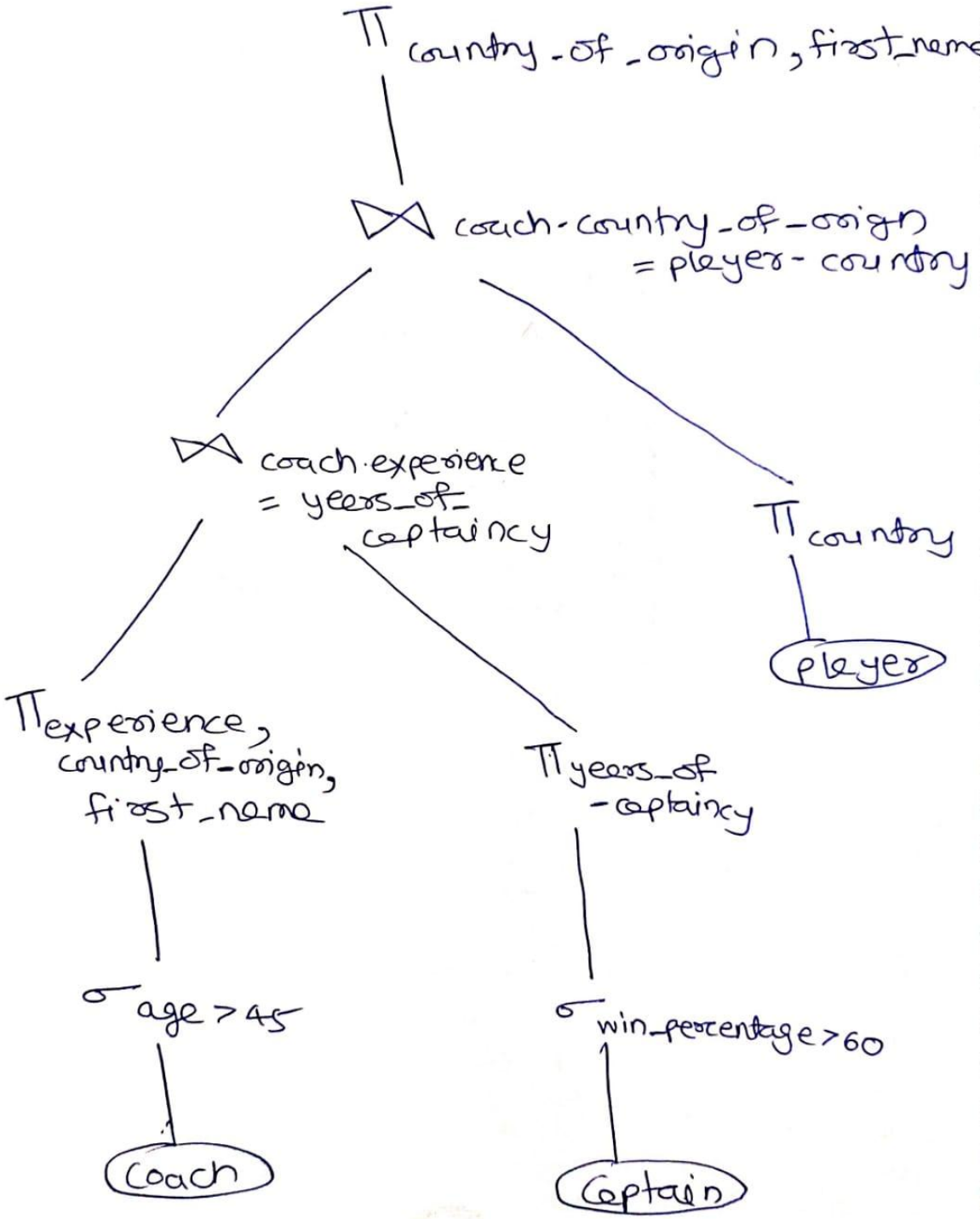
In our query tree, since the filtering out conditions ~~are~~ only exist for the entities "coach" and "captain".
∴ "Coach" and "Captain" will stay at the bottom most level of our query tree.

Hence, no changes are required in the query tree for step 3.

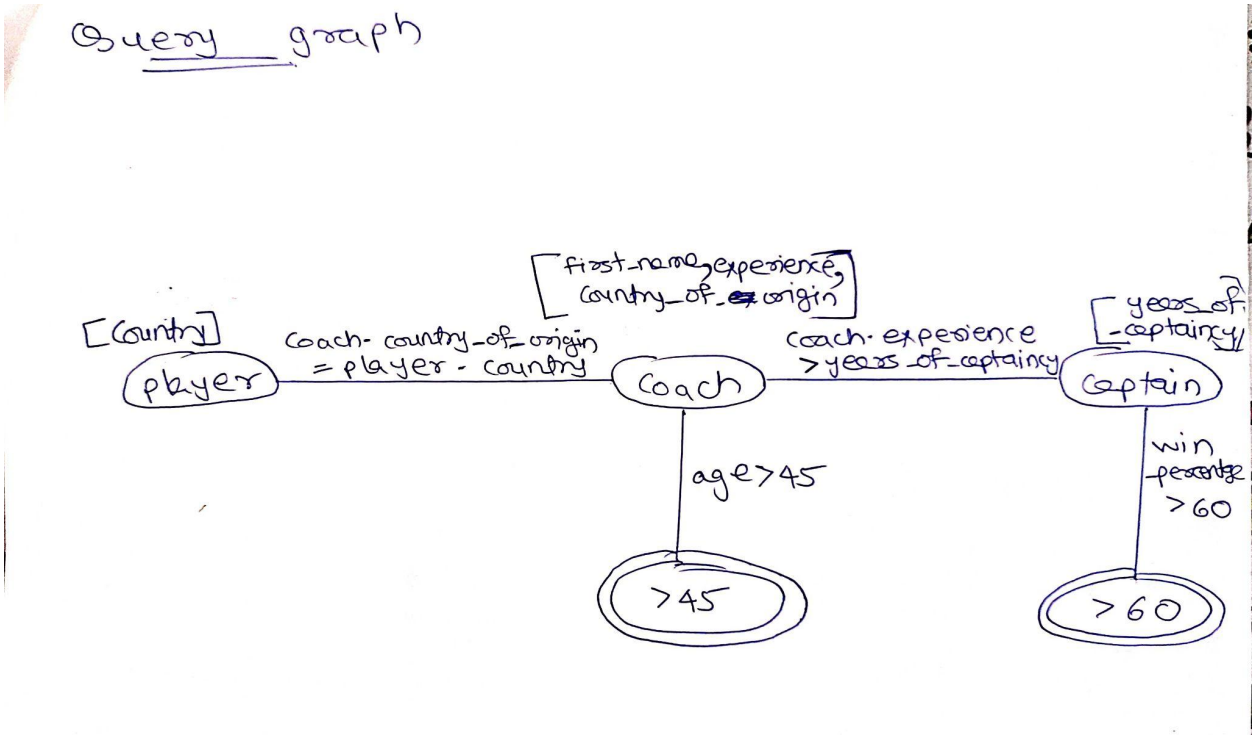
Step 4: Combining the select statement and cartesian product.



Step 5 : Moving the project operation down the query tree.



Query Graph


Query graph
[first_name, experience, country_of_origin]
[country]
player
coach. country_of_origin = player. country
coach
coach. experience > years_of_captaincy
[years_of_captaincy]
captain
age > 45
>45
win percentage > 60
>60

Query 2:

SQL QUERY:

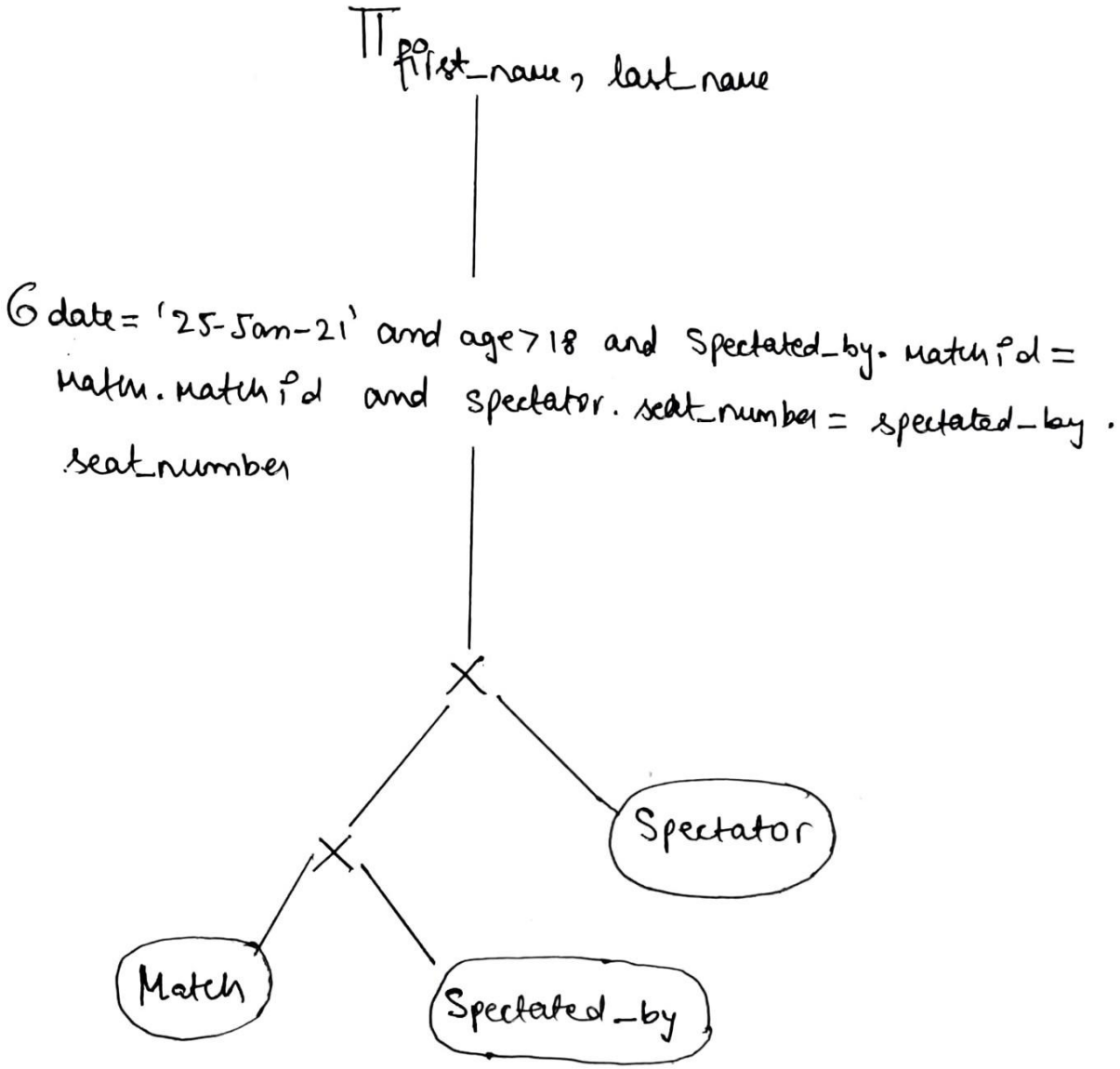
```
Select First_name,Last_name

FROM Spectator,spectated_by,Match

WHERE

Date=”25/22/21”

And Age>18

And Spectated_by.Match_id=Match.Match_id

And Spectated_by.Seat_Number=Spectator.Seat_Number
```

RAE:

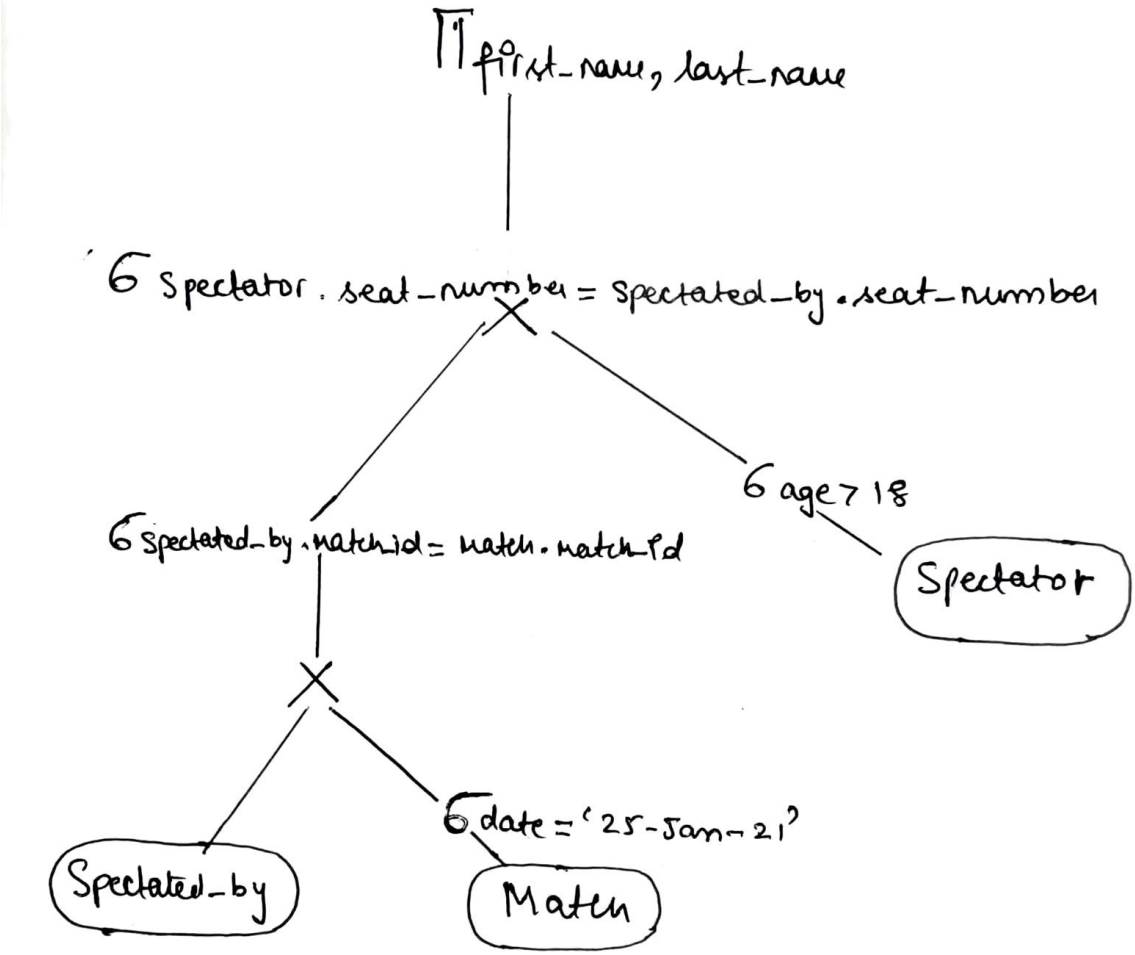
$\pi_{first\_name,last\_name}(\sigma_{Date='25\text{-}22\text{-}21'\ and\ Age>18\ and\ Spectated\_by.Match\_id=Match.Match\_id\ and\ Spectated\_by.Seat\_Number=Spectator.Seat\_Number}(Spectator \times spectated\_by \times Match))$

Query Tree:

Step 1: Making canonical form of query tree



Step 2: Moving select operations down the tree



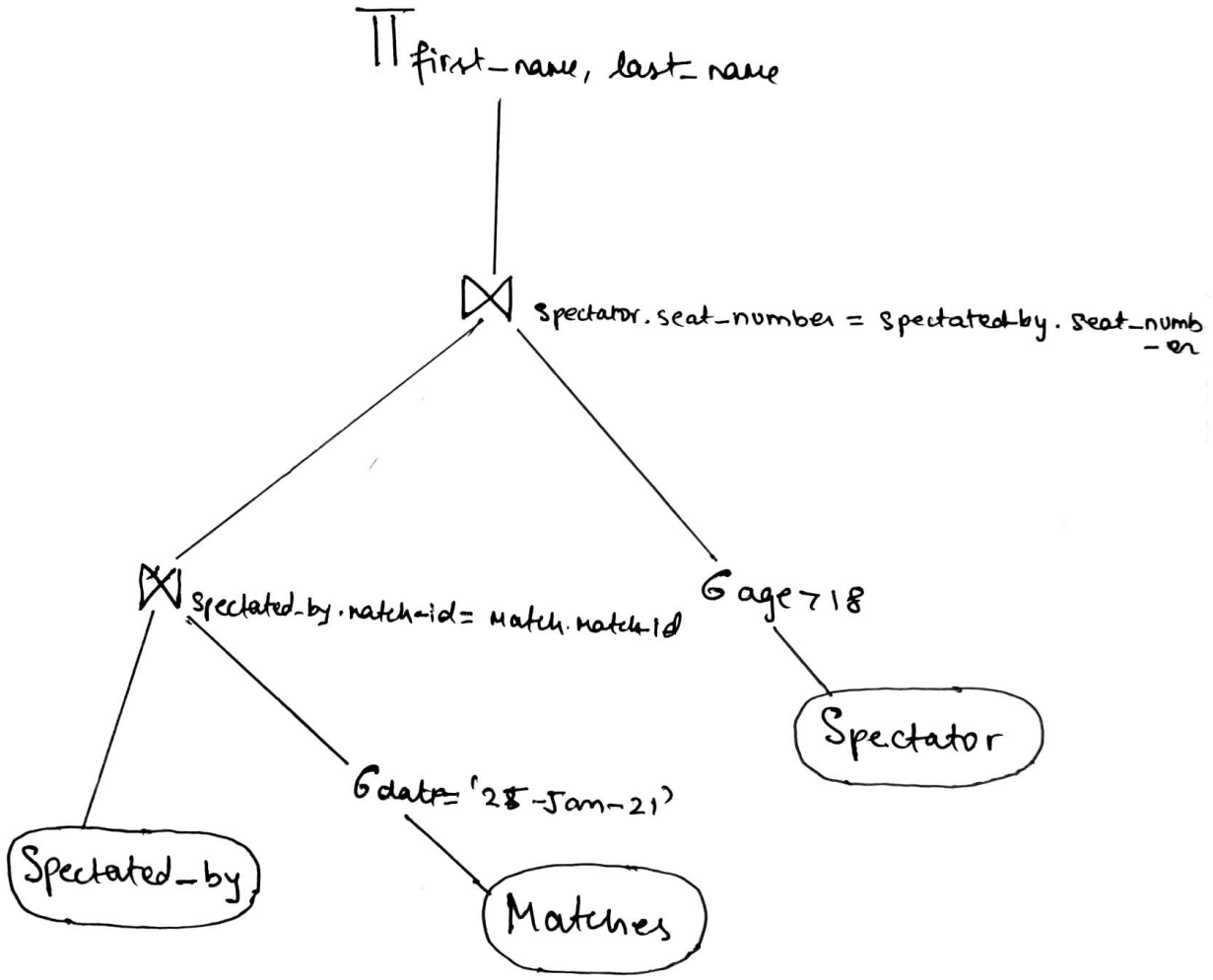
Step 3:- Restrictive Select Operation.

Rearrange the entities in the query tree in such a way that the maximum number of rows are filtered out in the bottom itself

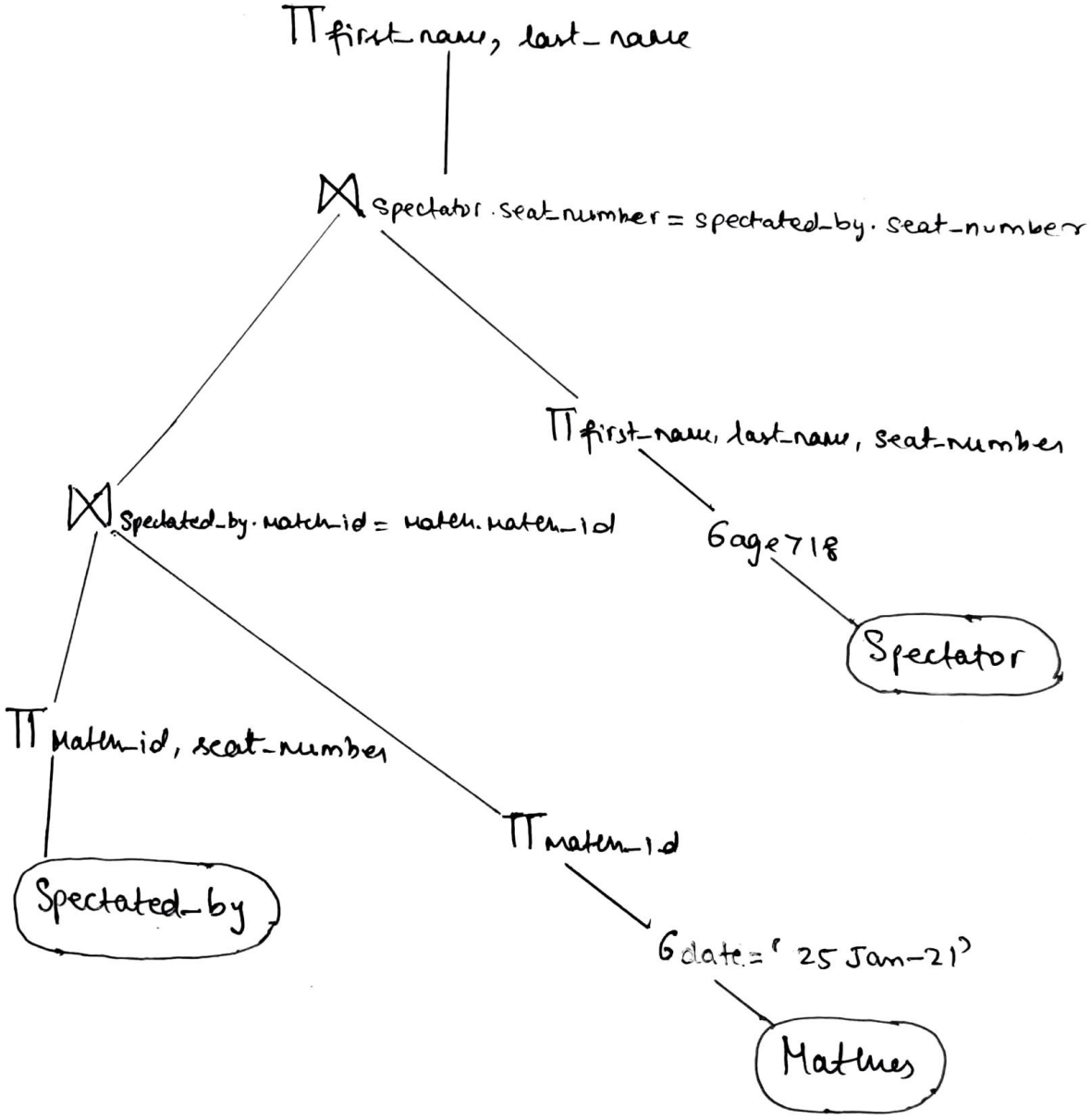
Here in our query tree, maximum number of rows are filtered out in bottom using filtering condition on entity "Matches"

Therefore, no changes are required in the query tree for step 3

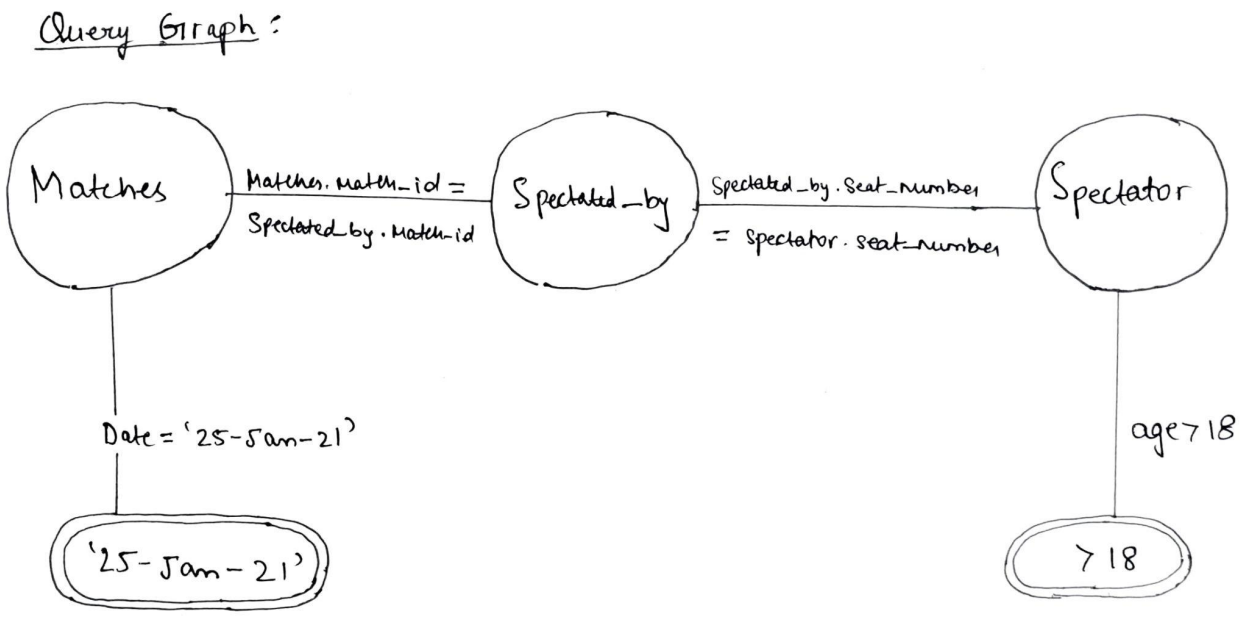
Step 4:- Combining the select statement and cartesian product, replacing with ⋈ operation.



Step 5: Moving the project operation down the query tree :- (Vertical Partioning)

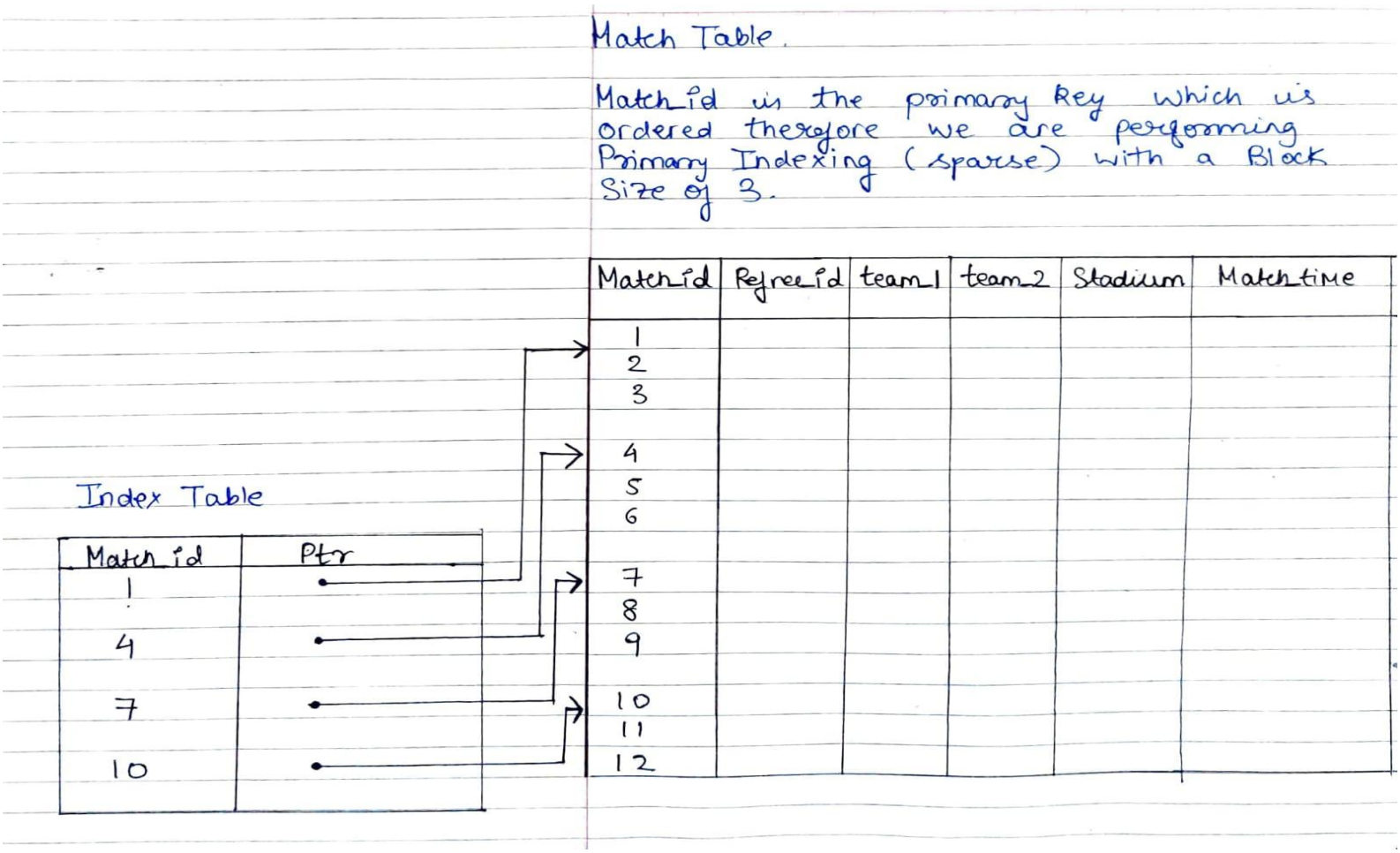


QUERY GRAPH:


Query Graph :
Matches
Matches.match_id =
Spectated_by.match_id
Spectated_by
Spectated_by.seat_number
= Spectator.seat_number
Spectator
Date = '25-Jan-21'
'25-Jan-21'
age > 18
> 18

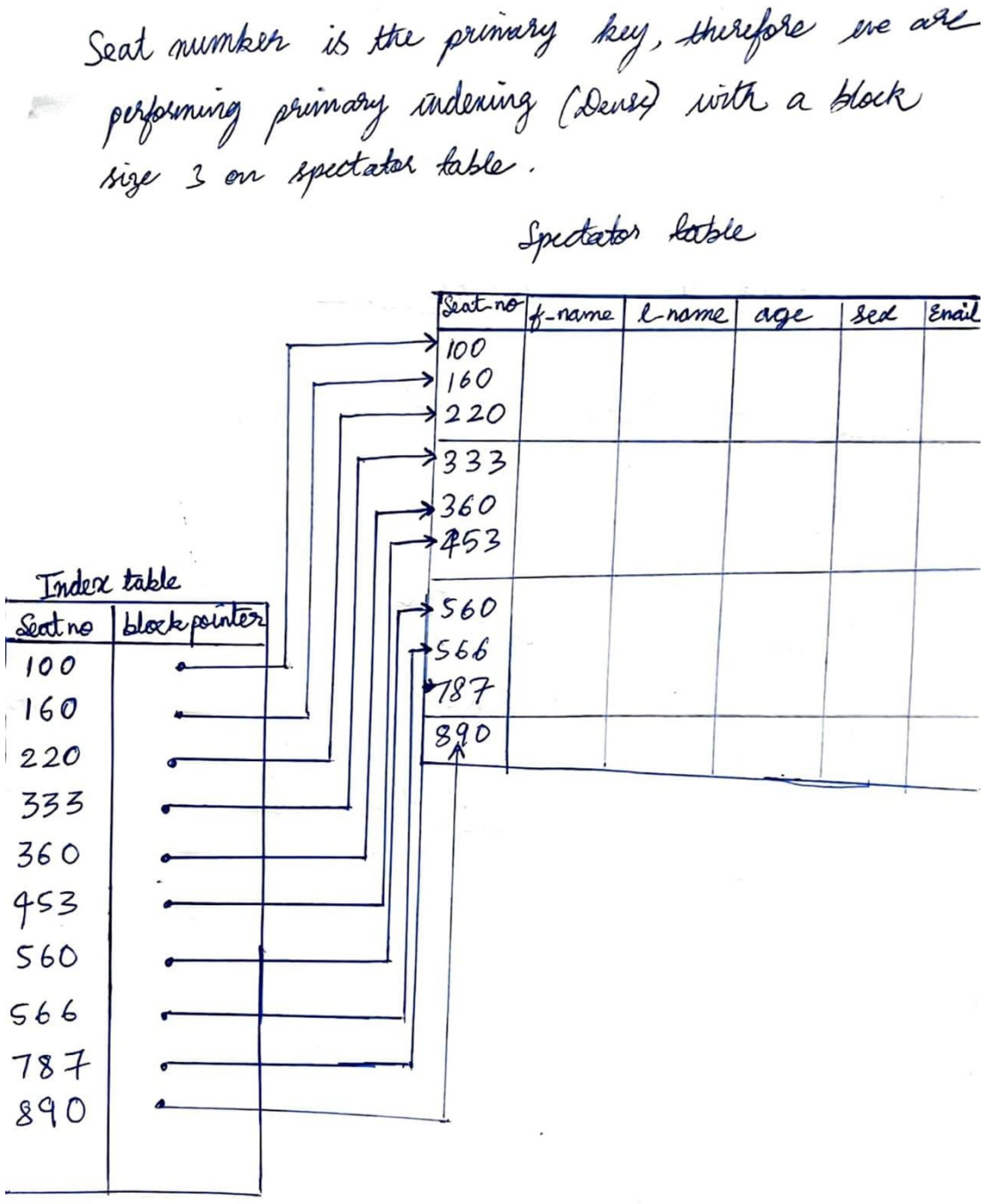
PRIMARY SPARSE INDEXING:

The primary Sparse indexing is being carried out on the table 'MATCH'



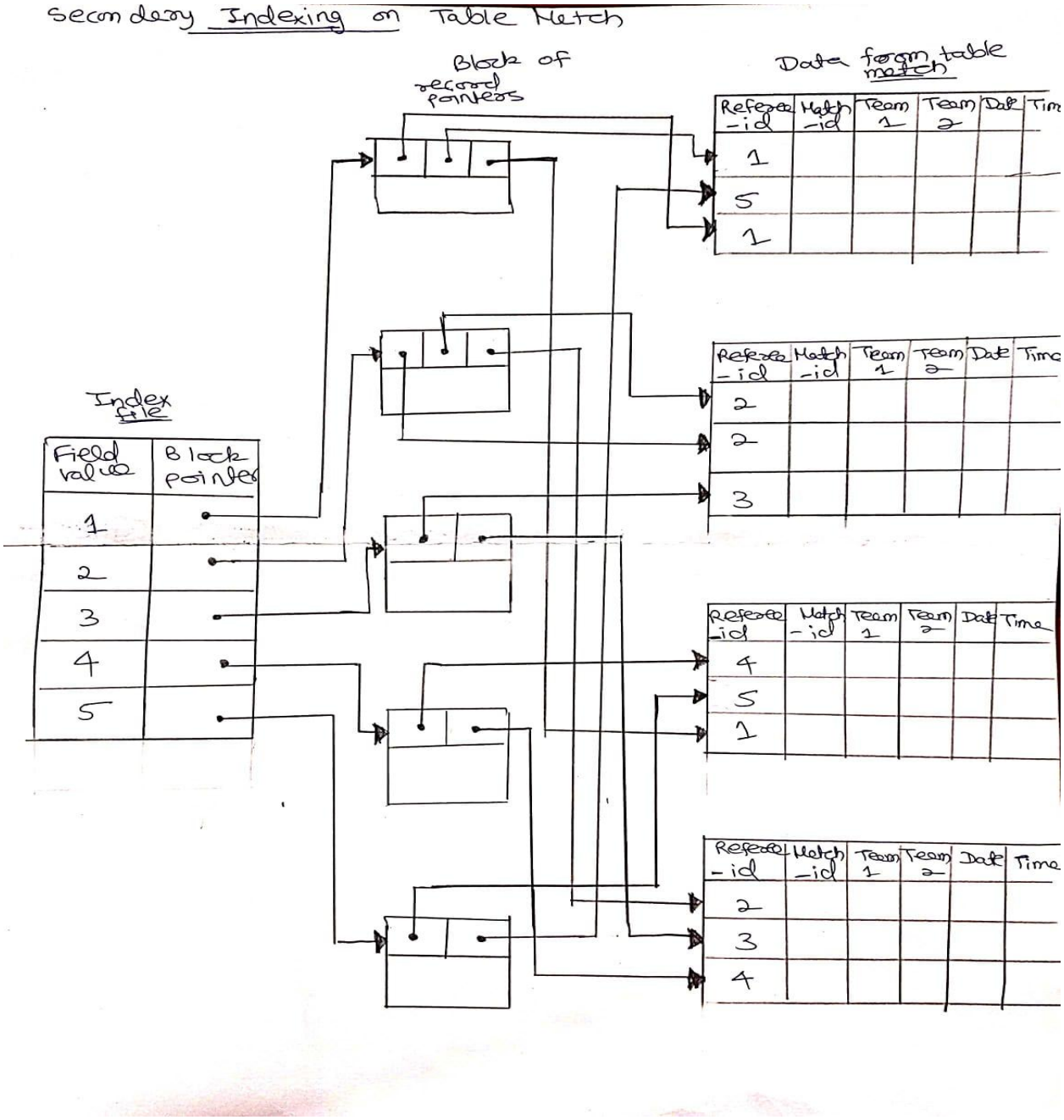
PRIMARY DENSE INDEXING ON THE TABLE SPECTATOR

Here the primary key is seat_number , performing primary dense indexing with a block size of 3.



SECONDARY INDEXING ON THE TABLE MATCH WITH RECORD POINTERS

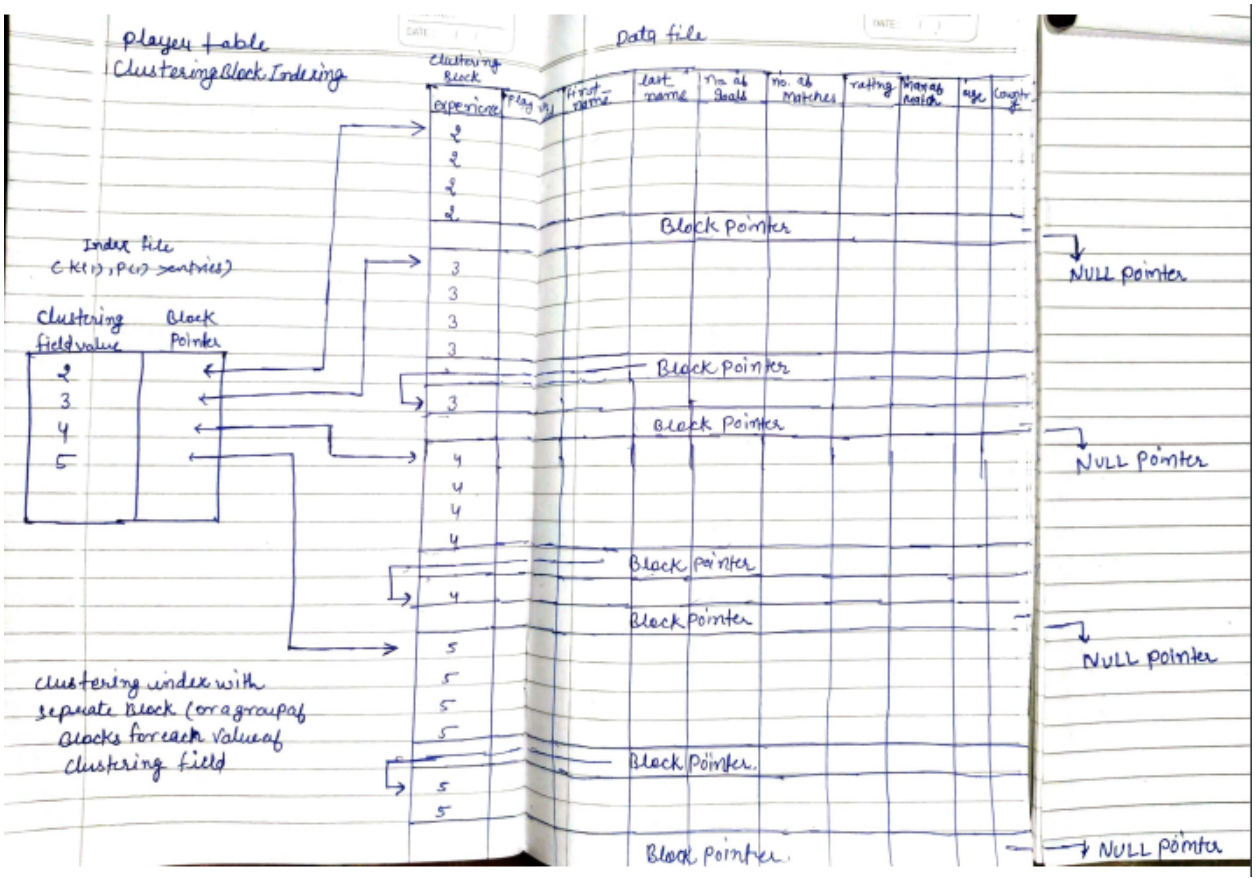
The key index here is Referee_id and the primary indexing has already been performed on Match_id

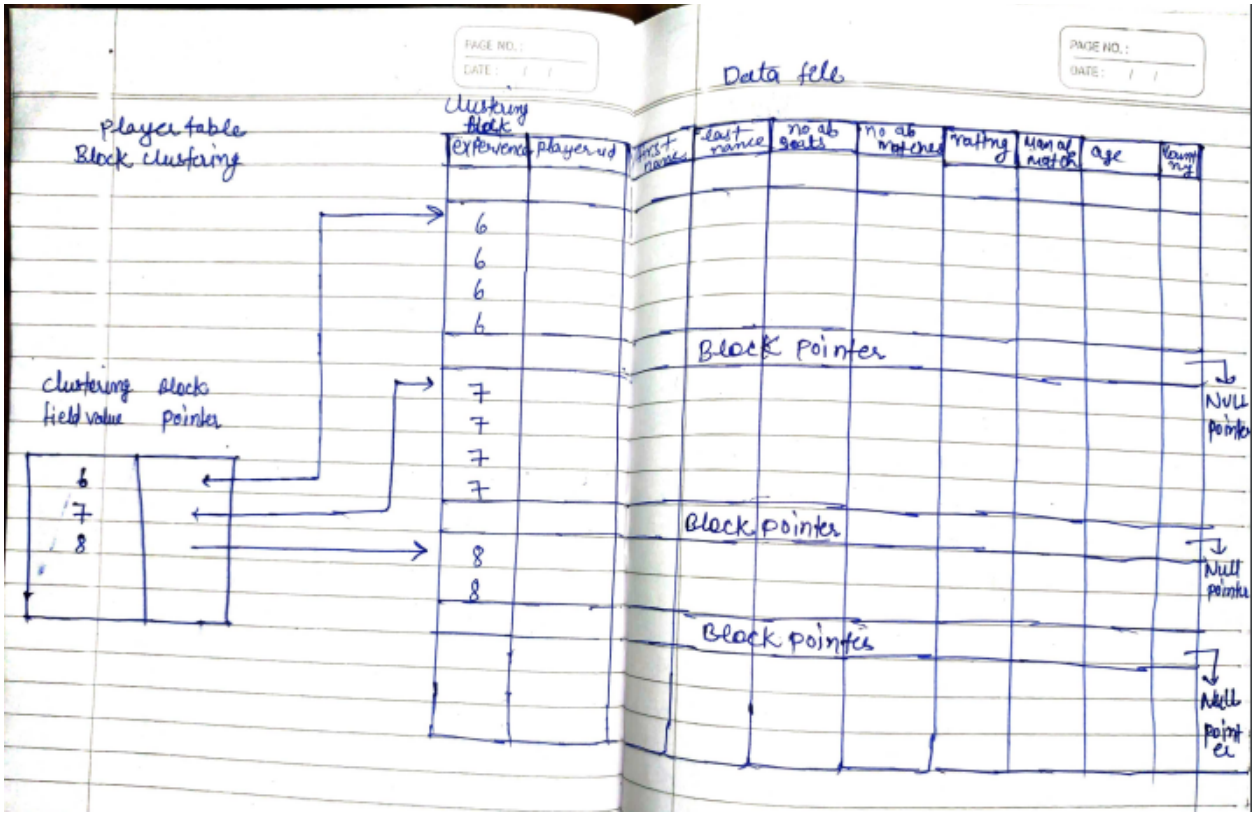


CLUSTERING INDEXING ON THE TABLE PLAYER

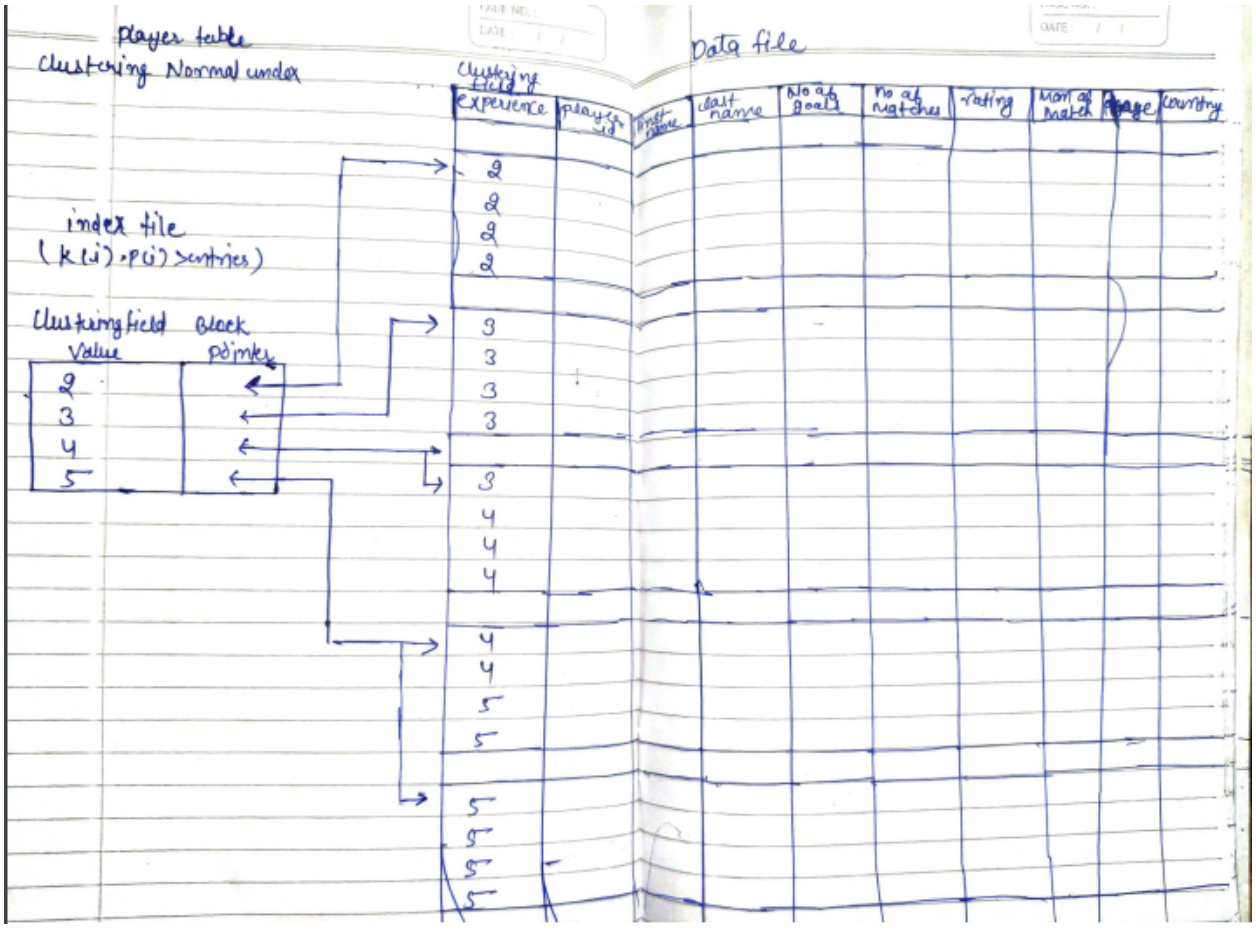
The key index here is experience

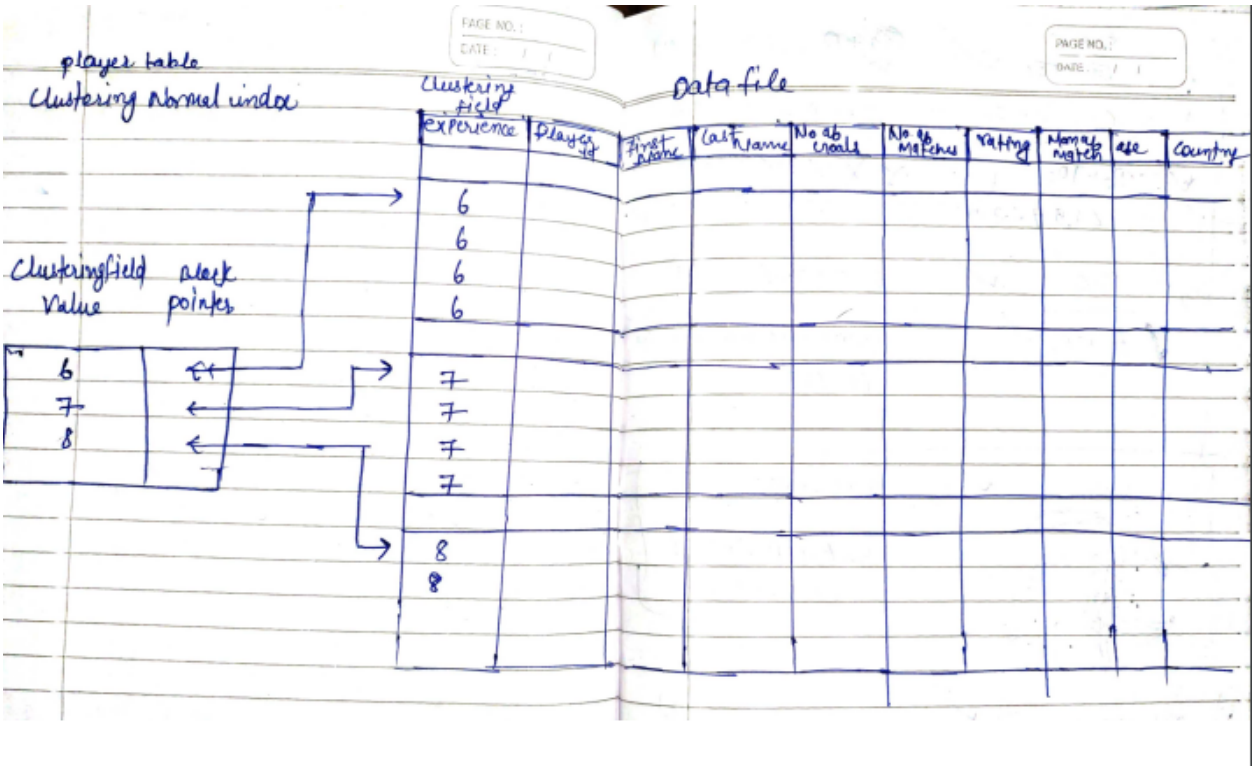
Block clustering




player table
Block clustering
clustering field value
block pointer
6
7
8
clustering field
experience
player id
6
6
6
6
7
7
7
7
8
8
Data file
first name
last name
no of goals
no of matches
rating
year of matches
age
country
Block pointer
NULL pointer
Block pointer
Null pointer
Block pointer
Null pointer

Normal clustering indexing





CONCLUSION

In this Project a Football Worldcup model was used to store and manage the football world cup database in a more organized and structured way. In the process of making the database more organized and structured, we undertook the following procedures and implemented the database entries as follows:

1) We analyzed the data requirements in the football world cup system and evaluated the relationships between the formerly decided data entities.
2) We mapped the Entity Relationship Diagram (ER-Diagram) and obtained the corresponding relational table for the ER Diagram and thereafter normalized the relational tables based on the functional dependencies.
3) We implemented SQL operations and performed query optimization and indexing on the relevant relational tables.