Fantasy cricket team database

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2019IMT-112

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INTRODUCTION

- **Fantasy Cricket Team Database** is a model of the database used in fantasy gaming platforms like Dream 11, My11Circle etc.
- This database model is concerned with storing the data of users, playing fantasy cricket.
- Users play fantasy cricket by creating a fantasy team and participating in a contest. For this :-
  - User will login into the fantasy sports app (like Dream11) using the login credentials he created.
  - Chooses a match (example: a match in IPL) and selects the players from both teams to create his fantasy team.
  - Assigns the role of the captain and the vice captain to two of those 11 players selected in his fantasy team.
  - Then participates in any no. of contests available in the app using the created fantasy team.

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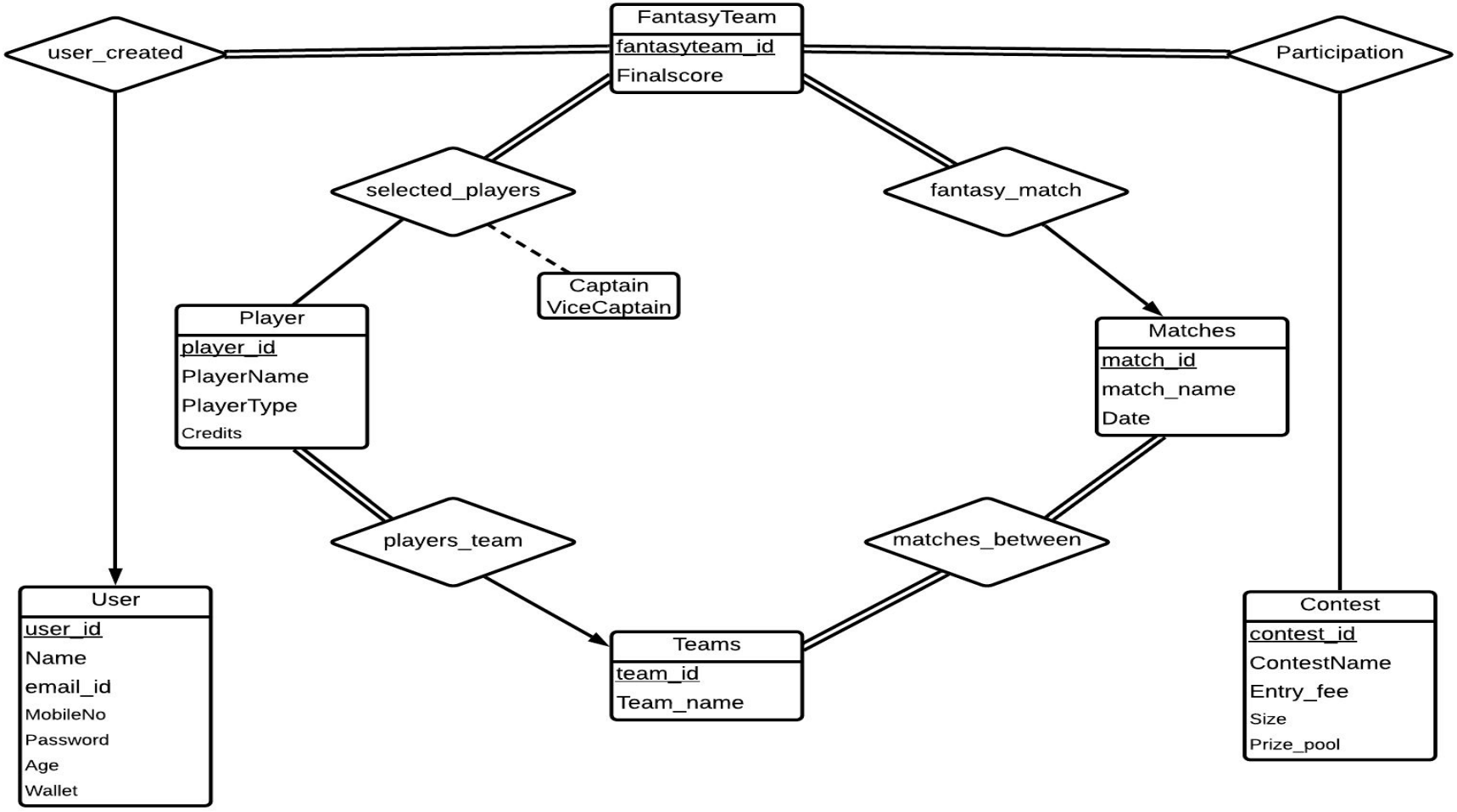
ENTITY-RELATIONSHIP DIAGRAM

ENTITIES

ENTITY	ATTRIBUTES	TYPE
User	user_id, Name, email_id, MoblileNo, Password, Age, Wallet	Strong
Teams	team_id, Team_Name	Strong
Players	player_id, PlayerName, Type, Credits	Strong
Matches	match_id, MatchName, Date	Strong
Contests	contest_id, Contestname, Entry_fee, Size, Prize_pool	Strong
FantasyTeam	fantasyteam_id, FinalScore	Strong

RELATIONSHIPS

RELATIONSHIPS	ENTITIES INVOLVED	CARDINALITY
user_created	User, FantasyTeam	one to many
players_team	Players, Teams	many to one
fantasy_match	Matches, FantasyTeam	one to many
matches_between	Teams, Matches	many to many
selected_players	FantasyTeam, Players	many to many
Participation	FantasyTeam, Contest	many to many


FantasyTeam
fantasyteam_id
Finalscore
user_created
Participation
selected_players
fantasy_match
Captain
ViceCaptain
Player
player_id
PlayerName
PlayerType
Credits
Matches
match_id
match_name
Date
players_team
matches_between
User
user_id
Name
email_id
MobileNo
Password
Age
Wallet
Teams
team_id
Team_name
Contest
contest_id
ContestName
Entry_fee
Size
Prize_pool

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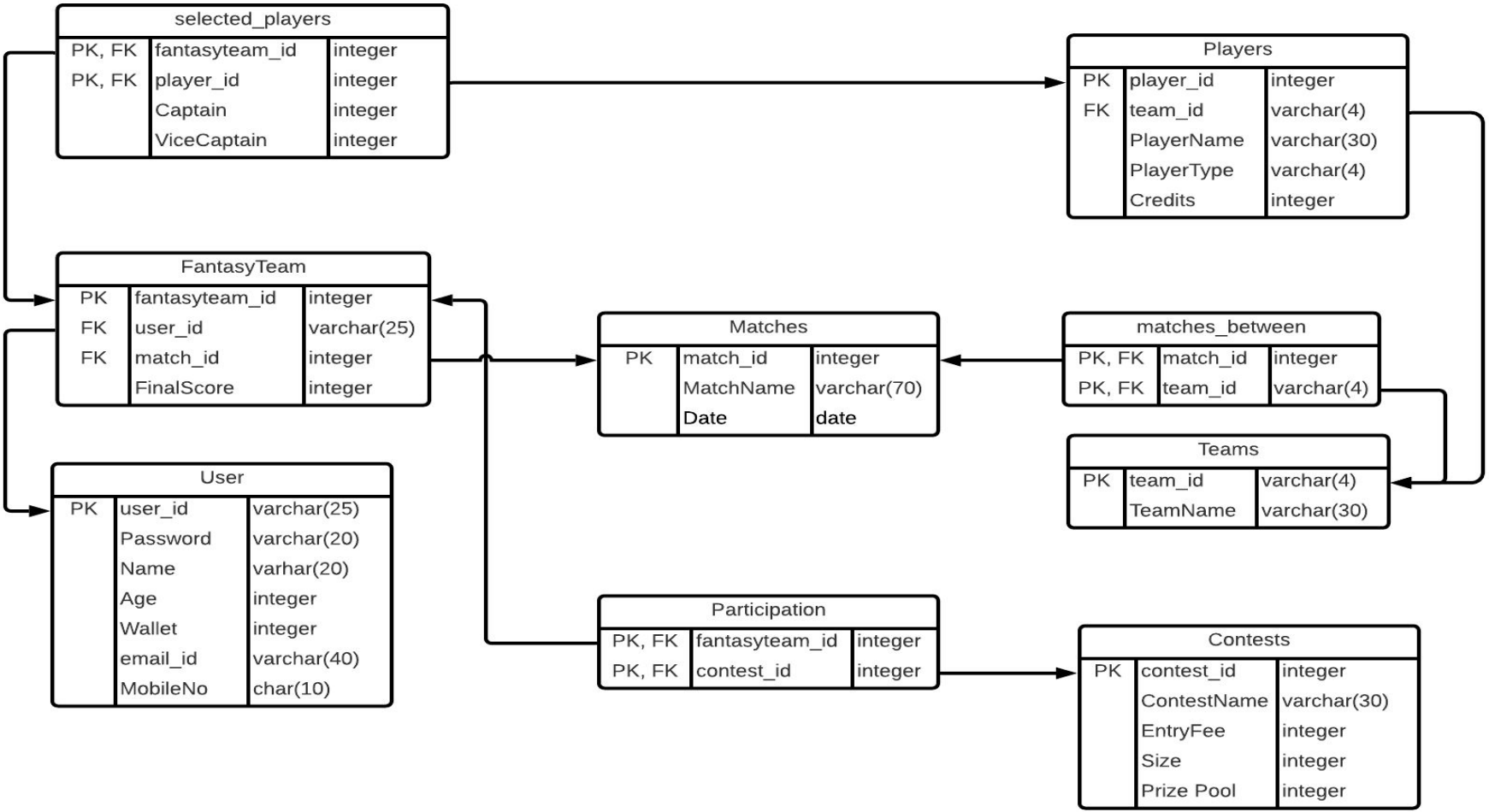
Initial relation schema

ER DIAGRAM → RELATION SCHEMA

RELATION	PRIMARY KEY	CREATED FROM
User	user_id	User (entity)
Teams	team_id	Teams (entity)
Player	player_id	Player (entity)
Matches	match_id	Matches (entity)
FantasyTeam	fantasyteam_id	FantasyTeam (entity)
Contest	contest_id	Contest (entity)
selected_players	fantasyteam_id , player_id	selected_players (relationship)
Participation	fantasyteam_id, contest_id	Participation (relationship)
matches_between	match_id, team_id	matches_between (relationship)


selected_players
PK, FK fantasyteam_id integer
PK, FK player_id integer
Captain integer
ViceCaptain integer
Players
PK player_id integer
FK team_id varchar(4)
PlayerName varchar(30)
PlayerType varchar(4)
Credits integer
FantasyTeam
PK fantasyteam_id integer
FK user_id varchar(25)
FK match_id integer
FinalScore integer
Matches
PK match_id integer
MatchName varchar(70)
Date date
matches_between
PK, FK match_id integer
PK, FK team_id varchar(4)
Teams
PK team_id varchar(4)
TeamName varchar(30)
User
PK user_id varchar(25)
Password varchar(20)
Name varhar(20)
Age integer
Wallet integer
email_id varchar(40)
MobileNo char(10)
Participation
PK, FK fantasyteam_id integer
PK, FK contest_id integer
Contests
PK contest_id integer
ContestName varchar(30)
EntryFee integer
Size integer
Prize Pool integer

4
NORMALISATION

FUNCTIONAL DEPENDENCIES IN THE SCHEMA

RELATION	FUNCTIONAL DEPENDENCIES
User	user_id → Name, Age, Wallet, email_id, Password, Mobile_no. email_id → Name, Age, Wallet, user_id, Password, Mobile_no. MobileNo → Name, Age, Wallet, email_id, Password, user_id
Teams	team_id → TeamName
Player	player_id → PlayerType, PlayerName, Credits, team_id
Matches	match_id → MatchName, Date
FantasyTeam	fantasyteam_id → user_id, match_id, FinalScore
Contest	Contest_id → ContestName, EntryFee, Size, Prizepool EntryFee, Size → Prizepool
selected_players	fantasyteam_id, player_id → Captain, ViceCaptain

FIRST NORMAL FORM

- A table is in 1NF iff :
  - There are only Single Valued Attributes (Atomic).
  - Values stored in a column should be of the same domain.
  - All the columns in a table should have unique names.

Relations in 1NF	User, Teams, Player, Matches, FantasyTeam, Contest, selected_players, Participation, matches_between
Relations not in 1NF	-

SECOND NORMAL FORM

- A table is said to be in 2NF if both the following conditions hold:
  - Table is in 1NF (First normal form)
  - No non-prime attribute should be dependent on the proper subset of any candidate key of table (**No Partial Dependency**).

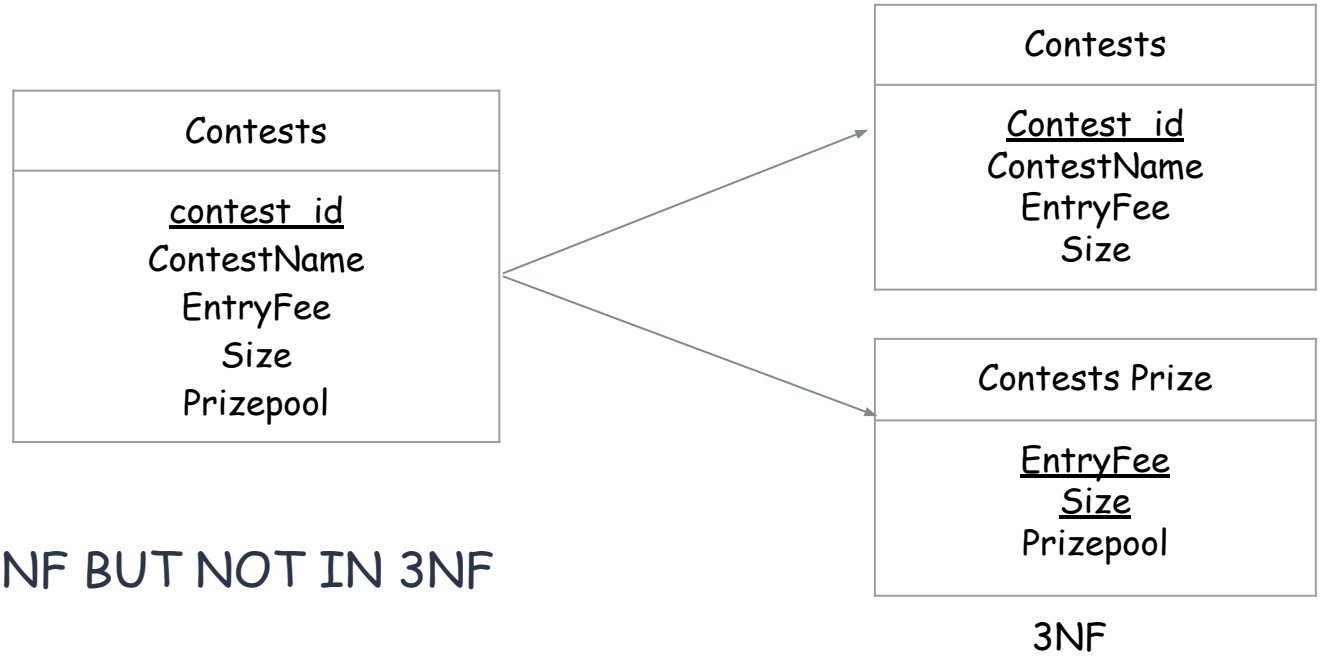
Relations in 2NF	User, Teams, Player, Matches, FantasyTeam, Contest, selected_players, Participation, matches_between,
Relations not in 2NF	-

THIRD NORMAL FORM

- A table is in 3NF if it is in 2NF and for each functional dependency X-> Y, at least one of the following conditions hold:
  - X is a super key of table
  - Y is a prime attribute of table.
- Or in other words, it shouldn't have **Transitive Dependency.**

Relations in 3NF	User, Teams, Player, Matches, FantasyTeam, Selected_players, Participation, matches_between
Relations not in 3NF	Contest

Conversion into 3rd NF



2NF BUT NOT IN 3NF

3NF

BOYCE-CODD NORMAL FORM

- For a table to satisfy the Boyce-Codd Normal Form, it should satisfy the following two conditions:
  - It should be in the Third Normal Form.
  - And, for any dependency $A \rightarrow B$, A should be a super key.

Relations in BCNF	User, Teams, Player, Matches, FantasyTeam, Contests, Participation, matches_between, selected_players, Contest_prize
Relations not in BCNF	-

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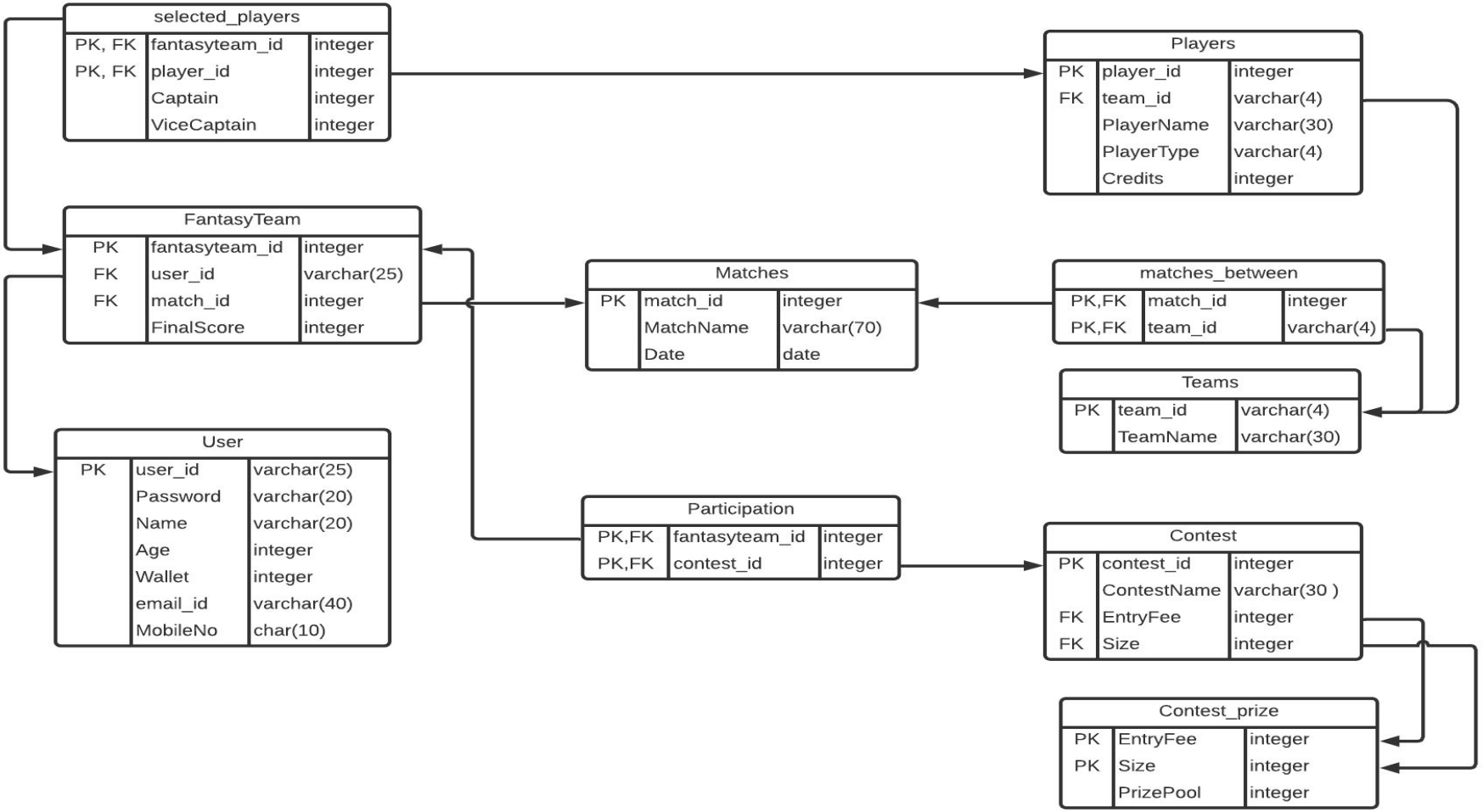
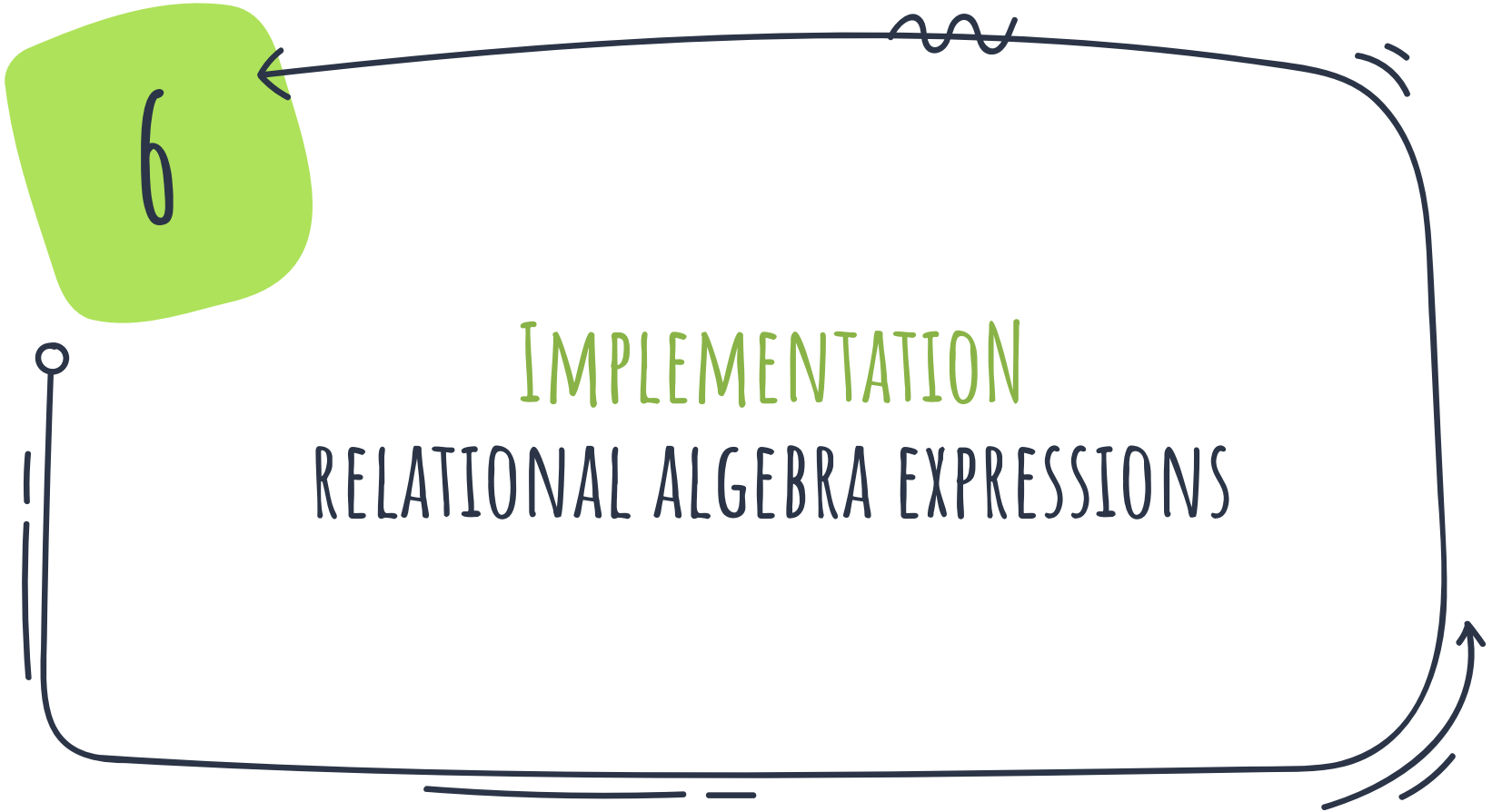
Relation schema
after normalisation


selected_players
PK, FK fantasyteam_id integer
PK, FK player_id integer
Captain integer
ViceCaptain integer
Players
PK player_id integer
FK team_id varchar(4)
PlayerName varchar(30)
PlayerType varchar(4)
Credits integer
FantasyTeam
PK fantasyteam_id integer
FK user_id varchar(25)
FK match_id integer
FinalScore integer
Matches
PK match_id integer
MatchName varchar(70)
Date date
matches_between
PK,FK match_id integer
PK,FK team_id varchar(4)
Teams
PK team_id varchar(4)
TeamName varchar(30)
User
PK user_id varchar(25)
Password varchar(20)
Name varchar(20)
Age integer
Wallet integer
email_id varchar(40)
MobileNo char(10)
Participation
PK,FK fantasyteam_id integer
PK,FK contest_id integer
Contest
PK contest_id integer
ContestName varchar(30)
FK EntryFee integer
FK Size integer
Contest_prize
PK EntryFee integer
PK Size integer
PrizePool integer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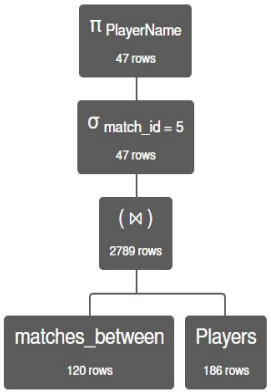
Implementation
relational algebra expressions

Q. List all the players available for selection in the fantasy-teams by users in 5th IPL match.



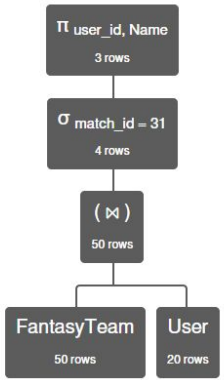
$$\pi_{\text{PlayerName}} (\sigma_{\text{match_id} = 5} (\text{matches_between} \bowtie \text{Players}))$$

$$\pi_{\text{PlayerName}} (\sigma_{\text{match_id} = 5} (\text{matches_between} \bowtie \text{Players}))$$

Players.PlayerName
'Ambati Rayudu (R)'
'Monu Kumar (R)'
'Murali Vijay (R)'
'Ruturaj Gaikwad (R)'
'MS Dhoni (R)'
'Jagadeesan Narayan (R)'
'K M Asif (R)'
'Dwayne Bravo (R)'
'Faf du Plessis (R)'
'Karn Sharma (R)'

‹ 1 2 3 ›

Q. Find name of users who created fantasy team and participated in contests in match-31.



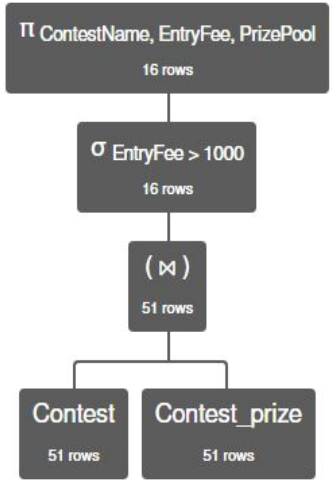
$\pi_{user_id, Name} (\sigma_{match_id = 31} (FantasyTeam \bowtie User))$

$\pi_{user_id, Name} (\sigma_{match_id = 31} (FantasyTeam \bowtie User))$

FantasyTeam.user_id	User.Name
'bommi_mahesh'	'Mahesh'
'ashish_chinthala'	'Ashish'
'gk_hire'	'Gowtham'

‹ 1 ›

Q. Find the name and prize pool of the contest having an entry fee greater than 1000.



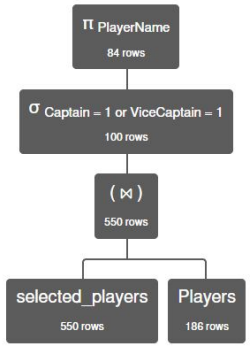
$$\pi_{\text{ContestName, EntryFee, PrizePool}} (\sigma_{\text{EntryFee} > 1000} (\text{Contest} \bowtie \text{Contest_prize}))$$

$$\pi_{\text{ContestName, EntryFee, PrizePool}} (\sigma_{\text{EntryFee} > 1000} (\text{Contest} \bowtie \text{Contest_prize}))$$

Contest.ContestName	Contest.EntryFee	Contest_prize.PrizePool
'Contests for Champions'	1234	15000
'Hot Contests'	1299	500000
'Head-to-Head'	1299	2250
'Contests for Champions'	1390	30000
'Contests for Champions'	1500	7500
'Head-to-Head'	1749	3000
'Contests for Champions'	1777	10000
'Contests for Champions'	1999	19000
'Contests for Champions'	1999	10000
'Contests for Champions'	2477	15000

Q. Find names of players who are at least once selected as either captain or vice captain by the users in total League.

$$\pi_{\text{PlayerName}} (\sigma_{\text{Captain = 1 or ViceCaptain = 1}} (\text{selected_players} \bowtie \text{Players}))$$

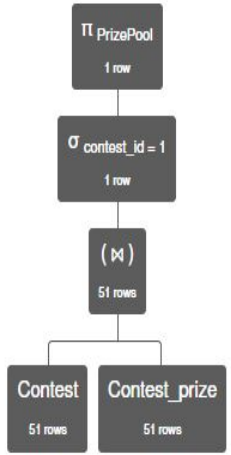


$$\pi_{\text{PlayerName}} (\sigma_{\text{Captain = 1 or ViceCaptain = 1}} (\text{selected_players} \bowtie \text{Players}))$$

Players.PlayerName
'Rahul Tripathi'
'Dale Steyn'
'Andrew Tye'
'Faf du Plessis (R)'
'Robin Uthappa'
'Ben Stokes (R)'
'Ambati Rayudu (R)'
'Ankit Rajpoot (R)'
'Prithvi Shaw (R)'
'Siddhesh Lad (R)'

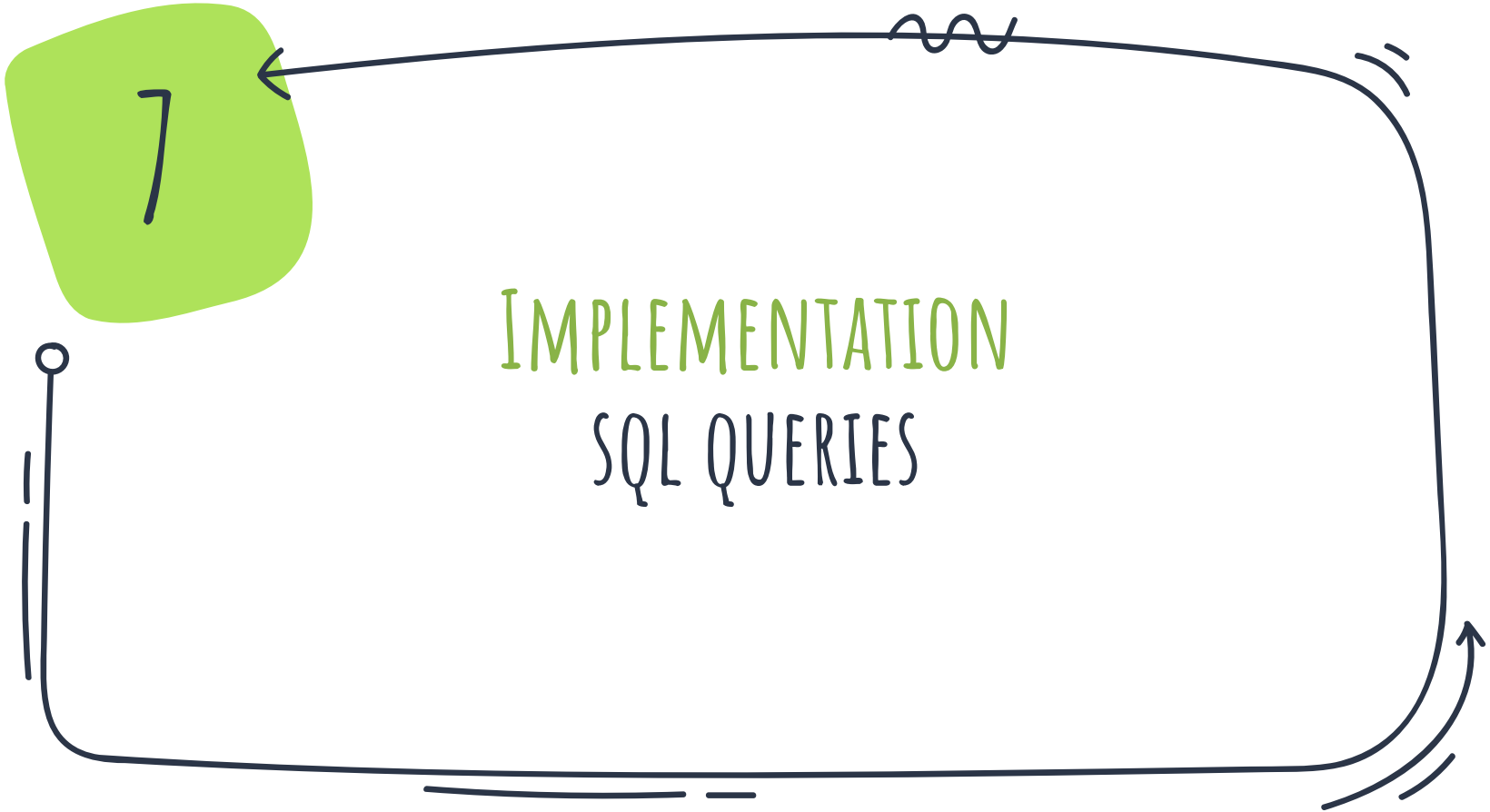
‹ 1 2 3 ›

Q. Find the prizepool of a contest for a given contest_id.



$$\pi_{PrizePool} (\sigma_{contest_id = 1} (Contest \bowtie Contest_prize))$$

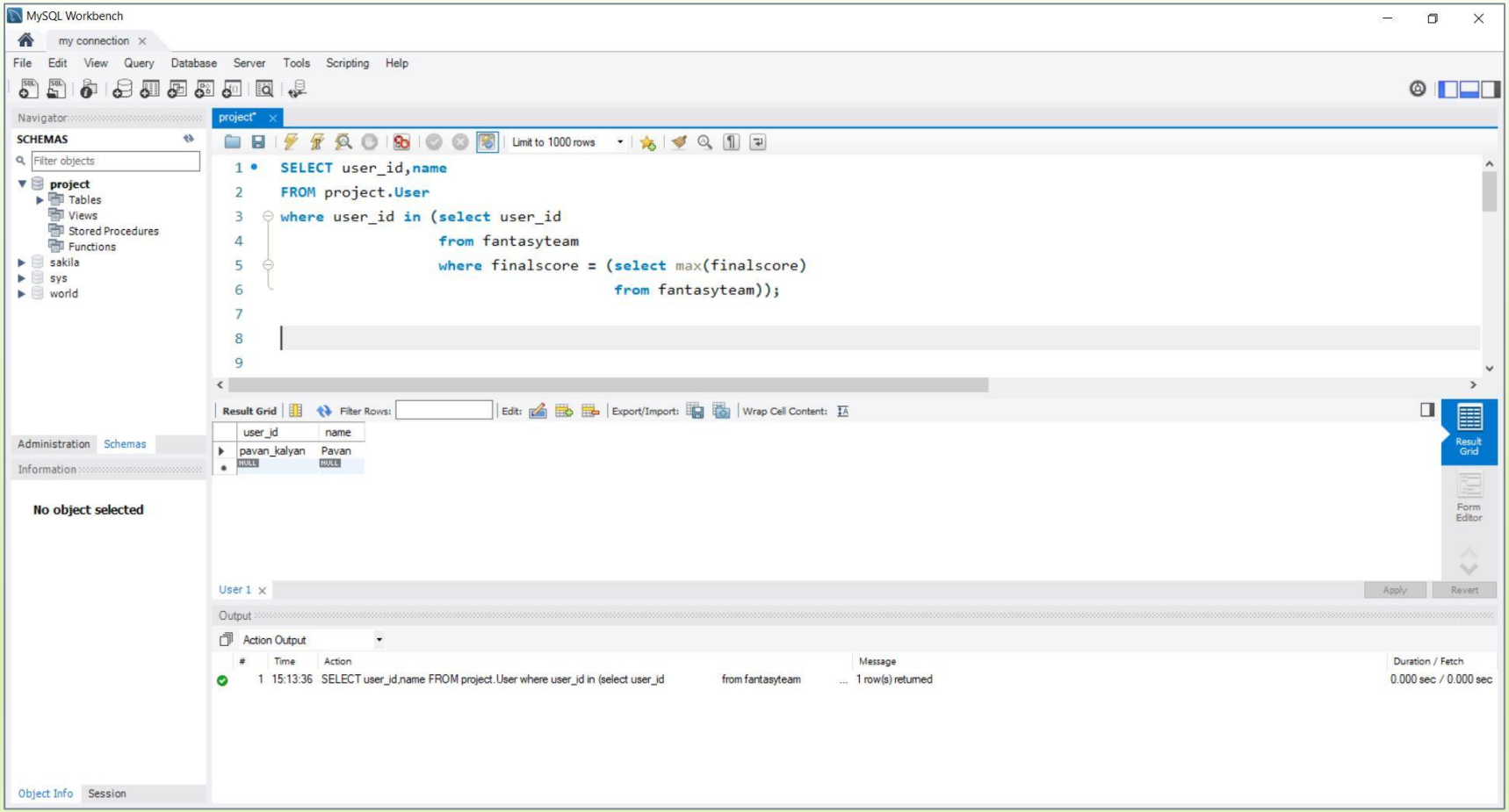
Contest_prize.PrizePool
0



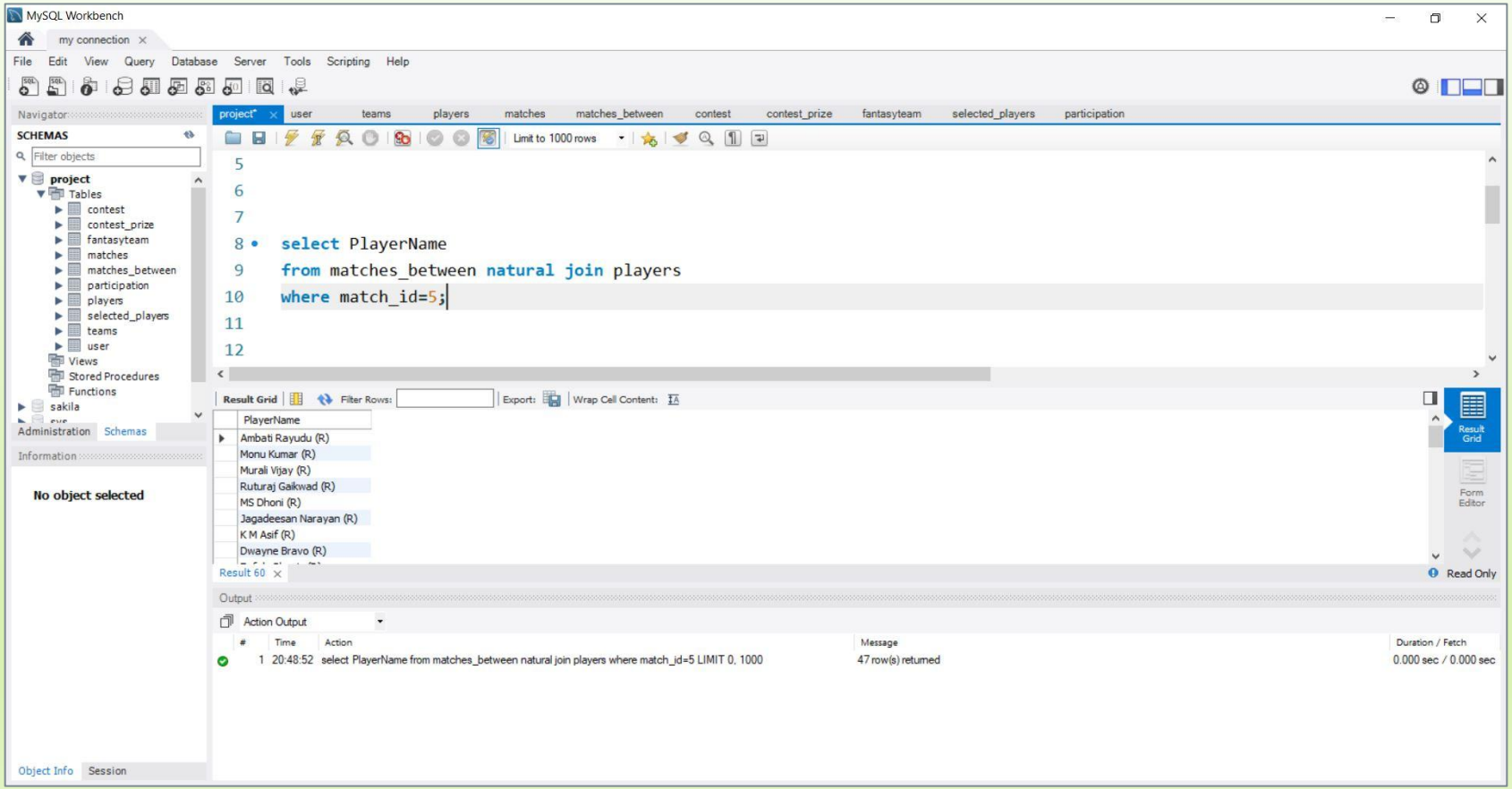
Implementation

SQL queries

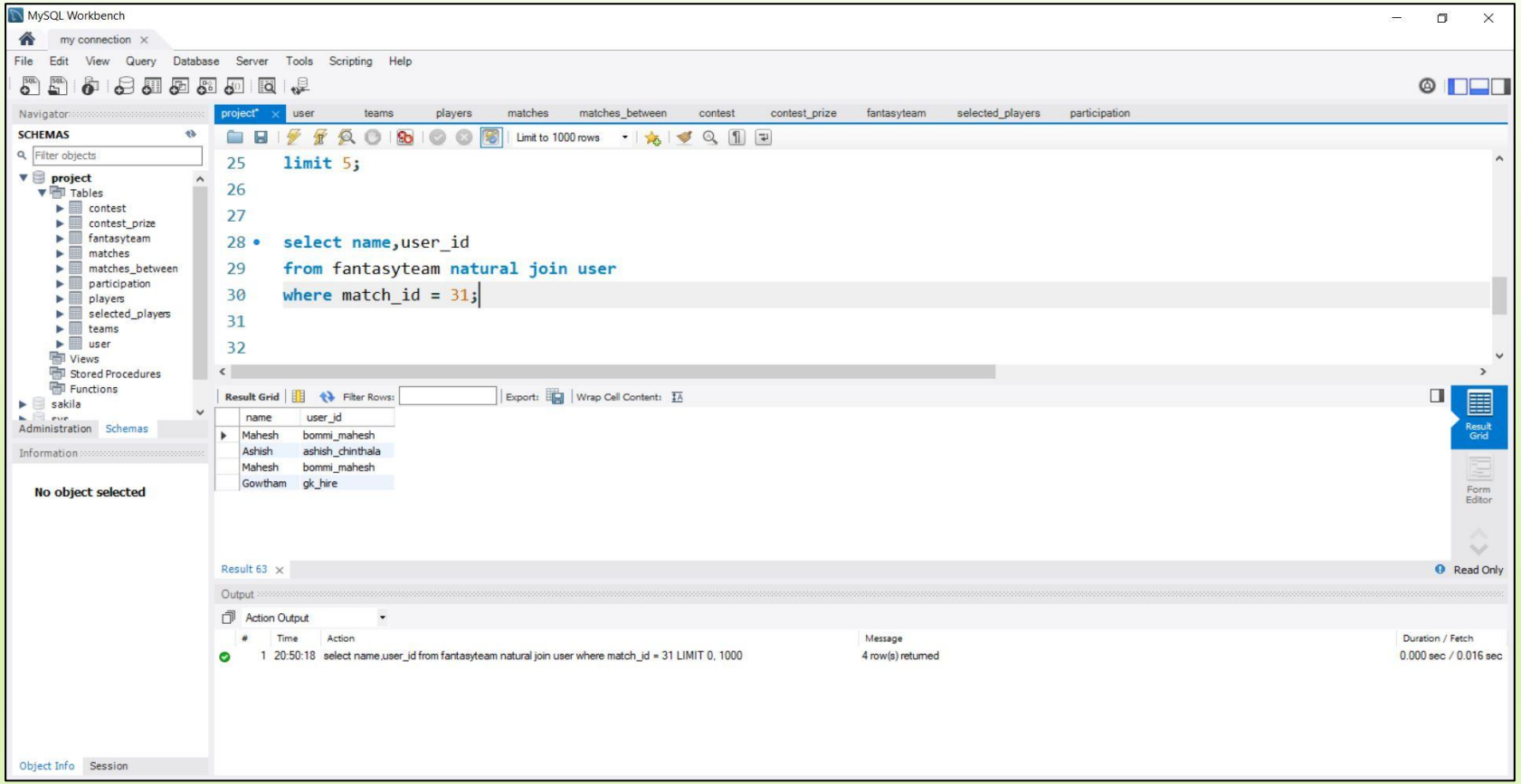
Q. Find the name and id of user who got maximum "FinalScore" in the entire league.



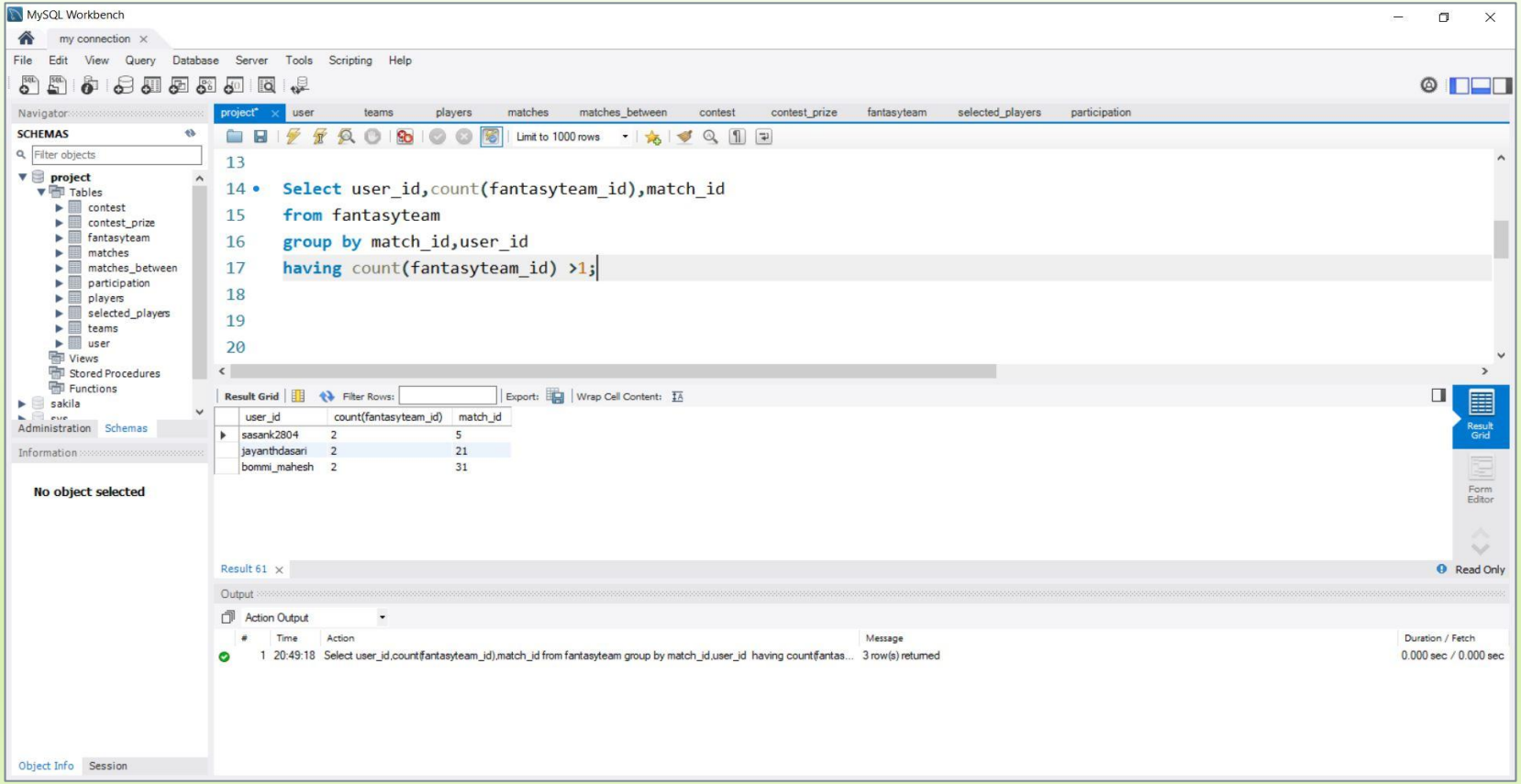
Q. List all the players available for selection in the fantasy team by users in 5th IPL match.



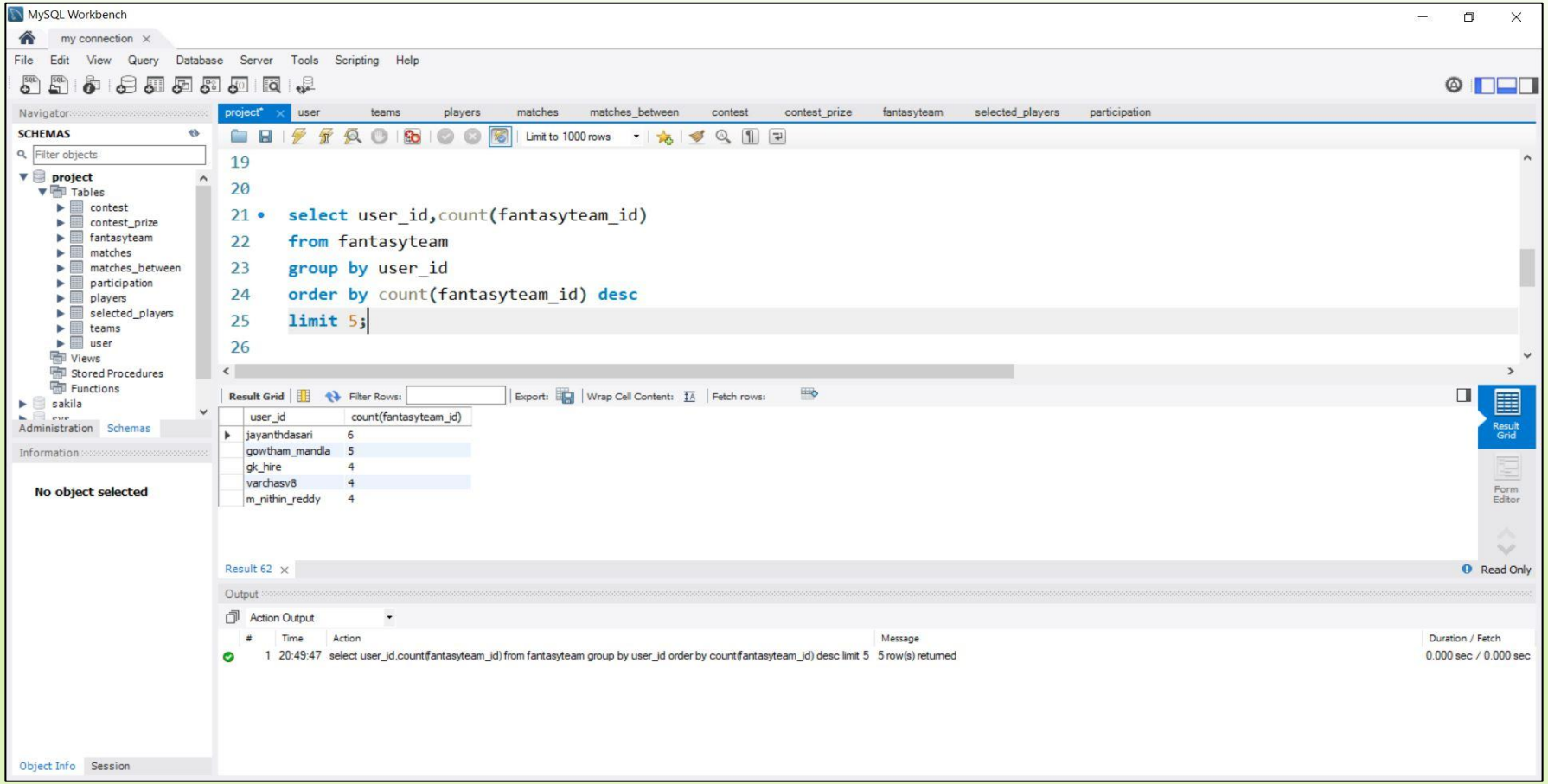
Q. Find name of users who created fantasy team and participated in contests in match-31.



Q. Find all the users who created more than one fantasyteam for a single match



Q. Find top5 users who played many contests with their fantasy teams ?



Thank You