NFL Project

By:
Gilberto Ramos, Brian Storm, Colin Lewis, Parker O'Brien

CIS 333
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General Purpose:

When most people think of the NFL, they tend to think of the players scrambling around the field trying to score touchdowns. It seems very simple from the surface, but when you start thinking about it, there are many things that need to work together in order for your favorite football team to take the field on a Sunday afternoon. There are around 1,696 players in the NFL; each and everyone of those players are assigned to a team. There are 32 teams, and each team is assigned to one of two separate conferences. Each team also has an owner, who dictates what players he wants and manages the team as whole.

The purpose of our database is to store the statistics of teams and players in the NFL. Having these statistics in a database will allow for careful examination of different aspects of players and teams. Querying and data manipulation of these statistics and data will allow our group to gain insight and draw conclusions about various statistical aspects of the NFL. Data can be viewed all at once, sorted by conference, or sorted by team. More precise data can be drawn from the player statistics data.

Conditions: Top 20 offensive players, based on overall yardage, in the following statistics were selected: QB, RB, WR, and TE.
Top 10 defensive players based off number of sacks were selected.
Top 10 defensive players based off number of interceptions were selected.
Statistics are up to date as of the final week 13 monday night game.

Database Requirements Specifications:

Team -

Our team table will include a team name and city. Each team has a city it's assigned to, and also has a name associated with it. Each team also has stats that are associated with it, such as: their average rushing, average passing yards, and so on and so forth. A team is constructed of 53 players, which produce the stats that each team produces on a weekly basis. The team entity has a 1:N relationship.

Team Stats -

Team stats table will consist of stats that each team produces, such as: wins/losses, passing yards, and rushing yards. Team stats table will have a one to many relationship with

our teams table. This is due to the fact that one entity of stats is related to many teams. This makes it a one to many relationship.

Division -

Division table will be a representation of all the divisions in the NFL along with each team in each division. The NFL has 8 divisions within two conferences:AFC North, AFC South, AFC East, AFC West, NFC North, NFC South, NFC East, NFC West. The division table and our team table has a one to many relationship. This is due to the fact that there are 4 teams in each division and each team is associated to one division.

Player -

There are about 1,696 players in the NFL, each team has 53 players on it. Each player also has stats associated with them. Each player table has a one to many relationship with team and a one to one relationship with player stats table. There are many players associated to one team and there is one player associated to one entity of stats.

Player Stats -

Player stats are a vital part of the NFL, it is usually an indication of whether a player is performing well or not. Our player stats table has a one to one relationship to our players table. This is due to the fact that each each player has a relationship to one entity of stats. Whether it be a defensive player or an offensive one. They have one entity of stats associated with them .

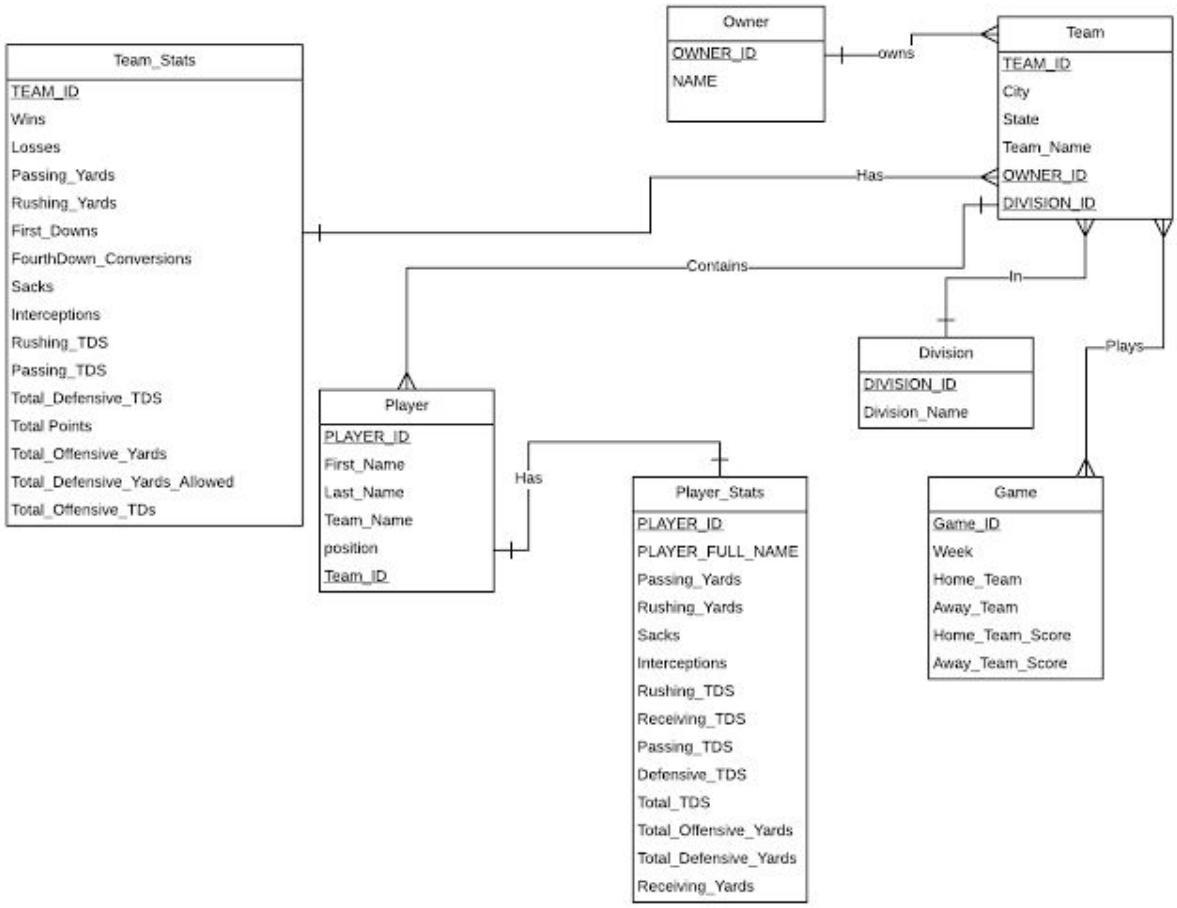
Game -

There are generally 16 nfl games per week, excluding bye weeks. Every one of these games has 2 teams and scoring summaries. This game table will store each game, the current week the game is being played in, the two teams playing in this game and the scores of those two teams. This table has a many to many relationship with the teams table.

Owner -

The owner table will give a unique id to each owner in the league as well as store the first and last name of each owner. The owner table is associated with the team entity and has a one to many relationship with this table.

ERD


Team_Stats
TEAM_ID
Wins
Losses
Passing_Yards
Rushing_Yards
First_Downs
FourthDown_Conversions
Sacks
Interceptions
Rushing_TDS
Passing_TDS
Total_Defensive_TDS
Total Points
Total_Offensive_Yards
Total_Defensive_Yards_Allowed
Total_Offensive_TDs
Owner
OWNER_ID
NAME
owns
Team
TEAM_ID
City
State
Team_Name
OWNER_ID
DIVISION_ID
Has
Contains
In
Division
DIVISION_ID
Division_Name
Plays
Player
PLAYER_ID
First_Name
Last_Name
Team_Name
position
Team_ID
Has
Player_Stats
PLAYER_ID
PLAYER_FULL_NAME
Passing_Yards
Rushing_Yards
Sacks
Interceptions
Rushing_TDS
Receiving_TDS
Passing_TDS
Defensive_TDS
Total_TDS
Total_Offensive_Yards
Total_Defensive_Yards
Receiving_Yards
Game
Game_ID
Week
Home_Team
Away_Team
Home_Team_Score
Away_Team_Score

Rudimentary relational schema -

- **Team** (Team_ID, City, State, Team_Name, Owner_ID, Division_ID)

- **Team_Stats** (Team_ID, Wins, Losses, Passing_Yards, Rushing_Yards, First_Downs, FourthDown_Conversions, Sacks, Interceptions, Team_Name, Rushing_TDS, Receiving_TDS, Passing_TDS, Defensive_TDS, Total_TDS, Total_Offensive_Yards, Total_Defensive_Yards_Allowed)

- **Division** (Division_ID, Division_Name)

- **Player** (Player_ID, Team_ID, First_Name, Last_Name, Team_Name, Position)

- **Player_Stats** (Player_ID, Passing_Yards, Rushing_Yards, Sacks, Interceptions, Rushing_TDS, Receiving_TDS, Passing_TDS, Defensive_TDS, Total_TDS, Total_Offensive_Yards, Receiving_Yards)

- **Game** (Game_ID, Week, Home_Team, Away_Team, Home_Team_score, Away_Team_Score)

- **Owner** (Owner_ID, Name)

Integrity Restraints -

IC name & Table	IC type	English statement	Page # Where Implemented	Page Number Where Tested
Division_Division_ID_PK DIVISION	Primary Key	Primary key for the Division table	9	7
Team_Owner_ID_FK TEAM	Foreign Key	Validates the relationship between Team table and Owner Table	10	8
Game_WK_CC GAME	1-attribute	Checks to confirm that the week column contains a valid week number 1-13	11	8
N/A	2-attribute	N/A (stated as optional)	N/A	N/A

Integrity Constraint Testing scripts

Violates Primary key

```
1  CREATE TABLE TEST1 (
2      DIVISION_ID NUMBER(2),
3      DIVISION_NAME VARCHAR(10),
4      CONSTRAINT DIVISION_DIVISION_ID_PK PRIMARY KEY(DIVISION_ID)
5  );
```

```
ORA-02264: name already used by an existing constraint
```

Violates Foreign Key

```
1  CREATE TABLE TEST2 (
2      OWNER_ID NUMBER(2),
3      CONSTRAINT TEAM_OWNER_ID_FK FOREIGN KEY (OWNER_ID) REFERENCES OWNER(OWNER_ID)
4  );
```

```
ORA-02264: name already used by an existing constraint
```

1-attribute - Violates week check (between 1-13) due to the value being 14

```
1  INSERT INTO GAME VALUES('01','CAR','DEN','20','21','14');
```

```
ORA-02290: check constraint (SQL_WNVMYVIKFLQBDYVBXLOFHZQXM.SYS_C001071318) violated ORA-06512: at "SYS.DBMS_SQL"
```

Database Construction and data insertion

```
CREATE TABLE OWNER (
    NAME VARCHAR(26),
    OWNER_ID NUMBER(2),
    CONSTRAINT OWNER_OWNER_ID_PK PRIMARY KEY(OWNER_ID)
);
INSERT INTO OWNER VALUES ('Tom Benson','01');
INSERT INTO OWNER VALUES ('Dan Snyder','02');
```

NAME	OWNER_ID
Tom Benson	1
Dan Snyder	2

```
CREATE TABLE DIVISION (
    DIVISION_ID NUMBER(2),
    DIVISION_NAME VARCHAR(10),
    CONSTRAINT DIVISION_DIVISION_ID_PK PRIMARY KEY(DIVISION_ID)
);
INSERT INTO DIVISION VALUES ('01','AFC_East');
INSERT INTO DIVISION VALUES ('02','AFC_North');
```

DIVISION_ID	DIVISION_NAME
1	AFC_East
2	AFC_North

```
CREATE TABLE TEAM (
    TEAM_ID VARCHAR(3),
    CITY VARCHAR(16),
    TEAM_NAME VARCHAR(16),
    STATE VARCHAR(2),
    OWNER_ID NUMBER(2),
    DIVISION_ID NUMBER(2),
    CONSTRAINT TEAM_TEAM_ID_PK PRIMARY KEY(TEAM_ID),
    CONSTRAINT TEAM_OWNER_ID_FK FOREIGN KEY (OWNER_ID) REFERENCES OWNER(OWNER_ID),
    CONSTRAINT TEAM_DIVISION_ID_FK FOREIGN KEY (DIVISION_ID) REFERENCES DIVISION(DIVISION_ID)
);
INSERT INTO TEAM VALUES ('NO','New Orleans','Saints','LA','01','07');
INSERT INTO TEAM VALUES ('WSH','Washington','Redskins','DC','02','05');
```

TEAM_ID	CITY	TEAM_NAME	STATE	OWNER_ID	DIVISION_ID
NO	New Orleans	Saints	LA	1	7
WSH	Washington	Redskins	DC	2	5

```
CREATE TABLE TEAM_STATS (
    TEAM_ID VARCHAR(3),
    TOTAL_OFFENSIVE_YARDS NUMBER(5) CHECK (TOTAL_OFFENSIVE_YARDS BETWEEN 0 and 10000),
    PASSING_YARDS NUMBER(5) CHECK (PASSING_YARDS BETWEEN 0 and 7000),
    RUSHING_YARDS NUMBER(5) CHECK (RUSHING_YARDS BETWEEN 0 and 5000),
    TOTAL_POINTS  NUMBER(4) CHECK (TOTAL_POINTS BETWEEN 0 and 600),
    WINS NUMBER(2) CHECK (WINS BETWEEN 0 and 18),
    LOSSES NUMBER(2) CHECK (LOSSES BETWEEN 0 and 18),
    PASSING_TDS NUMBER(4) CHECK (PASSING_TDS BETWEEN 0 and 70),
    RUSHING_TDS NUMBER(4) CHECK (RUSHING_TDS BETWEEN 0 and 50),
    TOTAL_OFFENSIVE_TDS NUMBER(4) CHECK (TOTAL_OFFENSIVE_TDS BETWEEN 0 and 100),
    FIRST_DOWNS NUMBER(4) CHECK (FIRST_DOWNS BETWEEN 0 and 600),
    FOURTHDOWN_CONVERSIONS NUMBER(4) CHECK (FOURTHDOWN_CONVERSIONS BETWEEN 0 and 50),
    TOTAL_DEFENSIVE_TDS NUMBER(4) CHECK (TOTAL_DEFENSIVE_TDS BETWEEN 0 and 30),
    TOTAL_DEFENSIVE_YARDS_ALLOWED NUMBER(5) CHECK (TOTAL_DEFENSIVE_YARDS_ALLOWED BETWEEN 0 and 10000),
    INTERCEPTIONS NUMBER(3) CHECK (INTERCEPTIONS BETWEEN 0 and 25),
    SACKS NUMBER(3) CHECK (SACKS BETWEEN 0 and 50),
    CONSTRAINT TEAM_TEAM_STATS_ID_PK PRIMARY KEY(TEAM_ID)
);
INSERT INTO TEAM_STATS VALUES ('NO','5114','3833','1311','347','5','7','31','11','42','297','8','0','4497','7','24');
INSERT INTO TEAM_STATS VALUES ('WSH','5023','3709','1314','303','6','5','21','10','31','274','5','0','4435','7','30');
```

TEAM_ID	TOTAL_OFFENSIVE_YARDS	PASSING_YARDS	RUSHING_YARDS	TOTAL_POINTS	WINS	LOSSES	PASSING_TDS	RUSHING_TDS	TOTAL_OFFENSIVE_TDS	FIRST_DOWNS	FOURTHDOWN_CONVERSIONS	TOTAL_DEFENSIVE_TDS	TOTAL_DEFENSIVE_
NO	5114	3833	1311	347	5	7	31	11	42	297	8	0	4497
WSH	5023	3709	1314	303	6	5	21	10	31	274	5	0	4435

```
CREATE TABLE GAME (
    GAME_ID NUMBER(3),
    AWAY_TEAM_ID VARCHAR(3),
    HOME_TEAM_ID VARCHAR(3),
    AWAY_TEAM_SCORE NUMBER(2) CHECK (AWAY_TEAM_SCORE BETWEEN 0 and 100),
    HOME_TEAM_SCORE NUMBER(2) CHECK (HOME_TEAM_SCORE BETWEEN 0 and 100),
    WEEK NUMBER(2) CHECK (WEEK BETWEEN 01 and 13),
    CONSTRAINT GAME_GAME_ID_PK PRIMARY KEY(GAME_ID),
    CONSTRAINT GAME_AWAY_TEAM_ID_FK FOREIGN KEY (AWAY_TEAM_ID) REFERENCES TEAM(TEAM_ID),
    CONSTRAINT GAME_HOME_TEAM_ID_FK FOREIGN KEY (HOME_TEAM_ID) REFERENCES TEAM(TEAM_ID)
);


INSERT INTO GAME VALUES('01','CAR','DEN','20','21','1');
INSERT INTO GAME VALUES('02','GB','JAX','27','23','1');
```

GAME_ID	AWAY_TEAM_ID	HOME_TEAM_ID	AWAY_TEAM_SCORE	HOME_TEAM_SCORE	WEEK
1	CAR	DEN	20	21	1
2	GB	JAX	27	23	1

```
CREATE TABLE PLAYER (
    PLAYER_ID NUMBER(2),
    FIRST_NAME VARCHAR(12),
    LAST_NAME VARCHAR(14),
    POSITION VARCHAR(3) CHECK (POSITION IN('QB','RB','WR','TE','DB','SS','FS','SS','CB','DE','OLB')),
    TEAM_ID VARCHAR(3),
    TEAM_NAME VARCHAR(24),
    CONSTRAINT PLAYER_PLAYER_ID_PK PRIMARY KEY(PLAYER_ID),
    CONSTRAINT PLAYER_TEAM_ID_FK FOREIGN KEY (TEAM_ID) REFERENCES TEAM(TEAM_ID)
);
INSERT INTO PLAYER VALUES ('01','Drew','Brees','QB','NO','New Orleans Saints');
INSERT INTO PLAYER VALUES ('02','Matt','Ryan','QB','ATL','Atlanta Falcons');
```

PLAYER_ID	FIRST_NAME	LAST_NAME	POSITION	TEAM_ID	TEAM_NAME
1	Drew	Brees	QB	NO	New Orleans Saints
2	Matt	Ryan	QB	ATL	Atlanta Falcons

```
CREATE TABLE PLAYER_STATS (
    PLAYER_ID NUMBER(2),
    PLAYER_FULL_NAME VARCHAR(24),
    TOTAL_OFFENSIVE_YARDS NUMBER(5) CHECK (TOTAL_OFFENSIVE_YARDS BETWEEN 0 and 10000),
    PASSING_YARDS NUMBER(5) CHECK (PASSING_YARDS BETWEEN 0 and 7000),
    PASSING_TDS NUMBER(4) CHECK (PASSING_TDS BETWEEN 0 and 70),
    RUSHING_YARDS NUMBER(5) CHECK (RUSHING_YARDS BETWEEN 0 and 5000),
    RUSHING_TDS NUMBER(4) CHECK (RUSHING_TDS BETWEEN 0 and 50),
    RECEIVING_YARDS NUMBER(5) CHECK (RECEIVING_YARDS BETWEEN 0 and 5000),
    RECEIVING_TDS NUMBER(4) CHECK (RECEIVING_TDS BETWEEN 0 and 50),
    DEFENSIVE_TDS NUMBER(4) CHECK (DEFENSIVE_TDS BETWEEN 0 and 20),
    TOTAL_TDS NUMBER(4) CHECK (TOTAL_TDS BETWEEN 0 and 100),
    INTERCEPTIONS NUMBER(4) CHECK (INTERCEPTIONS BETWEEN 0 and 20),
    SACKS NUMBER(4) CHECK (SACKS BETWEEN 0 and 50),
    CONSTRAINT PLAYER_STATS_PLAYER_ID_PK PRIMARY KEY(PLAYER_ID)
);
INSERT INTO PLAYER_STATS VALUES ('01','Drew Brees','3932','3913','30','19','2','0','0','0','32','0','0');
INSERT INTO PLAYER_STATS VALUES ('02','Matt Ryan','3920','3813','27','107','0','0','0','0','27','0','0');
```

PLAYER_ID	PLAYER_FULL_NAME	TOTAL_OFFENSIVE_YARDS	PASSING_YARDS	PASSING_TDS	RUSHING_YARDS	RUSHING_TDS	RECEIVING_YARDS	RECEIVING_TDS	DEFENSIVE_TDS	TOTAL_TDS	INTERCEPTIONS	SACKS
1	Drew Brees	3932	3913	30	19	2	0	0	0	32	0	0
2	Matt Ryan	3920	3813	27	107	0	0	0	0	27	0	0

Query 1

```
-- #1 Demonstrates a join of 4 relations.
-- This query evaluates top performing player's (Over 1000 total yards offense) tds scored and total offensive
-- yards compared to their corresponding team's total values. This shows us players that are exceptionaly crucial to their team.

SELECT a.TEAM_NAME, c.TOTAL_OFFENSIVE_TDS AS TOTAL_TEAM_TDS, c.TOTAL_OFFENSIVE_YARDS AS TOTAL_TEAM_YARDS,
b.FIRST_NAME, b.LAST_NAME, b.POSITION, d.TOTAL_OFFENSIVE_YARDS, d.TOTAL_TDS
FROM TEAM a, PLAYER b, TEAM_STATS c, PLAYER_STATS d
WHERE a.TEAM_ID = b.TEAM_ID
AND b.TEAM_ID = c.TEAM_ID
AND b.PLAYER_ID = d.PLAYER_ID
AND d.TOTAL_OFFENSIVE_YARDS > '1000'
ORDER BY d.TOTAL_TDS DESC;
```

TEAM_NAME	TOTAL_TEAM_TDS	TOTAL_TEAM_YARDS	FIRST_NAME	LAST_NAME	POSITION	TOTAL_OFFENSIVE_YARDS	TOTAL_TDS
Packers	34	4323	Aaron	Rodgers	QB	3584	32
Saints	42	5114	Drew	Brees	QB	3932	32
Falcons	41	4944	Matt	Ryan	QB	3920	27
Titans	38	4587	Marcus	Mariota	QB	3308	27
Steelers	34	4402	Ben	Roethlisberger	QB	3056	26
Chargers	35	4413	Philip	Rivers	QB	3387	25
Raiders	38	4700	Derek	Carr	QB	3429	24
Colts	28	3876	Andrew	Luck	QB	3377	24
Cowboys	39	4748	Dak	Prescott	QB	3191	24
Bucaneers	30	4347	Jameis	Winston	QB	3291	24
Redskins	31	5023	Kirk	Cousins	QB	3860	23
Giants	27	3929	Eli	Manning	QB	3097	22
Jaguars	25	4009	Blake	Bortles	QB	3253	22
Lions	25	4047	Matthew	Stafford	QB	3402	21
Cardinals	32	4429	Carson	Palmer	QB	3265	18
Ravens	22	4172	Joe	Flacco	QB	3316	17
Bengals	26	4464	Andy	Dalton	QB	3537	17
Dolphins	28	3933	Ryan	Tannehill	QB	2944	17
Cardinals	32	4429	David	Johnson	RB	1709	15
Seahawks	26	4295	Russell	Wilson	QB	3345	14
Cowboys	39	4748	Ezekiel	Elliott	RB	1607	13

Query 2

```sql
--#2 Demonstrates a self join
-- This query evaluates teams that have more total offensive yards than defensive yards allowed and more wins than losses.
-- This query's results list the most dominate teams in the league.
SELECT
    a.TEAM_ID, b.TOTAL_OFFENSIVE_YARDS, b.TOTAL_DEFENSIVE_YARDS_ALLOWED, b.WINS, b.LOSSES
FROM
    TEAM_STATS a
JOIN
    TEAM_STATS b ON a.TEAM_ID = b.TEAM_ID AND b.TOTAL_OFFENSIVE_YARDS > b.TOTAL_DEFENSIVE_YARDS_ALLOWED AND b.WINS > b.LOSSES
ORDER BY b.WINS DESC;
```

TEAM_ID	TOTAL_OFFENSIVE_YARDS	TOTAL_DEFENSIVE_YARDS_ALLOWED	WINS	LOSSES
DAL	4748	4302	11	1
NE	4650	4047	10	2
OAK	4700	4676	10	2
DEN	3917	3786	8	4
SEA	4295	3963	8	3
BAL	4172	3553	7	5
PIT	4402	4180	7	5
ATL	4944	4580	7	5
WSH	5023	4435	6	5

Query 3

```sql
-- #3 Demonstrates a union
-- This queary shows all home games the lions have played and the score of each one. The union adds all away games
-- the lions have played and again the scores of those games.
SELECT
    HOME_TEAM_ID,
    HOME_TEAM_SCORE,
    AWAY_TEAM_ID,
    AWAY_TEAM_SCORE
FROM GAME
WHERE HOME_TEAM_ID = 'DET'
UNION ALL
SELECT
    HOME_TEAM_ID,
    HOME_TEAM_SCORE,
    AWAY_TEAM_ID,
    AWAY_TEAM_SCORE
FROM GAME
WHERE AWAY_TEAM_ID = 'DET';
```

HOME_TEAM_ID	HOME_TEAM_SCORE	AWAY_TEAM_ID	AWAY_TEAM_SCORE
DET	15	TEN	16
DET	24	PHI	23
DET	31	LA	28
DET	20	WSH	17
DET	26	JAX	19
DET	16	MIN	13
IND	35	DET	39
GB	34	DET	27
CHI	17	DET	14
HOU	20	DET	13
MIN	16	DET	22
NO	13	DET	28

Query 4/5

```
#4/5 Demonstrates an AVG as well as a GROUP BY, HAVING, and ORDER BY in the same queary.
-- This queary finds average total tds of each offensive position

SELECT PLAYER.POSITION, AVG(PLAYER_STATS.TOTAL_TDS) AS AvgTDs
FROM PLAYER_STATS
INNER JOIN PLAYER
ON PLAYER_STATS.PLAYER_ID = PLAYER.PLAYER_ID
GROUP BY PLAYER.POSITION
HAVING PLAYER.POSITION IN('QB','RB','WR','TE')
ORDER BY AvgTDs DESC;
```

POSITION	AVGTDS
QB	22.45
RB	8
WR	5.888888888888888888888888888888888889
TE	3

Query 6

```
-- #6 Demonstrates Correlated Sub Queary
-- This queary shows each teams wins, losses, total offensive yards, and total defensive yards
-- in the Lions Division(NFC North).

SELECT TEAM.TEAM_NAME,TEAM_STATS.WINS, TEAM_STATS.LOSSES, TEAM_STATS.TOTAL_OFFENSIVE_YARDS,
TEAM_STATS.TOTAL_DEFENSIVE_YARDS_ALLOWED
FROM TEAM, TEAM_STATS
WHERE TEAM.TEAM_ID = TEAM_STATS.TEAM_ID AND DIVISION_ID = (
SELECT DIVISION_ID FROM DIVISION WHERE DIVISION_ID='06')
ORDER BY TEAM_STATS.WINS DESC;
```

TEAM_NAME	WINS	LOSSES	TOTAL_OFFENSIVE_YARDS	TOTAL_DEFENSIVE_YARDS_ALLOWED
Lions	8	4	4047	4257
Packers	6	6	4323	4166
Vikings	6	6	3562	3641
Bears	3	9	4178	3922