README.md

INFSCI 1540 Project Report - American Football Quarterbacks

What is this?

Our project provides a database of quarterback performances per game so answer questions such as: Who is the highest performing quarterback in N seasons? Which QB is the best performing average? Do I draft CJ Stroud?

What data are we maintaining in our system?

Our data engineering system maintains a list of NFL quarterbacks over the last 4 years, their **current** teams, the games they played in, and their standard fantasy football score each game.(.04*passings yard + .1*rushing yards + 4*passing touchdowns+.6*rushing touchdowns - 2*fumbles)

We seperated games by weeks because its how NFL seasons are split and organized the weeks of the 2020-2023 seasons into 1 table so the weeks do not overlap.

Importantly, we left in a lot of "empty" data, as it in itself is it's own statistic. Using this data we can find statistics on how often players were actually played in a series, and for more specific averages per weeks/matches played.

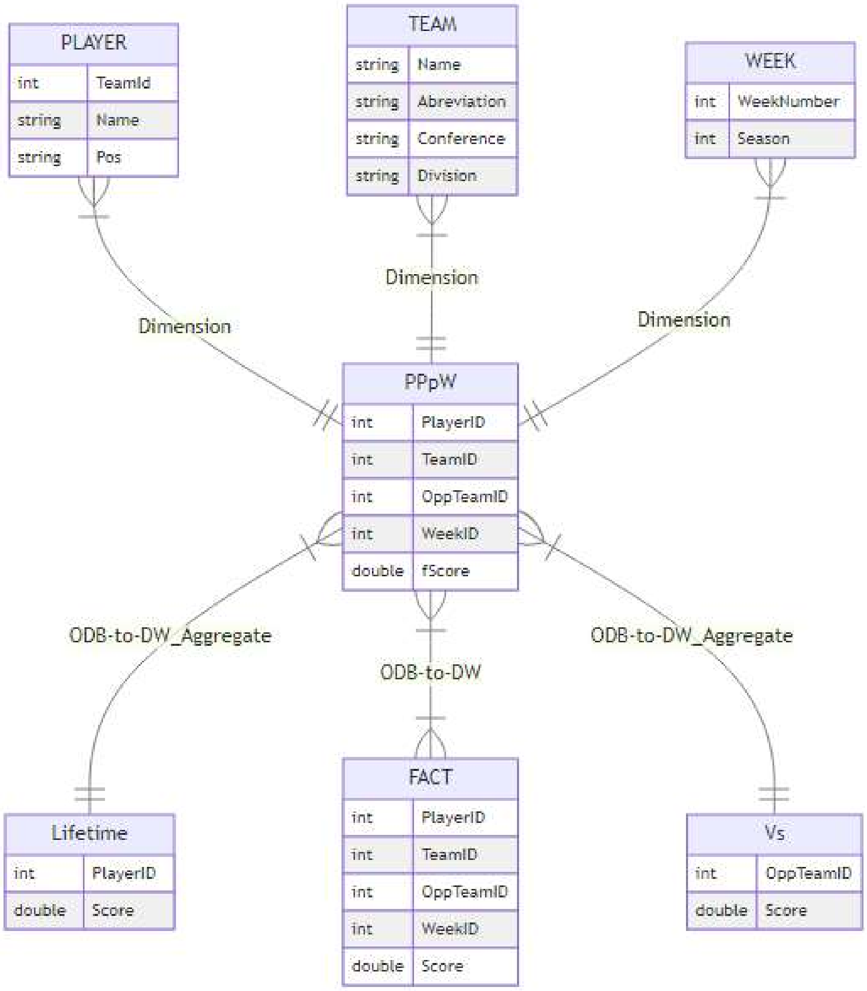
Our docker containers

1. Php Web Server - General DB Management
2. Mysql ODB Server - Our operational database to store our tables
3. Mysql DW Server - Our data warehouse holding onto our fact table and player performance information
4. ODB Phpmyadmin Server - Allows us to interact with the ODB sql server
5. DW Phpmyadmin Server - Allows us to interact with the DW sql server
6. Kafka Broker - Allows our producers and consumers to interact with each other
7. Zookeeper - Keeps track of our current broker and tells producers and consumers to go through our broker

The data loading process

Our data loading process involved organizing our data to be used. Each player and team was given a table. Each week in the past 4 seasons was given its own id. We then normalized these into one table that held each player's NAME TEAM and PLAYER PERFORMANCE(fantasy score) for EACH WEEK in the past four seasons and cross referenced this against a different dataset to find which teams the player played against. Then, using kafka, we uploaded the tables to the ODB and created a new table which gave each game that was played by someone its own row. Our data warehouse would then mirror our performance per week dataset.

Star Diagram



PLAYER	
int	TeamId
string	Name
string	Pos

TEAM	
string	Name
string	Abreviation
string	Conference
string	Division

WEEK	
int	WeekNumber
int	Season

PPpW	
int	PlayerID
int	TeamID
int	OppTeamID
int	WeekID
double	fScore

Lifetime	
int	PlayerID
double	Score

FACT	
int	PlayerID
int	TeamID
int	OppTeamID
int	WeekID
double	Score

Vs	
int	OppTeamID
double	Score

Data Streaming

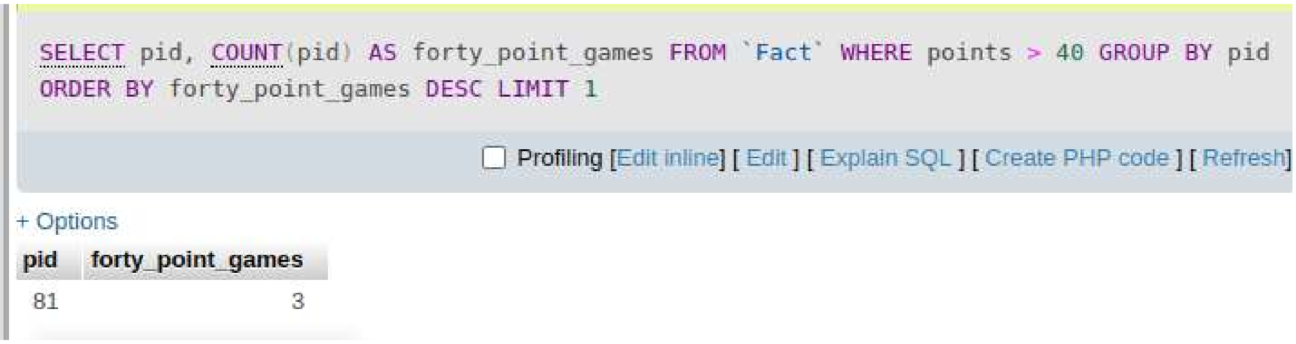
The data stream supported in our system was Kafka. We used it to move our data from CSVs to our ODB and our summary table to our DW.

Pre-Aggregated Summary table

Our main summary table is the **FACT** table. We took the data through our normalized csv then PPpW table and mirrored it to create our fact table. We also made a summary table for the total points each player earned in their **Lifetime** and the total points have been scored against each team in the past 4 seasons called **Vs**.

OLAP Queries

Player with the most 40-point games:

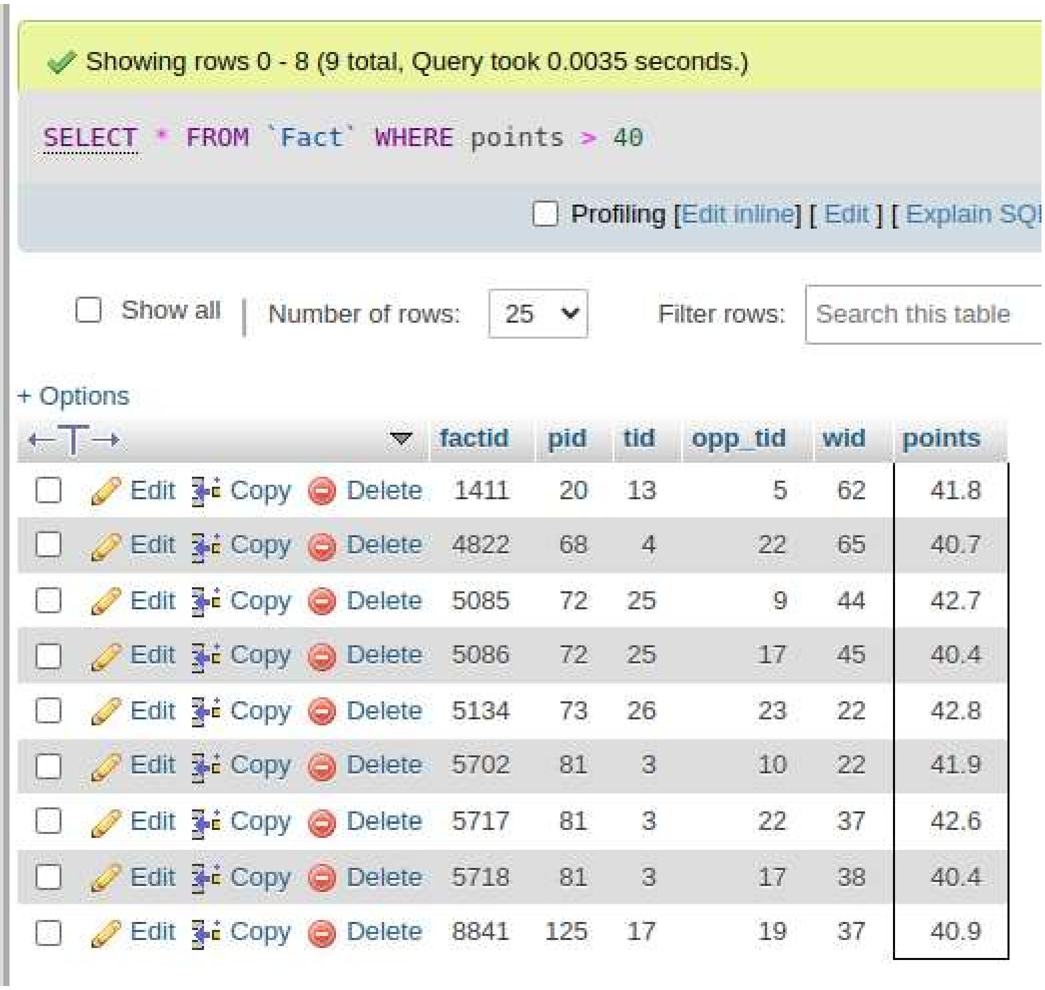


```
SELECT pid, COUNT(pid) AS forty_point_games FROM `Fact` WHERE points > 40 GROUP BY pid
ORDER BY forty_point_games DESC LIMIT 1
```

□ Profiling [Edit inline] [Edit] [Explain SQL] [Create PHP code] [Refresh]
+ Options

pid	forty_point_games
81	3

Every 40-point game:



✓ Showing rows 0 - 8 (9 total, Query took 0.0035 seconds.)

```
SELECT * FROM `Fact` WHERE points > 40
```

□ Profiling [Edit inline] [Edit] [Explain SQ
□ Show all | Number of rows: 25
Filter rows: Search this table
+ Options
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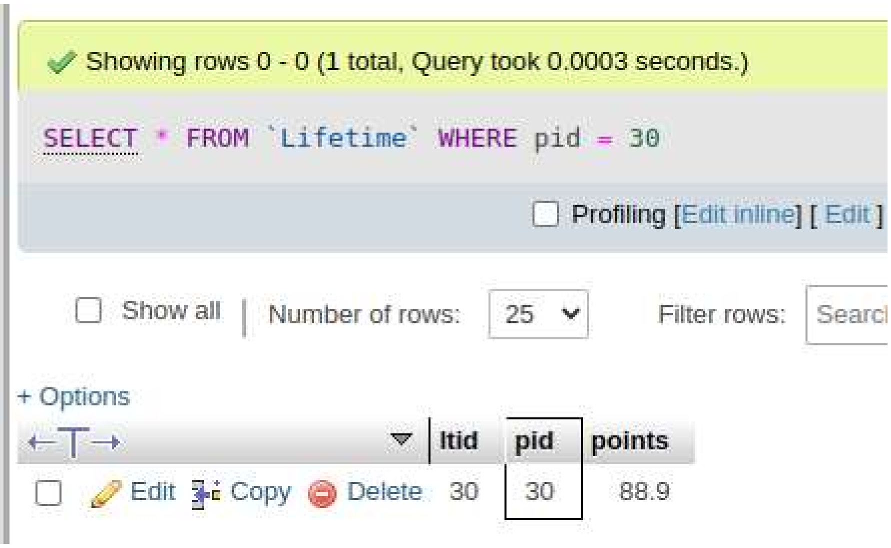
	factid	pid	tid	opp_tid	wid	points
□ Edit Copy Delete	1411	20	13	5	62	41.8
□ Edit Copy Delete	4822	68	4	22	65	40.7
□ Edit Copy Delete	5085	72	25	9	44	42.7
□ Edit Copy Delete	5086	72	25	17	45	40.4
□ Edit Copy Delete	5134	73	26	23	22	42.8
□ Edit Copy Delete	5702	81	3	10	22	41.9
□ Edit Copy Delete	5717	81	3	22	37	42.6
□ Edit Copy Delete	5718	81	3	17	38	40.4
□ Edit Copy Delete	8841	125	17	19	37	40.9

Dak Prescott's Lifetime Performance:



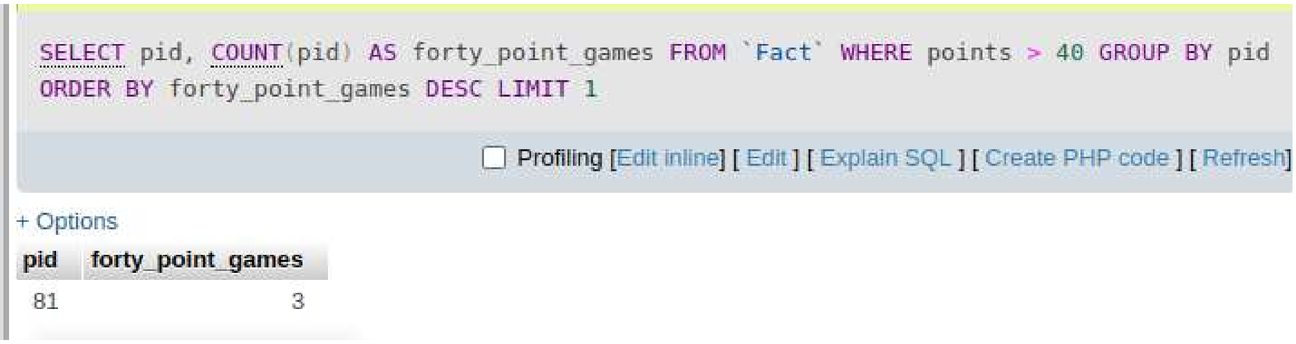
✓ Showing rows 0 - 0 (1 total, Query took 0.0003 seconds.)

```
SELECT * FROM `Lifetime` WHERE pid = 30
```

Number of rows: 25

	ltid	pid	points
□ Edit Copy Delete	30	30	88.9

Strongest Defensive Team:



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+ Options

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81	3

Thanks for reading! Feel free to demo on your own time!