

Project Step 7 (Portfolio Assignment) - Basketball Statistics Database

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URL to Site: <http://flip3.engr.oregonstate.edu:7787/index>

Executive Summary

The portfolio project database website UI went through two major updates based on peer and TA feedback from the “READ + CREATE” and “UPDATE + DELETE” project iterations. Major updates to the HTML UI mockup and the “READ + CREATE” project iterations occurred during project steps 3 and 4, whereas major updates to the “UPDATE + DELETE” project iterations occurred during project steps 5 and 6. Prior to these project iterations in the earlier modules of the course, feedback regarding the project outline predominantly indicated no issues. Feedback regarding the database outline (which the ER diagram and schema are based on) yielded an array of adjustments. Finally, feedback regarding the data definition and data manipulation SQL queries indicated no issues.

Major changes on the database outline influenced by feedback are as follows. Based on instructor feedback from step 1, we removed the Coaches entity in order to streamline the database outline, however, this change resulted in an insufficient number of entities required by project guidelines. The removal of the Coaches entity simplified the database to four non-intersection tables, below the required amount. The change was eventually reverted to its original form. Based on TA/peer feedback from step 2, some attributes possessed an ambiguous meaning as an unintended consequence of sticking to a singular tense attribute naming convention. For instance, the attribute name “total_season_num” was reworked to “completed_season_num” to clarify variable meaning. Also, some attributes were updated to not have the “NOT NULL” parameter due to extraneous situations that exclude the attribute (e.g. player sitting out a season & awards not having existed yet in a past season).

Major changes on the initial HTML mockup and the “READ + CREATE” iteration of the database website UI influenced by feedback are as follows. Based on TA/peer feedback from step 3, the entire table width was displayed instead of storing the table in a horizontal scrollbar. This change eliminated the chance of a user not identifying crucial “edit” and “delete” buttons that may have been hidden by the horizontal scrollbar. Also, all of the tables originally contained a sort option; this was promptly converted into a single filter option specifically located in the “players” table to simplify implementation in accordance with the project guidelines. Table headers were converted from attribute names (e.g. team_place_city) to more conventional names (e.g. Team Place City) and sample table entries were added to each table in order to make the UI more user friendly. Based on TA/peer feedback from step 4, dropdown menus for foreign ID input were implemented to prevent invalid entries. Also, the main page was updated to contain a prompt description and example for each table in the database in order to better situate the user regarding the utility of each page.

Major changes on the “UPDATE + DELETE” iteration of the database website UI influenced by feedback are as follows. When an invalid delete query is executed on the database (e.g. deleting an entity that is linked via foreign ID to other entities) the user is redirected to a page signifying so. The dropdown menu for foreign ID input includes the foreign ID name along with the foreign ID itself. Further, the many-to-many DELETE function has been implemented, in which if a Player or Coach is deleted, the associated Player Team Relation or Coach Team Relation is deleted as well. Further, form validation to ensure selected fields are “NOT NULL” was implemented using the “required” attribute for all relevant “input” html fields. DELETE query issues in the Coaches table were addressed, allowing for deletion of higher order entities (e.g. Teams, Seasons, League Histories). Finally, inconsistencies between CREATE and UPDATE pages regarding form validation (e.g. number steps) were smoothed out.

Project Outline (Final Version)

There are multiple professional basketball leagues in the world. This database primarily focuses on the NBA. The National Basketball Association (NBA) is a North American professional basketball league. The NBA has completed 74 seasons, with the 75th season currently in progress (i.e. this is the “league history” of the NBA). An NBA season typically consists of 82 games, and these games produce statline averages for ~450 players (can fluctuate due to varying roster sizes) and ~30 teams (can vary due to team expansions). A database (DB) driven backend can record stats of specific *players* of *teams* of *seasons* to *league_histories* and *coaches* of *teams* of *seasons* to *league_histories*. A problem that this database backend will solve is storing NBA statistics for various usages within a website (e.g. search, comparisons, filtering).

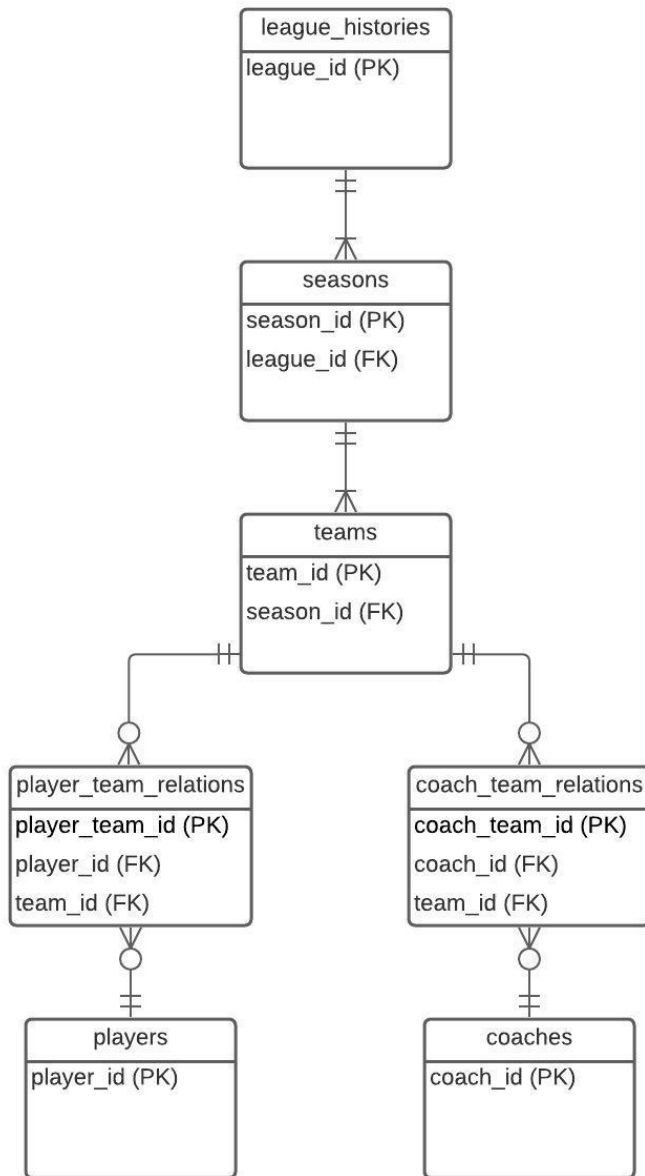
Database Outline (Final Version)

- **league_histories:** stores details (total number of seasons) of the basketball league’s history (i.e. all NBA seasons)
 - league_id: int, auto_increment, unique, not NULL, primary key (PK)
 - league_name: varchar, not NULL
 - completed_seasons_num: int, not NULL
 - Relationships: 1:M relationship between league_histories and seasons is implemented with league_id as a FK inside of seasons
- **seasons:** stores the details (dates, champions, awards) of a single basketball season (e.g. ‘95-’96 NBA Season)
 - season_id: int, auto_increment, unique, not NULL, primary key (PK)
 - league_id: int, not NULL, foreign key (FK)
 - season_name: varchar, not NULL
 - date_season_started: date, not NULL
 - date_season_ended; date, not NULL
 - league_champion: varchar, not NULL
 - western_champion: varchar, not NULL
 - eastern_champion: varchar, not NULL
 - most_valuable_player: varchar
 - defensive_player_of_the_year: varchar
 - most_improved_player_of_the_year: varchar
 - sixth_man_of_the_year: varchar
 - Relationships: 1:M relationship between seasons and teams is implemented with season_id as a FK inside of teams
- **teams:** stores the details (location, stats) of an basketball team’s season (e.g. ‘95-’96 Chicago Bulls)
 - team_id: int, auto_increment, unique, not NULL, primary key (PK)
 - season_id: int, not NULL, foreign key (FK)
 - team_name: varchar, not NULL
 - team_place_city: varchar
 - team_place_state: varchar, not NULL
 - points_per_game: decimal, not NULL
 - assists_per_game: decimal, not NULL
 - steals_per_game: decimal, not NULL
 - blocks_per_game: decimal, not NULL
 - rebounds_per_game: decimal, not NULL
 - fouls_per_game: decimal, not NULL

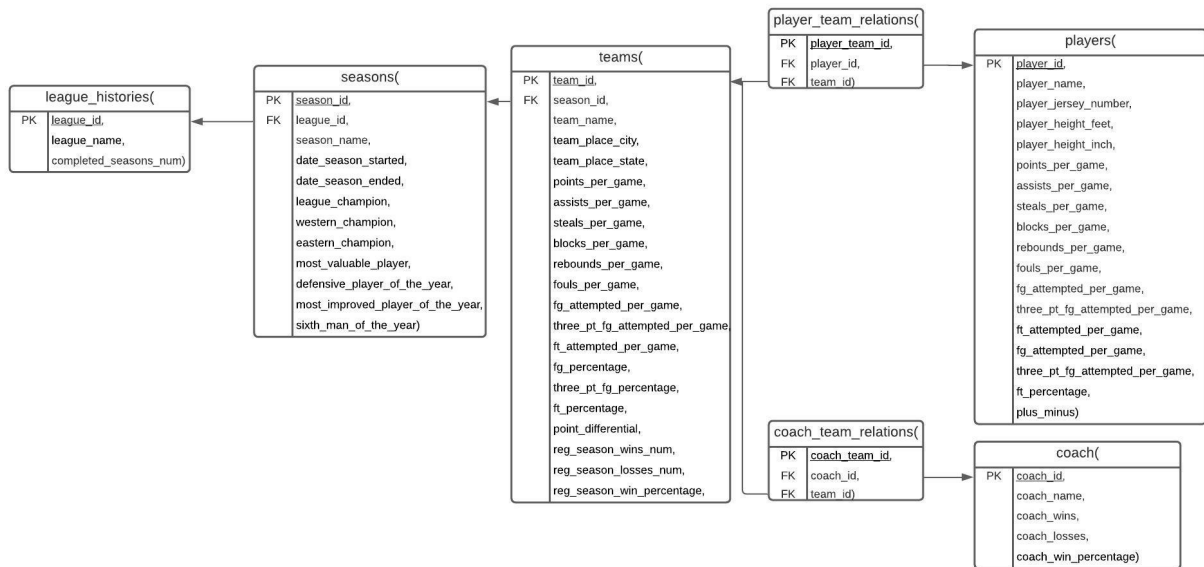
- fg_attempted_per_game: decimal, not NULL
 - three_pt_fg_attempted_per_game: decimal, not NULL
 - ft_attempted_per_game: decimal, not NULL
 - fg_percentage: decimal, not NULL
 - three_pt_fg_percentage: decimal, not NULL
 - ft_percentage: decimal, not NULL
 - point_differential: decimal, not NULL
 - reg_season_wins_num: int, not NULL
 - reg_season_losses_num: int, not NULL
 - reg_season_win_percentage: decimal, not NULL
 - Relationships: 1:M relationship between teams and player_team_relations is implemented with team_id as a FK inside of player_team_relations
- **players:** stores the details (physical attributes, stats) of an basketball player's season (e.g. '95-'96 Michael Jordan)
 - player_id: int, auto_increment, unique, not NULL, primary key (PK)
 - player_name: varchar, not NULL
 - player_jersey_number: int, not NULL
 - player_height_feet: int, not NULL
 - player_height_inch: int, not NULL
 - points_per_game: decimal
 - assists_per_game: decimal
 - steals_per_game: decimal
 - blocks_per_game: decimal
 - rebounds_per_game: decimal
 - fouls_per_game: decimal
 - fg_attempted_per_game: decimal
 - three_pt_fg_attempted_per_game: decimal
 - ft_attempted_per_game: decimal
 - fg_percentage: decimal
 - three_pt_fg_percentage: decimal
 - ft_percentage: decimal
 - plus_minus: decimal
 - Relationships: 1:M relationship between players and player_team_relations is implemented with player_id as a FK inside of player_team_relations
- **player_team_relations:** stores the details (via intersection table) of a basketball player for a team (e.g. Michael Jordan of the '95-'96 Chicago Bulls)
 - player_team_id: auto_increment, unique, not NULL, primary key (PK)
 - player_id: int, not NULL, foreign key (FK)
 - team_id: int, not NULL, foreign key (FK)
 - Relationships: 1:M relationship between teams and player_team_relations is implemented with team_id as a FK inside of player_team_relations
 - Relationships: 1:M relationship between players and player_team_relations is implemented with player_id as a FK inside of player_team_relations
- **coaches:** stores the details (wins, losses) of a coach's season (e.g. '95-'96 Phil Jackson)
 - coach_id: auto_increment, unique, not NULL, primary key (PK)
 - coach_name: varchar, not NULL

- coach_wins: int, not NULL
 - coach_losses: int, not NULL
 - coach_win_percentage: decimal
 - Relationships: 1:M relationship between coaches and coach_team_relations is implemented with coach_id as a FK inside of coach_team_relations
- **coach_team_relations:** stores the details (via intersection table) of a basketball coach for a team (e.g. Phil Jackson of the '95-'96 Chicago Bulls)
 - coach_team_id: auto_increment, unique, not NULL, primary key (PK)
 - player_id: int, not NULL, foreign key (FK)
 - team_id: int, not NULL, foreign key (FK)
 - Relationships: 1:M relationship between teams and coach_team_relations is implemented with team_id as a FK inside of coach_team_relations
 - Relationships: 1:M relationship between coaches and coach_team_relations is implemented with coach_id as a FK inside of coach_team_relations

Entity-Relationship (ER) Diagram (Final Version)



Schema (Final Version)



UI Screen Shots with Informative Titles

Homepage

Home | League Histories | Seasons | Teams | Players | Coaches | Player Team Relations | Coach Team Relations

Basketball Statistics Database

League Histories

Represents the complete history of a basketball organization. Allows the user to view, add, delete, and update leagues.
E.g. The National Basketball Association (NBA).

Seasons

Represents a single season of a basketball organization. Allows the user to view, add, delete, and update seasons.
E.g. The 1995-1996 NBA Season

Teams

Represents an individual team within a single season. Allows the user to view, add, delete, and update teams.
E.g. The 1995-1996 Chicago Bulls.

Players

Represents an individual player of a single team (within a single season). Allows the user to view, add, delete, and update players.
E.g. Michael Jordan of the 1995-1996 Chicago Bulls.

Coaches

Represents an individual coach of a single team (within a single season). Allows the user to view, add, delete, and update coaches.
E.g. Phil Jackson of the 1995-1996 Chicago Bulls.

Player Team Relations

Represents the playing relationship between an individual player and a single team (within a single season). Allows the user to view, add, delete, and update player team relations.
E.g. Michael Jordan's playing tenure for the 1995-1996 Chicago Bulls.

Coach Team Relations

Represents the coaching relationship between an individual coach and a single team (within a single season). Allows the user to view, add, delete, and update coach team relations.
E.g. Phil Jackson's coaching tenure for the 1995-1996 Chicago Bulls.

League Histories READ + CREATE + DELETE page

Home | League Histories | Seasons | Teams | Players | Coaches | Player Team Relations | Coach Team Relations

League Histories

This is the page for the League Histories table. Here, you are able to view, edit, delete, and add a row on to the table.
Here is the table for League Histories:

League ID	League Name	Number of Completed Seasons	Edit	Delete
1	NBA	74	Edit	Delete
2	WNBA	24	Edit	Delete
3	Euroleague	63	Edit	Delete

Add a league to the table:

League Name	Number of Completed Seasons
<input type="text"/>	<input type="text"/>
<input type="button" value="Add"/>	

Seasons READ + CREATE + DELETE page

Home | League Histories | Seasons | Teams | Players | Coaches | Player Team Relations | Coach Team Relations

Seasons

This is the page for the Seasons table. Here, you are able to view, edit, delete, and add a row on to the table.
Seasons Legend

- MVP - Most Valuable Player
- DPOY - Defensive Player of the Year
- MIP - Most Improved Player of the Year
- 6MOY - Sixth Man of the Year

Here is the table for Seasons:

Season ID	League ID	Season Name	Season Start Date	Season End Date	Champions	Western Champions	Eastern Champions	MVP	DPOY	MIP	6MOY	Edit	Delete
1	1	2000-2001	2000-10-31	2001-04-18	Los Angeles Lakers	Los Angeles Lakers	Philadelphia 76ers	Allen Iverson	Dikembe Mutombo	Tracy McGrady	Aaron McKie	Edit	Delete
2	1	2005-2006	2005-11-01	2006-04-19	Miami Heat	Dallas Mavericks	Miami Heat	Steve Nash	Ben Wallace	Boris Diaw	Mike Miller	Edit	Delete
3	1	2010-2011	2010-10-26	2011-04-13	Dallas Mavericks	Dallas Mavericks	Miami Heat	Derrick Rose	Dwight Howard	Kevin Love	Lamar Odom	Edit	Delete

Add a season to the table:

League ID	Season Name	Season Start Date	Season End Date	Champions	Western Champions	Eastern Champions	MVP	DPOY	MIP	6MOY
1 (NBA)	<input type="text"/>	<input type="text" value="mm / dd / yyyy"/>	<input type="text" value="mm / dd / yyyy"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
<input type="button" value="Add"/>										

Teams READ + CREATE + DELETE page

Home | League Histories | Seasons | Teams | Players | Coaches | Player Team Relations | Coach Team Relations

Teams

This is the page for the Teams table. Here, you are able to view, edit, delete, and add a row on to the table.

Teams Legend

- PPG - Points Per Game
- APG - Assists Per Game
- SPG - Steals Per Game
- BPG - Blocks Per Game
- RPG - Rebounds Per Game
- PF - Personal Fouls Per Game
- FGA - Field Goals Attempted Per Game
- 3PA - Three Point Field Goals Attempted Per Game
- FTA - Free Throws Attempted Per Game
- FG% - Field Goal Percentage
- 3P% - Three Point Field Goal Percentage
- FT% - Free Throw Percentage
- +/- - Point Differential
- W - Wins
- L - Losses
- W/L% - Win Loss Percentage

Here is the table for Teams:

Team ID	Season ID	Team Name	Team City	Team State	PPG	APG	SPG	BPG	RPG	PF	FGA	3PA	FTA	FG%	3P%	FT%	+/-	W	L	W/L%	Edit	Delete
1	1	Los Angeles Lakers	Los Angeles	California	100.6	23.0	6.9	6.0	44.7	22.8	81.6	15.5	28.5	0.465	0.344	0.683	3.2	56	26	0.683	Edit	Delete
2	2	Miami Heat	Miami	Florida	99.9	20.6	6.4	5.4	43.1	22.8	77.5	17.6	19.7	0.478	0.345	0.700	3.9	52	30	0.634	Edit	Delete
3	3	Dallas Mavericks	Dallas	Texas	100.2	23.8	6.8	4.3	41.5	19.2	78.8	21.6	22.6	0.475	0.365	0.777	4.2	57	25	0.695	Edit	Delete

Add a team to the table:

Add a team to the table:																			
Season ID	Team Name	Team City	Team State	PPG	APG	SPG	BPG	RPG	PF	FGA	3PA	FTA	FG%	3P%	FT%	+/-	W	L	W/L%
1 (2000-2001) ▾																			

Add

Players READ + CREATE + DELETE page

Home | League Histories | Seasons | Teams | Players | Coaches | Player Team Relations | Coach Team Relations

Players

This is the page for the Players table. Here, you are able to view, edit, delete, and add a row on to the table.

Players Legend

- PPG - Points Per Game
- APG - Assists Per Game
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- FTA - Free Throws Attempted Per Game
- FG% - Field Goal Percentage
- 3P% - Three Point Field Goal Percentage
- FT% - Free Throw Percentage
- +/- - Plus Minus

Filter Players by Team: Filter

Here is the table for Players:

Player ID	Team ID	Name	Jersey Number	Height (Ft)	Height (In)	PPG	APG	SPG	BPG	RPG	PF	FGA	3PA	FTA	FG%	3F%	FT%	+/-	Edit	Delete
1	1	Shaquille O'Neal	34	7	1	28.7	3.7	0.6	2.8	12.7	3.5	19.2	0.0	13.1	0.572	0.000	0.513	8.0	Edit	Delete
2	2	Dwyane Wade	3	6	4	27.2	6.7	1.9	0.8	5.7	2.9	18.8	1.0	10.7	0.455	0.171	0.783	8.3	Edit	Delete
3	3	Dirk Nowitzki	41	7	0	23.0	2.6	0.5	0.6	7.0	2.4	16.2	2.3	6.1	0.517	0.393	0.892	10.6	Edit	Delete

Add a player to the table:

Team ID	Name	Jersey Number	Height (Ft)	Height (In)	PPG	APG	SPG	BPG	RPG	PF	FGA	3PA	FTA	FG%	3F%	FT%	+/-
1 (Los Angeles Lakers) ▾																	

Add

Coaches READ + CREATE + DELETE page

Home | League Histories | Seasons | Teams | Players | Coaches | Player Team Relations | Coach Team Relations

Coaches

This is the page for the Coach Team Relations table. Here, you are able to view, edit, delete, and add a row on to the table.

Here is the table for Coaches:

Coach ID	Team ID	Coach Name	Coach Wins	Coach Losses	Coach Win Percentage	Edit	Delete
1	1	Phil Jackson	56	26	0.683	Edit	Delete
2	2	Pat Riley	41	20	0.671	Edit	Delete
3	3	Rick Carlisle	57	25	0.695	Edit	Delete

Add a coach to the table:

Team ID	Coach Name	Coach Wins	Coach Losses	Coach Win Percentage
1 (Los Angeles Lakers) ▾				

Add

Player Team Relations READ + CREATE + DELETE page

[Home](#) | [League Histories](#) | [Seasons](#) | [Teams](#) | [Players](#) | [Coaches](#) | [Player Team Relations](#) | [Coach Team Relations](#)

Player Team Relations

This is the section for the Player Team Relations table. Here, you are able to view, edit, delete, and add a row on to the table

Here is the table for Player Team Relations:

Player-Team ID	Player Name	Player ID	Team Name	Team ID	Edit	Delete
1	Shaquille O'Neal	1	Los Angeles Lakers	1	Edit	Delete
2	Dwyane Wade	2	Miami Heat	2	Edit	Delete
3	Dirk Nowitzki	3	Dallas Mavericks	3	Edit	Delete

Add a player team relation to the table:

Player Name/ID	Team Name/ID
Shaquille O'Neal (Player ID: 1) ▾	Los Angeles Lakers (Team ID: 1) ▾

Add

Coach Team Relations READ + CREATE + DELETE page

[Home](#) | [League Histories](#) | [Seasons](#) | [Teams](#) | [Players](#) | [Coaches](#) | [Player Team Relations](#) | [Coach Team Relations](#)

Coach Team Relations

This is the section for the Coach Team Relations table. Here, you are able to view, edit, delete, and add a row on to the table

Here is the table for Coach Team Relations.

Coach Team ID	Coach Name	Coach ID	Team Name	Team ID	Edit	Delete
1	Phil Jackson	1	Los Angeles Lakers	1	Edit	Delete
2	Pat Riley	2	Miami Heat	2	Edit	Delete
3	Rick Carlisle	3	Dallas Mavericks	3	Edit	Delete

Add a coach team relation to the table:

Coach Name/ID	Team Name/ID
Phil Jackson (Coach ID: 1) ▾	Los Angeles Lakers (Team ID: 1) ▾

Add

League Histories UPDATE page

[Home](#) | [League Histories](#) | [Seasons](#) | [Teams](#) | [Players](#) | [Coaches](#) | [Player Team Relations](#) | [Coach Team Relations](#)

Update League History:

League Name:

Number of Seasons:

Seasons UPDATE page

[Home](#) | [League Histories](#) | [Seasons](#) | [Teams](#) | [Players](#) | [Coaches](#) | [Player Team Relations](#) | [Coach Team Relations](#)

Update Season:

League ID:

Season Name:

Season Start Date:

Season End Date:

Champions:

Western Champions:

Eastern Champions:

Most Valuable Player:

Defensive Player of the Year:

Most Improved Player:

Sixth Man of the Year:

Teams UPDATE page

Update Team:

Season ID: 1 (2000-2001) ▾

Team Name: Los Angeles Lakers

Team Place (City): Los Angeles

Team Place (State): California

Points Per Game: 100.6

Assists Per Game: 23.0

Steals per Game: 6.9

Blocks Per Game: 6.0

Rebounds Per Game: 44.7

Fouls Per Game: 22.8

FG Attempted Per Game: 81.5

3PT FG Attempted Per Game: 15.5

FT Attempted Per Game: 28.5

FG Percentage: 0.465

3PT FG Percentage: 0.344

FT Percentage: 0.683

Point Differential: 3.2

Regular Seasons Wins: 56

Regular Season Losses: 26

Regular Season Win Percentage: 0.683

Submit

Players UPDATE page

Update Player:

Team ID: 1 (Los Angeles Lakers) ▾

Player Name: Shaquille O'Neal

Player Jersey Number: 34

Player Height (Feet): 7

Player Height (inch): 1

Points Per Game: 28.7

Assists Per Game: 3.7

Steals per Game: 0.6

Blocks Per Game: 2.8

Rebounds Per Game: 12.7

Fouls Per Game: 3.5

FG Attempted Per Game: 19.2

3PT FG Attempted Per Game: 6.0

FT Attempted Per Game: 13.1

FG Percentage: 0.572

3PT FG Percentage: 0.000

FT Percentage: 0.513

Plus Minus: 8.0

Submit

Coaches UPDATE page

Update Coach:

Team ID: 1 (Los Angeles Lakers) ▾

Coach Name: Phil Jackson

Coach Wins: 56

Coach Losses: 26

Coach Win Percentage: 0.683

Submit

Player Team Relations UPDATE page

Update Player Team Relation:

Player Name/ID: Shaquille O'Neal (Player ID: 1) ▾

Team Name/ID: Los Angeles Lakers (Team ID: 1) ▾

Submit

Coach Team Relations UPDATE page

Update Coach Team Relation:

Coach Name/ID: Phil Jackson (Coach ID: 1) ▾

Team Name/ID: Los Angeles Lakers (Team ID: 1) ▾

Submit

Players READ (FILTER) page

Filter Players by Team

This is the page to filter for specific players by team.

Players Legend

- PPG - Points Per Game
- APG - Assists Per Game
- SPG - Steals Per Game
- BPG - Blocks Per Game
- RPG - Rebounds Per Game
- PF - Personal Fouls Per Game
- FGA - Field Goals Attempted Per Game
- 3PA - Three Point Field Goals Attempted Per Game
- FTA - Free Throws Attempted Per Game
- FG% - Field Goal Percentage
- 3P% - Three Point Field Goal Percentage
- FT% - Free Throw Percentage
- +/- - Plus Minus

Filter Players by Team:

-- Select Team --

Submit

Here is the table for Players:

Player ID	Team ID	Name	Jersey Number	Height (Ft)	Height (In)	PPG	APG	SPG	BPG	RPG	PF	FGA	3PA	FTA	FG%	3FG%	FT%	+/-	Edit	Delete
1	1	Shaquille O'Neal	34	7	1	28.7	3.7	0.6	2.8	12.7	3.6	19.2	0.0	13.1	0.572	0.000	0.513	0.0	Edit	Delete
2	2	Dwyane Wade	3	6	4	27.2	6.7	1.9	0.8	6.7	2.9	18.9	1.0	10.7	0.496	0.171	0.783	0.3	Edit	Delete
3	3	Dirk Nowitzki	41	7	0	23.0	2.6	0.5	0.6	7.0	2.4	16.2	2.3	6.1	0.517	0.393	0.892	10.6	Edit	Delete