

Project Step 6 Portfolio Assignment

Basketball League Database

Team 175 – Space Balls

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Project URL: <https://nba-manager.vercel.app/>

Table of Contents

<i>Executive Summary</i>	<i>2</i>
Actions based on Project Feedback	2
Updates from Previous Drafts	2
<i>Project Outline / Overview</i>	<i>3</i>
<i>Database Outline</i>	<i>4</i>
<i>Entity Relationship (ER) Diagram</i>	<i>5</i>
<i>Schema</i>	<i>6</i>
<i>Sample Data Figures</i>	<i>7</i>
<i>UI Screen Shots with Informative Titles</i>	<i>10</i>
<i>Data Definition Queries.....</i>	<i>12</i>
<i>Data Manipulation Queries.....</i>	<i>12</i>

Executive Summary

This database was initially designed for a large basketball league to manage players, coaches, and rosters. Over the course of the project, we stayed true to our original visions but adopted changes to our structure and which data elements were in our final database. These changes allows us to produce a final product was responsive, intuitive, and allows all CRUD functions. The project went through the process of database design, creation of the SQL database, frontend design, then finally we did an front end and backend overhaul when we shifted from MySQL/Node.js to SQLite/Next.js.

Actions based on Project Feedback

Initially, we sent out with the vision of having coaches, players, teams, rosters, and playoff rounds. While this goal was ambitious and loved by our peers, we found that it was significantly harder to implement. We saw much of this during the project feedback stages. Below, we have made a brief list of all major actions taken based on the feedback from the initial project to now.

- Our peers suggested reducing the players from 15 per team to 5. This would greatly help reduce the size of the database, while maintaining enough players for functionality.
- The removal of the *coaches* entity was suggest by our TA. While the coaches would have neem great, it exceeded the scope of the project. Therefore, we removed it to focus on the core of the project.
- Removing a player's position. We found this was an unnecessary element based on peer feedback. It would be best to implement if we had time later in the project.
- For normalization, we expanded on the removal of elements that were redundant. This predominantly applied to the *Playoff Round* column in the *Rosters* table. Since a team had to pass through the semifinals to get to the finals, we made this column only reflective of the team's last game of the season. This also moved removed the M:N for these items.
- Updates to *CASCADE* allowing deletion of playoff rounds. This would turn the last *Playoff Round* element in *Rosters* to NULL if the playoff round is deleted from the *Playoff Round* table.
- Search and filter functionality added to all tables.
- Reduced teams from 30 to 15. This simplified the database. 30 teams would give us 150 players per year. The removal allows us to focus more of the project scope.

Updates from Previous Drafts

- Moved from Node.js and MySQL to Next.js (REACT) and SQLite. Next.js gave us improved speed and handled full stack development better than Node.js.
- New player additions populate when creating or modifying roster(s).
- Improved speed and fluid operations by changing websites backend. Early versions displayed tabled with significant lag. The team removed redundant SQL requests and simplified table rendering inside of Typescript code to improve user experience.

Project Outline / Overview

A basketball league needs data infrastructure to manage teams and personnel dynamically throughout the year. Players, coaches, and teams need to record which personnel are currently with which teams. The league has 5 starting players per roster with 15 total teams. This can give us up to 75 players per season in the database. Additionally, the league needs prior data to see the history of the teams each year. For this database, we will include the current year, 2023/2024, and the past year 2022/2023. The 2023/2024 season will be referred to as 2023. This naming protocol will be followed for the proceeding years. This will allow us to see the tenure of each individual player in the league. Our database will create entities of each player, team, and roster. This will allow us to easily find, update, or delete items from this data as needed by the organization. Each roster's post-season performance will also be available. This data will contain either none or the furthest round that roster advances to. The database will be accessible from a frontend website that allows an organization to search for a team or player. Historical queries can also be initiated from this site to view a specific team's roster from within the last two years with the possibility to expand to additional years if the league desires.

Database Outline

- **Players:** Stores each NBA player's basic information
 - o **playerID:** (int, auto_increment, unique, not NULL, PK)
 - o **firstName:** (varchar(255), not NULL)
 - o **lastName:** (varchar(255), not NULL)
 - o Relationships:
 - M:N relationship between **Players** and **Rosters** through intersection table **RosterPlayers** using **playerID** as FK.
- **Teams:** Stores each NBA team's basic information
 - o **teamID:** (int, auto_increment, unique, not NULL, PK)
 - o **name:** (varchar(255), not NULL)
 - o **city:** (varchar(255), not NULL)
 - o **state:** (varchar(255), not NULL)
 - o Relationships:
 - 1:M relationship between Teams and Rosters using **teamID** as FK.
- **Rosters:** Stores a team's roster for a specific season
 - o **rosterID:** (int, auto_increment, unique, not NULL, PK)
 - o **year:** (varchar(4), not NULL)
 - o **teamID:** (int, not NULL, FK)
 - o **playoffRoundID:** (int, FK) The last playoff round the roster made that season. Can be NULL.
 - o Relationships:
 - M:N relationship between **Rosters** and **Players** through intersection table **RosterPlayers** using **rosterID** as FK.
 - M:1 relationship between **Rosters** and **Teams** using **teamID** as FK.
 - M:1 relationship between **Rosters** and **PlayoffRounds** using **playoffRoundID** as FK.
 - M:1 relationship between **Rosters** and **Coaches** using **coachID** as FK.
- **PlayoffRounds:** *Stores a rosters last postseason round played. Null will be for no postseason, and champion will be if they won it all.*
 - o **playoffRoundID:** (int, auto_increment, unique, not NULL, PK)
 - o **name:** (varchar(255), not NULL)
 - o Relationships:
 - 1:M relationship between **PlayoffRounds** and **Rosters** using **playoffRoundID** as FK.

Entity Relationship (ER) Diagram

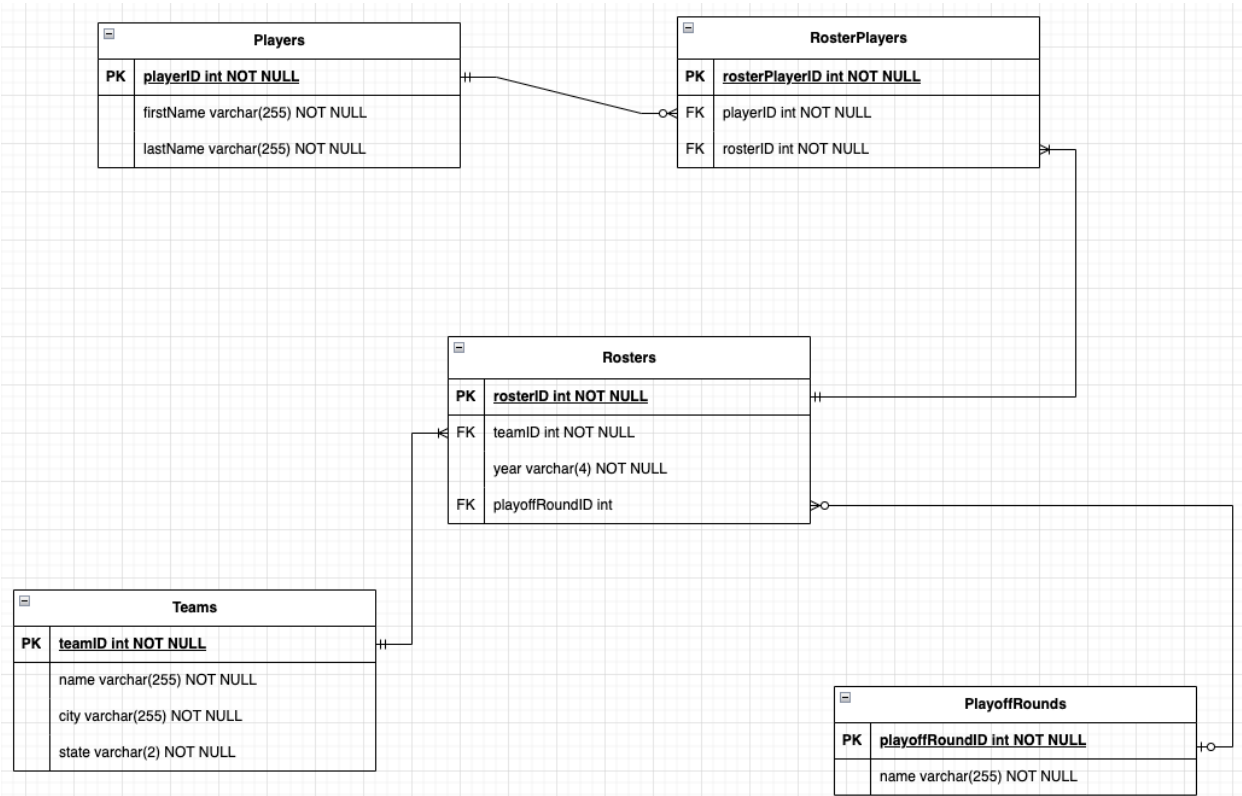


Figure 1: Entity Relationship Diagram for basketball league.

Schema

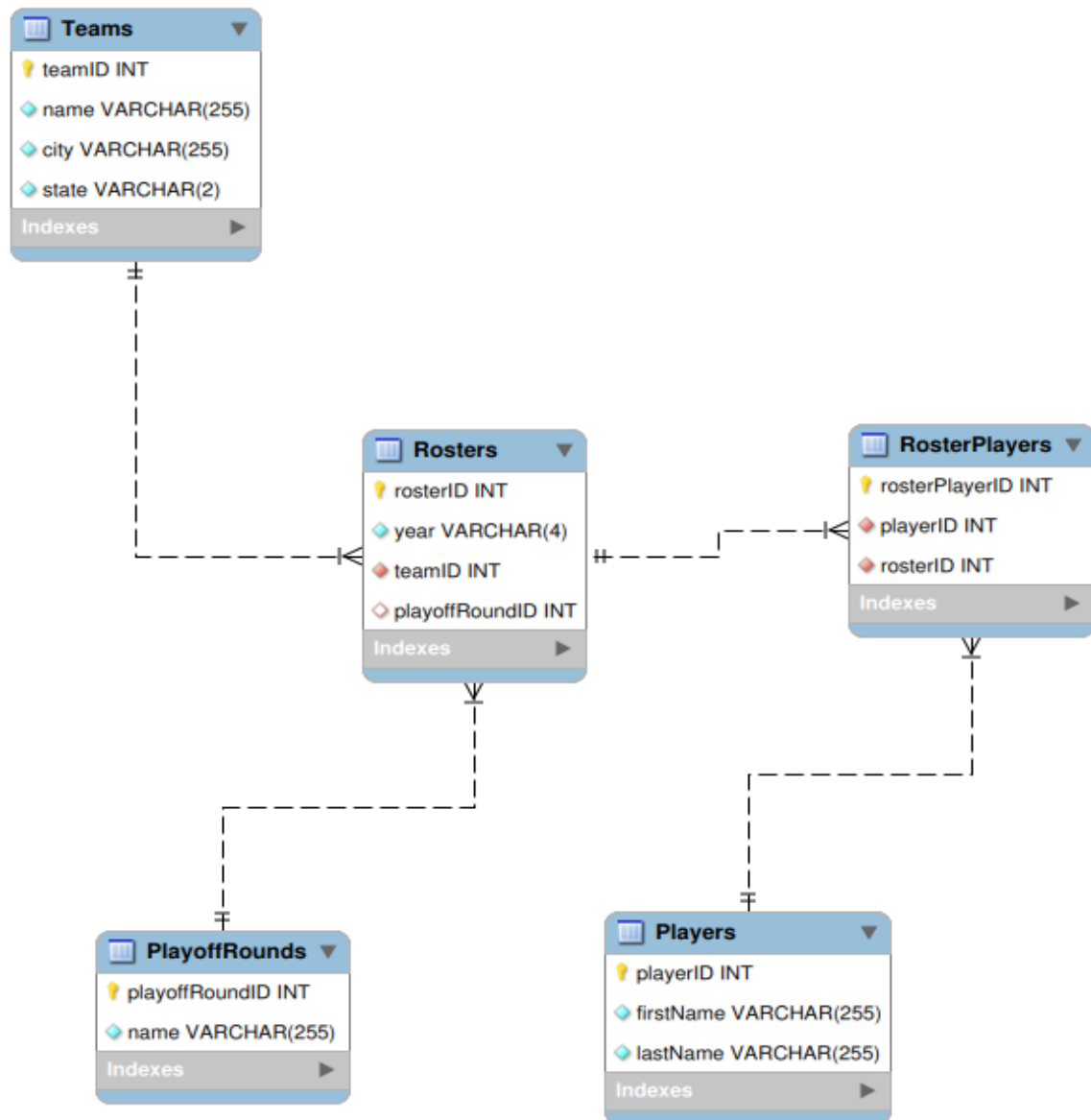


Figure 2: Schema for basketball database.

Sample Data Figures

<div>←T→</div>				playerID	firstName	lastName
<input type="checkbox"/>	 Edit	 Copy	 Delete	1	LeBron	James
<input type="checkbox"/>	 Edit	 Copy	 Delete	2	D'Angelo	Russell
<input type="checkbox"/>	 Edit	 Copy	 Delete	3	Austin	Reaves
<input type="checkbox"/>	 Edit	 Copy	 Delete	4	Anthony	Davis
<input type="checkbox"/>	 Edit	 Copy	 Delete	5	Rui	Hachimura
<input type="checkbox"/>	 Edit	 Copy	 Delete	6	Jarred	Vanderbilt
<input type="checkbox"/>	 Edit	 Copy	 Delete	7	Jrue	Holiday
<input type="checkbox"/>	 Edit	 Copy	 Delete	8	Derrick	White
<input type="checkbox"/>	 Edit	 Copy	 Delete	9	Jaylen	Brown
<input type="checkbox"/>	 Edit	 Copy	 Delete	10	Jayson	Tatum
<input type="checkbox"/>	 Edit	 Copy	 Delete	11	Kristaps	Porzingis
<input type="checkbox"/>	 Edit	 Copy	 Delete	12	Marcus	Smart
<input type="checkbox"/>	 Edit	 Copy	 Delete	13	Al	Hortford

Figure 3: Players Table













<div>←T→</div>				playoffRoundID	name
<input type="checkbox"/>	 Edit	 Copy	 Delete	3	Conference Finals
<input type="checkbox"/>	 Edit	 Copy	 Delete	2	Conference Semifinals
<input type="checkbox"/>	 Edit	 Copy	 Delete	1	First Round
<input type="checkbox"/>	 Edit	 Copy	 Delete	4	NBA Finals

Figure 4: Playoff Round Table

<div><div><div><div></div><div></div><div></div></div><div><div></div><div></div><div></div></div></div><div></div></div>						teamID	name	city	state	
<div><div><div></div></div></div>	<div><div><div></div></div><div></div></div>	Edit	<div><div><div></div></div><div></div></div>	Copy	<div><div><div></div></div><div></div></div>	Delete	1	Clippers	Los Angeles	CA
<div><div><div></div></div></div>	<div><div><div></div></div><div></div></div>	Edit	<div><div><div></div></div><div></div></div>	Copy	<div><div><div></div></div><div></div></div>	Delete	2	Warriors	San Francisco	CA
<div><div><div></div></div></div>	<div><div><div></div></div><div></div></div>	Edit	<div><div><div></div></div><div></div></div>	Copy	<div><div><div></div></div><div></div></div>	Delete	3	76ers	Philadelphia	PA
<div><div><div></div></div></div>	<div><div><div></div></div><div></div></div>	Edit	<div><div><div></div></div><div></div></div>	Copy	<div><div><div></div></div><div></div></div>	Delete	4	Suns	Phoenix	AZ
<div><div><div></div></div></div>	<div><div><div></div></div><div></div></div>	Edit	<div><div><div></div></div><div></div></div>	Copy	<div><div><div></div></div><div></div></div>	Delete	5	Thunder	Oklahoma City	OK
<div><div><div></div></div></div>	<div><div><div></div></div><div></div></div>	Edit	<div><div><div></div></div><div></div></div>	Copy	<div><div><div></div></div><div></div></div>	Delete	6	Spurs	San Antonio	TX
<div><div><div></div></div></div>	<div><div><div></div></div><div></div></div>	Edit	<div><div><div></div></div><div></div></div>	Copy	<div><div><div></div></div><div></div></div>	Delete	7	Mavericks	Dallas	TX
<div><div><div></div></div></div>	<div><div><div></div></div><div></div></div>	Edit	<div><div><div></div></div><div></div></div>	Copy	<div><div><div></div></div><div></div></div>	Delete	8	Bulls	Chicago	IL
<div><div><div></div></div></div>	<div><div><div></div></div><div></div></div>	Edit	<div><div><div></div></div><div></div></div>	Copy	<div><div><div></div></div><div></div></div>	Delete	9	Nets	Brooklyn	NY
<div><div><div></div></div></div>	<div><div><div></div></div><div></div></div>	Edit	<div><div><div></div></div><div></div></div>	Copy	<div><div><div></div></div><div></div></div>	Delete	10	Wizards	Washington	DC
<div><div><div></div></div></div>	<div><div><div></div></div><div></div></div>	Edit	<div><div><div></div></div><div></div></div>	Copy	<div><div><div></div></div><div></div></div>	Delete	11	Knicks	New York	NY
<div><div><div></div></div></div>	<div><div><div></div></div><div></div></div>	Edit	<div><div><div></div></div><div></div></div>	Copy	<div><div><div></div></div><div></div></div>	Delete	12	Bucks	Milwaukee	WI
<div><div><div></div></div></div>	<div><div><div></div></div><div></div></div>	Edit	<div><div><div></div></div><div></div></div>	Copy	<div><div><div></div></div><div></div></div>	Delete	13	Hawks	Atlanta	GA
<div><div><div></div></div></div>	<div><div><div></div></div><div></div></div>	Edit	<div><div><div></div></div><div></div></div>	Copy	<div><div><div></div></div><div></div></div>	Delete	14	Lakers	Los Angeles	CA
<div><div><div></div></div></div>	<div><div><div></div></div><div></div></div>	Edit	<div><div><div></div></div><div></div></div>	Copy	<div><div><div></div></div><div></div></div>	Delete	15	Celtics	Boston	MA

Figure 5: Teams Table


← T →				rosterID	year	teamID	playoffRoundID
<input type="checkbox"/>	 Edit	 Copy	 Delete	1	2023	1	NULL
<input type="checkbox"/>	 Edit	 Copy	 Delete	2	2023	2	NULL
<input type="checkbox"/>	 Edit	 Copy	 Delete	3	2023	3	NULL
<input type="checkbox"/>	 Edit	 Copy	 Delete	4	2023	4	NULL
<input type="checkbox"/>	 Edit	 Copy	 Delete	5	2023	5	NULL
<input type="checkbox"/>	 Edit	 Copy	 Delete	6	2023	6	1
<input type="checkbox"/>	 Edit	 Copy	 Delete	7	2023	7	1
<input type="checkbox"/>	 Edit	 Copy	 Delete	8	2023	8	2
<input type="checkbox"/>	 Edit	 Copy	 Delete	9	2023	9	2
<input type="checkbox"/>	 Edit	 Copy	 Delete	10	2023	10	2
<input type="checkbox"/>	 Edit	 Copy	 Delete	11	2023	11	2
<input type="checkbox"/>	 Edit	 Copy	 Delete	12	2023	12	3
<input type="checkbox"/>	 Edit	 Copy	 Delete	13	2023	13	3
<input type="checkbox"/>	 Edit	 Copy	 Delete	14	2023	14	4
<input type="checkbox"/>	 Edit	 Copy	 Delete	15	2023	15	4

Figure 6: Roster Table

























← T →				rosterPlayerID	playerID	rosterID
<input type="checkbox"/>	 Edit	 Copy	 Delete	1	1	1
<input type="checkbox"/>	 Edit	 Copy	 Delete	2	1	2
<input type="checkbox"/>	 Edit	 Copy	 Delete	3	1	3
<input type="checkbox"/>	 Edit	 Copy	 Delete	4	1	4
<input type="checkbox"/>	 Edit	 Copy	 Delete	5	1	5
<input type="checkbox"/>	 Edit	 Copy	 Delete	6	2	6
<input type="checkbox"/>	 Edit	 Copy	 Delete	7	2	7
<input type="checkbox"/>	 Edit	 Copy	 Delete	8	2	8

Figure 7: RosterPlayer join table

UI Screen Shots with Informative Titles

Figure 8: CRUD for Rosters. CREATE/READ/UPDATE/DELETE Rosters.

The figure displays three UI screens for managing basketball rosters. The 'Browse Rosters' screen features a 'CREATE' button to add new rosters, filter toggles for Year, Team, Playoff Round, and Players, and a search bar. It contains a table of rosters with columns for ID, Year, Team, Playoff Round, Players, and Actions (Edit, Delete). Annotations highlight a 'NULLABLE RELATIONSHIP' for the Playoff Round and 'UPDATE FUNCTION' and 'DELETE FUNCTION' for the Actions. The 'Add New Roster' screen shows input fields for Year, Team, Playoff Round (with a 'NULLABLE RELATIONSHIP' annotation), and Players (with a 'MANY TO MANY RELATIONSHIP' annotation). The 'Edit Roster' screen shows fields for Year, Team, Playoff Round (with a 'NULLABLE RELATIONSHIP' annotation), and a list of selected players.

ID	Year	Team	Playoff Round	Players	Actions
8	2023	Chicago Bulls	NULLABLE RELATIONSHIP	Kawhi bc, Zach LaVine, DeMar DeRozan, Lonzo Ball, Nikola Vucevic	Edit Delete
9	2023	Brooklyn Nets	-	Ben Simmons, Cameron Johnson, Mikal Bridges, Dorian Finney-Smith, Dennis Schroder	Edit Delete
10	2023	Washington Wizards	-	Jordan Poole, Kyle Kuzma, Tyus Jones, Marvin Bagley, Richaun Holmes	Edit Delete
11	2023	New York Knicks	-	Julius Randle, Jalen Brunson, OG Anunoby, Bojan Bogdanovic, Mitchell Robinson	Edit Delete
12	2023	Milwaukee Bucks	Conference Finals	Giannis Antetokounmpo, Thanasis Antetokounmpo, Damian Lillard, Khris Middleton, Brook Lopez	Edit Delete
13	2023	Atlanta Hawks	Conference Finals	Trae Young, Clint Capela, DeAndre Hunter, Bogdan Bogdanovic, Dejonte Murray	Edit Delete

Figure 9: CRUD for Players. CREATE/READ/UPDATE/DELETE Players.

The figure displays three UI screens for managing basketball players. The 'Browse Players' screen features a 'CREATE' button to add new players, filter toggles for First Name and Last Name, and a search bar. It contains a table of players with columns for ID, First Name, Last Name, and Actions (Edit, Delete). Annotations highlight 'UPDATE FUNCTION' and 'DELETE FUNCTION' for the Actions. The 'Add New Player' screen shows input fields for First Name and Last Name. The 'Edit Player' screen shows input fields for First Name and Last Name.

ID	First Name	Last Name	Actions
2	Kawhi	bc	Edit Delete UPDATE FUNCTION DELETE FUNCTION
3	James	Harden	Edit Delete
5	P.J.	Tucker	Edit Delete
6	Stephen	Curry	Edit Delete
7	Klay	Thompson	Edit Delete

Figure 10: CRUD for Teams. CREATE/READ/UPDATE/DELETE Teams

Browse Team

CREATE

Add New Team

☒ Show Name
 ☒ Show City
 ☒ Show State

Search by value

Lakers, Los Angeles, etc

BROWSE DATA

ID	Name	City	State (ABR)	Actions
3	76ers	Philadelphia	ND	<div>Edit</div> <div>Delete</div> <div>UPDATE FUNCTION</div>
4	Suns	Phoenix	AZ	<div>Edit</div> <div>Delete</div> <div>DELETE FUNCTION</div>
5	Thunder	Oklahoma City	OK	<div>Edit</div> <div>Delete</div>
6	Spurs	San Antonio	TX	<div>Edit</div> <div>Delete</div>
7	Mavericks	Dallas	TX	<div>Edit</div> <div>Delete</div>
8	Bulls	Chicago	IL	<div>Edit</div> <div>Delete</div>

Add New Team

Name *

Goshornets

City *

Hartem

State *

NY

Cancel

Apply

Edit Team

Name *

76ers

City *

Philadelphia

State *

PA

Cancel

Apply

Figure 11:CRUD for Playoff Rounds. CREATE/READ/UPDATE/DELETE Playoff Rounds

Browse Playoff Rounds

CREATE

Add New Playoff Round

☒ Show Name

Search by value

NBA Finals, Finals, etc

BROWSE DATA

ID	Name	Actions
1	testFirstRound	<div>Edit</div> <div>Delete</div> <div>UPDATE FUNCTION</div>
3	Conference Finals	<div>Edit</div> <div>Delete</div> <div>DELETE FUNCTION Cascade to Rosters</div>
8	testRound	<div>Edit</div> <div>Delete</div>

Add New Playoff Round

Name *

Championship

Cancel

Apply

Edit Playoff Round

Name *

testFirstRound

Cancel

Apply

Data Definition Queries

Please see enclosed document DDL.sql for full code.

```
INSERT INTO
  Teams (name, city, state)
VALUES
  ('Clippers', 'Los Angeles', 'CA'),
  ('Warriors', 'San Francisco', 'CA'),
  ('76ers', 'Philadelphia', 'PA'),
  ('Suns', 'Phoenix', 'AZ'),
  ('Thunder', 'Oklahoma City', 'OK'),
  ('Spurs', 'San Antonio', 'TX'),
  ('Mavericks', 'Dallas', 'TX'),
  ('Bulls', 'Chicago', 'IL'),
  ('Nets', 'Brooklyn', 'NY'),
  ('Wizards', 'Washington', 'DC'),
  ('Knicks', 'New York', 'NY'),
  ('Bucks', 'Milwaukee', 'WI'),
  ('Hawks', 'Atlanta', 'GA'),
  ('Lakers', 'Los Angeles', 'CA'),
  ('Celtics', 'Boston', 'MA');
```

```
INSERT INTO
  PlayoffRounds (name)
VALUES
  ('First Round'),
  ('Conference Semifinals'),
  ('Conference Finals'),
  ('NBA Finals');
```

Figure 12: Snippet of DDL.sql for this project.

Data Manipulation Queries

Please see enclosed document DML.sql for full code.

```
-- INSERT --
INSERT INTO PlayoffRounds (name) VALUES (:nameInput);

-- UPDATE --
UPDATE PlayoffRounds SET name=:nameInput WHERE playoffRoundID=:playoffRoundIDInput;

-- DELETE --
DELETE FROM PlayoffRounds WHERE playoffRoundID=:playoffRoundIDInput;

-- Rosters / RosterPlayers --
-- SELECT --
-- Full roster with associated team, playoff round, and players
SELECT
  r.rosterID,
  r.teamID,
  r.playoffRoundID,
  r.year,
  t.name AS teamName,
  t.city AS teamCity,
  t.state AS teamState,
  pr.name AS playoffRoundName,
  p.playerID AS playerID,
  p.firstName AS playerFirstName,
  p.lastName AS playerLastName,
FROM Rosters AS r
  JOIN Teams AS t ON r.teamID = t.teamID
  LEFT OUTER JOIN PlayoffRounds AS pr ON pr.playoffRoundID = r.playoffRoundID
  LEFT OUTER JOIN RosterPlayers AS rp ON rp.rosterID = r.rosterID
  LEFT OUTER JOIN Players AS p ON rp.playerID = p.playerID
ORDER BY r.year, t.name;
```

Figure 13: Snippet of DML.sql for this project.

