# CPSC 304 Project Cover Page

Milestone #: _____4_____

Date: 2022-11-25

Group Number: 08

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By typing our names and student numbers in the above table, we certify that the work in the attached assignment was performed solely by those whose names and student IDs are included above.  (In the case of Project Milestone 0, the main purpose of this page is for you to let us know your e-mail address, and then let us assign you to a TA for your project supervisor.)

In addition, we indicate that we are fully aware of the rules and consequences of plagiarism, as set forth by the Department of Computer Science and the University of British Columbia.

**University of British Columbia, Vancouver**
Department of Computer Science

# Contents

**University of British Columbia, Vancouver**
Department of Computer Science

## Project Overview

Our group successfully completed a full stack web project, where we designed and built an NBA Fan Page to bring maximum relevant information to user/fans from data available to us, using ORACLE Database and SQL. In detail, we:
- Conceptually model the database in ER Diagram
- Logically model the database in the relational model
- Normalize the database relations
- Generated tables and insert data in ORACLE Database using SQL statements
- Designed, tested, and implemented SQL queries on ORACLE Database based on user inputs
- Designed user-interface using HTML and PHP

## Change of Schema

We did not change the overall schema for the project. However, we did fix the problem in SQL DDL that pointed out by our TA, Sharon He, in Milestone 2 feedbacks. These changes including adding NOT NULL constraints to teamID for Player, Fan, Boss, and Staff.

## Schema and SQL Script

```
CREATE TABLE Certificate_Wage (
        certificate CHAR(100) PRIMARY KEY,
        minimumWage INT
);
```

| | CERTIFICATE | MINIMUMWAGE |
|---|---|---|
| 1 | Entry | 100000 |
| 2 | Intermediate | 200000 |
| 3 | Advanced | 400000 |
| 4 | Proficient | 800000 |
| 5 | Expert | 1600000 |

```
CREATE TABLE PostalCode_Location (
        postalCode CHAR(100) PRIMARY KEY,
        state CHAR(100),
        city CHAR(100),
        address CHAR(100)
);
```

| | POSTALCODE | STATE | CITY | ADDRESS |
|---|---|---|---|---|
| 1 | 02114 | Massachusetts | Boston | 100 Legends Way |
| 2 | 11207 | New York | Brooklyn | 620 Atlantic Avenue |
| 3 | 10001 | New York | Manhattan | 4 Pennsylvania Plaza |
| 4 | 19148 | Pennsylvania | Philadelphia | 3601 South Broad Street |
| 5 | M5J 2X2 | Ontario | Toronto | 40 Bay Street |
| 6 | 60612 | Illinois | Chicago | 1901 West Madison Street |
| 7 | 44115 | Ohio | Cleveland | 1 Center Court |
| 8 | 48201 | Michigan | Detroit | 2645 Woodland Avenue |
| 9 | 46204 | Indiana | Indianapolis | 125 South Pennsylvania Street |
| 10 | 53203 | Wisconsin | Milwaukee | 1111 Vel R. Phillips Avenue |
| 11 | 30303 | Georgia | Atlanta | 1 State Farm Drive |
| 12 | 28202 | North Carolina | Charlotte | 333 East Trade Street |
| 13 | 33132 | Florida | Miami | 601 Biscayne Boulevard |
| 14 | 32805 | Florida | Orlando | 400 West Church Street |
| 15 | 20004 | District of Columbia | Washington | 601 F. Street Northwest |
| 16 | 80204 | Colorado | Denver | 1000 Chopper Circle |
| 17 | 55403 | Minnesota | Minneapolis | 600 First Avenue North |
| 18 | 73102 | Oklahoma | Oklahoma City | 100 West Reno Avenue |
| 19 | 97227 | Oregon | Portland | 1 Center Court |
| 20 | 84101 | Utah | Salt Lake City | 301 South Temple |
| 21 | 94158 | California | San Francisco | 1 Warriors Way |
| 22 | 90015 | California | Los Angeles | 1111 South Figueroa Street |
| 23 | 85004 | Arizona | Phoenix | 201 East Jefferson Street |
| 24 | 95814 | California | Sacramento | 500 David J. Stern Walk |
| 25 | 75219 | Texas | Dallas | 2500 Victory Avenue |
| 26 | 77002 | Texas | Houston | 1510 Polk Street |
| 27 | 38103 | Tennessee | Memphis | 191 Beale Street |
| 28 | 70113 | Louisiana | New Orleans | 1501 Dave Dixon Drive |
| 29 | 78219 | Texas | San Antonio | 1 AT&T Center Parkway |

```
CREATE TABLE Stadium_Location(
        stadiumName CHAR(100) PRIMARY KEY,
        postalCode CHAR(100),
        address CHAR(100),
        FOREIGN KEY (postalCode) REFERENCES PostalCode_Location(postalCode)
);
```

| | STADIUMNAME | POSTALCODE | ADDRESS |
|---|---|---|---|
| 1 | TD Garden | 02114 | 100 Legends Way |
| 2 | Barclays Center | 11207 | 620 Atlantic Avenue |
| 3 | Madison Square Garden | 10001 | 4 Pennsylvania Plaza |
| 4 | Wells Fargo Center | 19148 | 3601 South Broad Street |
| 5 | Scotiabank Arena | M5J 2X2 | 40 Bay Street |
| 6 | United Center | 60612 | 1901 West Madison Street |
| 7 | Rocket Mortgage FieldHouse | 44115 | 1 Center Court |
| 8 | Little Caesars Arena | 48201 | 2645 Woodland Avenue |
| 9 | Gainbridge Fieldhouse | 46204 | 125 South Pennsylvania Street |
| 10 | Fiserv Forum | 53203 | 1111 Vel R. Phillips Avenue |
| 11 | State Farm Arena | 30303 | 1 State Farm Drive |
| 12 | Spectrum Center | 28202 | 333 East Trade Street |
| 13 | FTX Arena | 33132 | 601 Biscayne Boulevard |
| 14 | Amway Center | 32805 | 400 West Church Street |
| 15 | Capital One Arena | 20004 | 601 F. Street Northwest |
| 16 | Ball Arena | 80204 | 1000 Chopper Circle |
| 17 | Target Center | 55403 | 600 First Avenue North |
| 18 | Paycom Center | 73102 | 100 West Reno Avenue |
| 19 | Moda Center | 97227 | 1 Center Court |
| 20 | Vivint Arena | 84101 | 301 South Temple |
| 21 | Chase Center | 94158 | 1 Warriors Way |
| 22 | Crypto.com Arena | 90015 | 1111 South Figueroa Street |
| 23 | Footprint Center | 85004 | 201 East Jefferson Street |
| 24 | Golden 1 Center | 95814 | 500 David J. Stern Walk |
| 25 | American Airlines Center | 75219 | 2500 Victory Avenue |
| 26 | Toyota Center | 77002 | 1510 Polk Street |
| 27 | FedEx Forum | 38103 | 191 Beale Street |
| 28 | Smoothie King Center | 70113 | 1501 Dave Dixon Drive |
| 29 | AT&T Center | 78219 | 1 AT&T Center Parkway |

```
CREATE TABLE Team_Sponsors_Stadium (
        teamID INT PRIMARY KEY,
        stadiumName CHAR(100) NOT NULL,
        foundedYear INT,
        teamName CHAR(100),
        sponserName CHAR(100) NOT NULL,
        fundingPerYear INT,
        FOREIGN KEY (stadiumName) REFERENCES Stadium_Location(stadiumName)
);
```

| TEAMID | STADIUMNAME | FOUNDEDYEAR | TEAMNAME | SPONSERNAME | FUNDINGPERYEAR |
|---|---|---|---|---|---|
| 1 | TD Garden | 1946 | Boston Celtics | Vistaprint | 1000 |
| 2 | Barclays Center | 1967 | Brooklyn Nets | Webull | 900 |
| 3 | Madison Square Garden | 1946 | New York Knicks | Squarespace | 800 |
| 4 | Wells Fargo Center | 1946 | Philadelphia 76ers | Crypto.com | 1000 |
| 5 | Scotiabank Arena | 1995 | Toronto Raptors | Sun Life Financial | 1100 |
| 6 | United Center | 1966 | Chicago Bulls | Zenni Optical | 1200 |
| 7 | Rocket Mortgage FieldHouse | 1970 | Cleveland Cavaliers | Goodyear Tire and Rubber Company | 1000 |
| 8 | Little Caesars Arena | 1941 | Detroit Pistons | United Wholesale Mortgage | 1300 |
| 9 | Gainbridge Fieldhouse | 1967 | Indiana Pacers | Motorola | 800 |
| 10 | Fiserv Forum | 1968 | Milwaukee Bucks | Motorola | 1000 |
| 11 | State Farm Arena | 1946 | Atlanta Hawks | Sharecare | 900 |
| 12 | Spectrum Center | 1988 | Charlotte Hornets | LendingTree | 1000 |
| 13 | FTX Arena | 1988 | Miami Heat | Ultimate Kronos Group | 1000 |
| 14 | Amway Center | 1989 | Orlando Magic | Walt Disney World | 900 |
| 15 | Capital One Arena | 1961 | Washington Wizards | Calvin Klein | 900 |
| 16 | Ball Arena | 1967 | Denver Nuggets | Western Union | 1000 |
| 17 | Target Center | 1989 | Minnesota Timberwolves | Aura | 900 |
| 18 | Paycom Center | 1967 | Oklahoma City Thunder | Love's Travel Stops & Country Stores | 1200 |
| 19 | Moda Center | 1970 | Portland Trail Blazers | StormX | 1100 |
| 20 | Vivint Arena | 1974 | Utah Jazz | Qualtrics | 1000 |
| 21 | Chase Center | 1946 | Golden State Warriors | Rakuten | 1000 |
| 22 | Crypto.com Arena | 1970 | Los Angeles Clippers | Honey | 1300 |
| 23 | Crypto.com Arena | 1947 | Los Angeles Lakers | Bibigo | 1000 |
| 24 | Footprint Center | 1968 | Phoenix Suns | PayPal | 1000 |
| 25 | Golden 1 Center | 1923 | Sacramento Kings | Dialpad | 800 |
| 26 | American Airlines Center | 1980 | Dallas Mavericks | Chime | 1000 |
| 27 | Toyota Center | 1967 | Houston Rockets | Credit Karma | 700 |
| 28 | FedEx Forum | 1995 | Memphis Grizzlies | Bose | 700 |
| 29 | Smoothie King Center | 2002 | New Orleans Pelicans | Ibotta | 1000 |
| 30 | AT&T Center | 1967 | San Antonio Spurs | Frost Bank | 1000 |

```
CREATE TABLE Player (
        playerID INT PRIMARY KEY,
        teamID INT NOT NULL,
        playerName CHAR(100),
        birthdate DATE,
        jerseyNum INT NOT NULL,
        salary INT,
        appearance INT,
        threePointer INT,
        midRange INT,
        paint INT,
        UNIQUE (teamID, jerseyNum),
        FOREIGN KEY (teamID) REFERENCES Team_Sponsors_Stadium (teamID) ON DELETE
CASCADE
);
```

| | PLAYERID | TEAMID | PLAYERNAME | BIRTHDATE | JERSEYNUM | SALARY | APPEARANCE | THREEPOINTER | MIDRANGE | PAINT |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 1 | 1 | Brown, Jaylen | 1996-10-24 | 7 | 300 | 354 | 312 | 584 | 416 |
| 2 | 2 | 2 | Curry, Seth | 1990-08-23 | 30 | 400 | 324 | 310 | 684 | 326 |
| 3 | 3 | 3 | Arcidiacono, Ryan | 1994-03-26 | 51 | 250 | 302 | 410 | 664 | 356 |
| 4 | 4 | 4 | Bassey, Charles | 2000-10-28 | 23 | 300 | 224 | 240 | 689 | 346 |
| 5 | 5 | 5 | Achiuwa, Precious | 1999-09-19 | 5 | 200 | 214 | 350 | 604 | 325 |
| 6 | 6 | 6 | Ball, Lonzo | 1997-10-27 | 2 | 300 | 424 | 410 | 984 | 826 |
| 7 | 7 | 7 | Allen, Jarrett | 1998-04-21 | 31 | 300 | 344 | 262 | 562 | 572 |
| 8 | 8 | 8 | Bey, Saddiq | 1999-04-09 | 41 | 300 | 265 | 245 | 352 | 623 |
| 9 | 9 | 9 | Bitadze, Goga | 1999-07-20 | 88 | 200 | 345 | 245 | 532 | 435 |
| 10 | 10 | 10 | Allen, Grayson | 1995-10-08 | 7 | 250 | 865 | 856 | 747 | 1423 |
| 11 | 11 | 11 | Bogdanovic, Bogdan | 1992-08-18 | 13 | 300 | 332 | 234 | 345 | 456 |
| 12 | 12 | 12 | Ball, LaMelo | 2001-08-22 | 2 | 200 | 143 | 241 | 124 | 142 |
| 13 | 13 | 13 | Adebayo, Bam | 1997-07-18 | 13 | 300 | 345 | 345 | 635 | 365 |
| 14 | 14 | 14 | Anthony, Cole | 2000-05-15 | 50 | 200 | 135 | 234 | 134 | 242 |
| 15 | 15 | 15 | Avdija, Deni | 2001-01-03 | 9 | 250 | 124 | 213 | 231 | 323 |
| 16 | 16 | 16 | Barton, Will | 1991-01-06 | 5 | 400 | 532 | 635 | 763 | 735 |
| 17 | 17 | 17 | Beasley, Malik | 1996-11-26 | 5 | 500 | 578 | 735 | 746 | 855 |
| 18 | 18 | 18 | Bazley, Darius | 2000-06-12 | 7 | 300 | 351 | 521 | 345 | 452 |
| 19 | 19 | 19 | Bledsoe, Eric | 1989-12-09 | 5 | 400 | 525 | 645 | 473 | 746 |
| 20 | 20 | 20 | Alexander-Walker, Nickeil | 1998-09-02 | 6 | 500 | 633 | 745 | 684 | 875 |
| 21 | 21 | 21 | Bjelica, Nemanja | 1988-05-09 | 8 | 600 | 653 | 780 | 805 | 709 |
| 22 | 22 | 22 | Batum, Nicolas | 1988-12-14 | 33 | 550 | 468 | 478 | 568 | 528 |
| 23 | 23 | 23 | Davis, Anthony | 1993-03-11 | 3 | 350 | 452 | 670 | 684 | 852 |
| 24 | 24 | 24 | Ayton, Deandre | 1998-07-23 | 22 | 200 | 342 | 562 | 489 | 379 |
| 25 | 25 | 25 | Barnes, Harrison | 1992-05-30 | 40 | 350 | 479 | 587 | 546 | 462 |
| 26 | 26 | 26 | Bertans, Davis | 1992-11-12 | 44 | 350 | 583 | 782 | 780 | 682 |
| 27 | 27 | 27 | Christopher, Josh | 2001-12-08 | 9 | 200 | 397 | 429 | 420 | 520 |
| 28 | 28 | 28 | Adams, Steven | 1993-07-20 | 4 | 450 | 502 | 689 | 518 | 593 |
| 29 | 29 | 29 | Alvarado, Jose | 1998-04-12 | 15 | 500 | 425 | 637 | 579 | 597 |
| 30 | 30 | 30 | Bates-Diop, Keita | 1996-01-23 | 31 | 300 | 426 | 489 | 509 | 542 |
| 31 | 31 | 1 | Fitts, Malik | 1997-07-04 | 8 | 200 | 300 | 582 | 341 | 481 |
| 32 | 32 | 2 | Durant, Kevin | 1988-09-29 | 7 | 1000 | 581 | 810 | 941 | 894 |
| 33 | 33 | 3 | Barrett, RJ | 2000-06-14 | 9 | 200 | 209 | 240 | 310 | 201 |
| 34 | 34 | 4 | Embiid, Joel | 1994-03-16 | 21 | 300 | 491 | 502 | 492 | 578 |
| 35 | 35 | 5 | Anunoby, OG | 1997-07-17 | 3 | 250 | 149 | 247 | 259 | 261 |
| 36 | 36 | 6 | Bradley, Tony | 1998-08-01 | 13 | 200 | 310 | 368 | 489 | 471 |
| 37 | 37 | 7 | Garland, Darius | 2000-01-26 | 10 | 200 | 204 | 287 | 276 | 280 |
| 38 | 38 | 8 | Cunningham, Cade | 2001-09-25 | 2 | 200 | 183 | 278 | 265 | 247 |
| 39 | 39 | 9 | Brissett, Oshae | 1998-06-20 | 12 | 250 | 268 | 280 | 289 | 324 |
| 40 | 40 | 10 | Antetokounmpo, Giannis | 1994-12-06 | 34 | 300 | 471 | 509 | 591 | 602 |
| 41 | 41 | 11 | Capela, Clint | 1994-05-18 | 15 | 350 | 462 | 489 | 598 | 562 |
| 42 | 42 | 12 | Bouknight, James | 2000-09-18 | 5 | 200 | 376 | 397 | 404 | 407 |
| 43 | 43 | 13 | Dedmon, Dewayne | 1989-08-12 | 21 | 350 | 587 | 698 | 764 | 762 |
| 44 | 44 | 14 | Bamba, Mo | 1998-05-12 | 5 | 250 | 185 | 284 | 283 | 254 |

| 45 | 45 | 15 Beal, Bradley | 1993-06-28 | 3 | 300 | 378 | 474 | 498 | 467 |
| 46 | 46 | 16 Jokic, Nikola | 1995-02-19 | 15 | 1200 | 648 | 893 | 902 | 941 |
| 47 | 47 | 17 Beverley, Patrick | 1988-07-12 | 22 | 350 | 395 | 497 | 502 | 505 |
| 48 | 48 | 18 Dort, Luguentz | 1999-04-19 | 5 | 250 | 287 | 299 | 304 | 314 |
| 49 | 49 | 19 Brown, Greg | 2001-09-01 | 4 | 200 | 135 | 178 | 191 | 167 |
| 50 | 50 | 20 Azubuike, Udoka | 1999-09-17 | 20 | 200 | 120 | 145 | 178 | 176 |
| 51 | 51 | 21 Curry, Stephen | 1988-03-14 | 30 | 1200 | 586 | 798 | 829 | 941 |
| 52 | 52 | 22 Coffey, Amir | 1997-06-17 | 7 | 250 | 198 | 289 | 312 | 300 |
| 53 | 53 | 23 Gabriel, Wenyen | 1997-03-26 | 35 | 250 | 295 | 386 | 378 | 391 |
| 54 | 54 | 24 Biyombo, Bismack | 1992-08-28 | 18 | 350 | 359 | 462 | 398 | 472 |
| 55 | 55 | 25 Davis, Terence | 1997-05-16 | 3 | 250 | 273 | 298 | 303 | 324 |
| 56 | 56 | 26 Brunson, Jalen | 1996-08-31 | 13 | 300 | 358 | 423 | 453 | 476 |
| 57 | 57 | 27 Garuba, Usman | 2002-03-09 | 16 | 200 | 125 | 157 | 187 | 168 |
| 58 | 58 | 28 Anderson, Kyle | 1993-09-20 | 1 | 350 | 428 | 498 | 537 | 552 |
| 59 | 59 | 29 Graham, Devonte' | 1995-02-22 | 4 | 300 | 419 | 498 | 503 | 531 |
| 60 | 60 | 30 Johnson, Keldon | 1999-10-11 | 3 | 300 | 273 | 304 | 324 | 342 |
| 61 | 61 | 1 Hauser, Sam | 1997-12-08 | 30 | 250 | 278 | 341 | 351 | 343 |
| 62 | 62 | 2 Harris, Joe | 1991-09-07 | 12 | 700 | 572 | 724 | 703 | 698 |
| 63 | 63 | 3 Burks, Alec | 1991-07-20 | 18 | 450 | 523 | 682 | 691 | 672 |
| 64 | 64 | 4 Green, Danny | 1987-06-22 | 14 | 900 | 693 | 987 | 894 | 962 |
| 65 | 65 | 5 Banton, Dalano | 1999-11-07 | 45 | 250 | 231 | 341 | 302 | 298 |
| 66 | 66 | 6 Caruso, Alex | 1994-02-28 | 6 | 800 | 472 | 598 | 682 | 703 |
| 67 | 67 | 7 LeVert, Caris | 1994-08-25 | 3 | 350 | 381 | 498 | 487 | 501 |
| 68 | 68 | 8 Diallo, Hamidou | 1998-07-31 | 6 | 250 | 289 | 357 | 387 | 400 |
| 69 | 69 | 9 Brogdon, Malcolm | 1992-12-11 | 7 | 500 | 472 | 598 | 604 | 614 |
| 70 | 70 | 10 Antetokounmpo, Thanasis | 1992-07-18 | 43 | 600 | 572 | 698 | 732 | 743 |
| 71 | 71 | 11 Collins, John | 1997-09-23 | 20 | 300 | 381 | 493 | 487 | 502 |
| 72 | 72 | 12 Hayward, Gordon | 1990-03-23 | 20 | 550 | 413 | 498 | 572 | 563 |
| 73 | 73 | 13 Butler, Jimmy | 1989-09-14 | 22 | 450 | 451 | 587 | 567 | 587 |
| 74 | 74 | 14 Bol, Bol | 1999-11-16 | 10 | 200 | 250 | 213 | 289 | 342 |
| 75 | 75 | 15 Bryant, Thomas | 1997-07-31 | 13 | 300 | 243 | 298 | 305 | 323 |
| 76 | 76 | 16 Gordon, Aaron | 1995-09-16 | 50 | 350 | 387 | 498 | 513 | 543 |
| 77 | 77 | 17 Bolmaro, Leandro | 2000-09-11 | 9 | 200 | 179 | 287 | 298 | 301 |
| 78 | 78 | 18 Favors, Derrick | 1991-07-15 | 15 | 900 | 643 | 870 | 872 | 891 |
| 79 | 79 | 19 Dunn, Kris | 1994-03-18 | 18 | 400 | 245 | 376 | 367 | 391 |
| 80 | 80 | 20 Bogdanovic, Bojan | 1989-04-18 | 44 | 500 | 671 | 872 | 893 | 845 |
| 81 | 81 | 21 Green, Draymond | 1990-03-04 | 23 | 950 | 503 | 798 | 803 | 746 |
| 82 | 82 | 22 Boston, Brandon | 2001-11-28 | 4 | 200 | 143 | 183 | 198 | 204 |
| 83 | 83 | 23 Horton-Tucker, Talen | 2000-11-25 | 5 | 250 | 174 | 304 | 298 | 333 |
| 84 | 84 | 24 Booker, Devin | 1996-10-30 | 1 | 400 | 312 | 478 | 487 | 463 |
| 85 | 85 | 25 DiVincenzo, Donte | 1997-01-31 | 0 | 300 | 259 | 304 | 351 | 326 |
| 86 | 86 | 26 Brown, Sterling | 1995-02-10 | 0 | 300 | 288 | 375 | 380 | 401 |
| 87 | 87 | 27 Gordon, Eric | 1988-12-25 | 10 | 750 | 694 | 798 | 873 | 903 |
| 88 | 88 | 28 Aldama, Santi | 2001-01-10 | 7 | 200 | 113 | 156 | 176 | 147 |
| 89 | 89 | 29 Hayes, Jaxson | 2000-05-23 | 10 | 250 | 181 | 245 | 275 | 253 |
| 90 | 90 | 30 Collins, Zach | 1997-11-19 | 23 | 350 | 321 | 389 | 394 | 425 |

```
CREATE TABLE AwardsAndHonors (
        playerID INT,
        awardName CHAR(100),
        season CHAR(100),
        PRIMARY KEY (playerID, awardName, season),
        FOREIGN KEY (playerID) REFERENCES Player(playerID) ON DELETE CASCADE
);
```

| | PLAYERID | AWARDNAME | SEASON |
|---|---|---|---|
| 1 | 1 | Rookie of the Year | 2020-2021 |
| 2 | 2 | Most Improved | 2020-2021 |
| 3 | 3 | Sixth Man | 2020-2021 |
| 4 | 4 | Defensive Player of Year | 2020-2021 |
| 5 | 5 | Rookie of the Year | 2019-2020 |
| 6 | 6 | Most Improved | 2019-2020 |
| 7 | 7 | Sixth Man | 2019-2020 |
| 8 | 8 | Defensive Player of Year | 2019-2020 |
| 9 | 46 | Defensive Player of Year | 2018-2019 |
| 10 | 46 | MVP | 2019-2020 |
| 11 | 46 | MVP | 2020-2021 |
| 12 | 46 | Most Improved | 2018-2019 |
| 13 | 46 | Rookie of the Year | 2018-2019 |
| 14 | 46 | Sixth Man | 2018-2019 |
| 15 | 51 | MVP | 2018-2019 |

```
CREATE TABLE Fan (
        fanID INT PRIMARY KEY,
        teamID INT NOT NULL,
        fanName CHAR(100),
        email CHAR(100) UNIQUE,
        FOREIGN KEY (teamID) REFERENCES Team_Sponsors_Stadium (teamID) ON DELETE
CASCADE
);
```

| | FANID | TEAMID | FANNAME | EMAIL |
|---|---|---|---|---|
| 1 | 1 | 1 | Jia Lu | jialu@gmail.com |
| 2 | 2 | 2 | Yingquan Wang | yingquanwang@gmail.com |
| 3 | 3 | 3 | Qiyu Zhou | qiyuzhou@gmail.com |
| 4 | 4 | 4 | Lewys Sanders | lewyssanders@gmail.com |
| 5 | 5 | 5 | Betty Colon | bettycolon@gmail.com |

```
CREATE TABLE Boss (
        bossID INT PRIMARY KEY,
        teamID INT NOT NULL,
        bossName CHAR(100),
        wealth INT,
        FOREIGN KEY (teamID) REFERENCES Team_Sponsors_Stadium (teamID) ON DELETE
CASCADE
);
```

| | BOSSID | TEAMID | BOSSNAME | WEALTH |
|---|---|---|---|---|
| 1 | 1 | 1 | Boston Basketball Partners | 74000000 |
| 2 | 2 | 2 | Joseph Tsai | 37000000 |
| 3 | 3 | 3 | Madison Square Garden Sports | 83000000 |
| 4 | 4 | 4 | Harris Blitzer Sports & Entertainment | 216000000 |
| 5 | 5 | 5 | Maple Leaf Sports & Entertainment | 37000000 |
| 6 | 6 | 6 | Jerry Reinsdorf | 83000000 |
| 7 | 7 | 7 | Dan Gilbert | 27000000 |
| 8 | 8 | 8 | Tom Gores | 94000000 |
| 9 | 9 | 9 | Herb Simon | 83000000 |
| 10 | 10 | 10 | Wes Edens | 94000000 |
| 11 | 11 | 11 | Tony Ressler | 28000000 |
| 12 | 12 | 12 | Michael Jordan | 73000000 |
| 13 | 13 | 13 | Micky Arison | 73000000 |
| 14 | 14 | 14 | RDV Sports, Inc. | 261000000 |
| 15 | 15 | 15 | Monumental Sports & Entertainment | 32000000 |
| 16 | 16 | 16 | Kroenke Sports & Entertainment | 84000000 |
| 17 | 17 | 17 | Marc Lore | 83000000 |
| 18 | 18 | 18 | Professional Basketball Club LLC | 94000000 |
| 19 | 19 | 19 | Paul G. Allen Trust | 267000000 |
| 20 | 20 | 20 | Jazz Basketball Investors, Inc. | 37000000 |
| 21 | 21 | 21 | Joe Lacob | 84000000 |
| 22 | 22 | 22 | Steve Ballmer | 83000000 |
| 23 | 23 | 23 | Buss Family Trusts | 65000000 |
| 24 | 24 | 24 | Robert Sarver | 48000000 |
| 25 | 25 | 25 | Vivek Ranadive | 38000000 |
| 26 | 26 | 26 | Mark Cuban | 253000000 |
| 27 | 27 | 27 | Tilman Fertitta | 172000000 |
| 28 | 28 | 28 | Memphis Basketball, LLC | 201000000 |
| 29 | 29 | 29 | Gayle Benson | 457000000 |
| 30 | 30 | 30 | Spurs Sports & Entertainment | 281000000 |

```
CREATE TABLE Staff (
        staffID INT PRIMARY KEY,
        teamID INT NOT NULL,
        staffName CHAR(100),
        FOREIGN KEY (teamID) REFERENCES Team_Sponsors_Stadium(teamID) ON DELETE
CASCADE
);
```

| | STAFFID | TEAMID | STAFFNAME |
|---|---|---|---|
| 1 | 1 | 1 | Joe Mazzulla |
| 2 | 2 | 2 | Jacque Vaughn |
| 3 | 3 | 3 | Tom Thibodeau |
| 4 | 4 | 4 | Doc Rivers |
| 5 | 5 | 5 | Nick Nurse |
| 6 | 6 | 6 | Billy Donovan |
| 7 | 7 | 7 | J. B. Bickerstaff |
| 8 | 8 | 8 | Dwane Casey |
| 9 | 9 | 9 | Rick Carlisle |
| 10 | 10 | 10 | Mike Budenholzer |
| 11 | 11 | 11 | Nate McMillan |
| 12 | 12 | 12 | Steve Clifford |
| 13 | 13 | 13 | Erik Spoelstra |
| 14 | 14 | 14 | Jamahl Mosley |
| 15 | 15 | 15 | Wes Unseld Jr. |
| 16 | 16 | 16 | Michael Malone |
| 17 | 17 | 17 | Chris Finch |
| 18 | 18 | 18 | Mark Daigneault |
| 19 | 19 | 19 | Chauncey Billups |
| 20 | 20 | 20 | Will Hardy |
| 21 | 21 | 21 | Steve Kerr |
| 22 | 22 | 22 | Tyronn Lue |

| 23 | 23 | 23 | Darvin Ham |
| 24 | 24 | 24 | Monty Williams |
| 25 | 25 | 25 | Mike Brown |
| 26 | 26 | 26 | Jason Kidd |
| 27 | 27 | 27 | Stephen Silas |
| 28 | 28 | 28 | Taylor Jenkins |
| 29 | 29 | 29 | Willie Green |
| 30 | 30 | 30 | Gregg Popovich |
| 31 | 31 | 1 | Torin Hodson |
| 32 | 32 | 2 | Geoffrey Lloyd |
| 33 | 33 | 3 | Beau Conner |
| 34 | 34 | 4 | Aditya Kim |
| 35 | 35 | 5 | Rohan Whelan |
| 36 | 36 | 6 | Vincent Quintero |
| 37 | 37 | 7 | Kevin Andrade |
| 38 | 38 | 8 | Vlad Boyd |
| 39 | 39 | 9 | Jordanne Green |
| 40 | 40 | 10 | Taran Roth |
| 41 | 41 | 11 | Haleemah Callaghan |
| 42 | 42 | 12 | Daisy Brown |
| 43 | 43 | 13 | Nelly Bate |
| 44 | 44 | 14 | Alexandre Gross |

| 45 | 45 | 15 | Daniyal Rose |
| 46 | 46 | 16 | Rizwan Lee |
| 47 | 47 | 17 | Jay-Jay Fox |
| 48 | 48 | 18 | Iga Knapp |
| 49 | 49 | 19 | Felicity Roth |
| 50 | 50 | 20 | Clarissa Henson |
| 51 | 51 | 21 | Christian Barrow |
| 52 | 52 | 22 | Tasmin Cousins |
| 53 | 53 | 23 | Rachael Cannon |
| 54 | 54 | 24 | Madihah Salter |
| 55 | 55 | 25 | Imogen Mackenzie |
| 56 | 56 | 26 | Koby Curtis |
| 57 | 57 | 27 | Gaia Arnold |
| 58 | 58 | 28 | Petra Lara |
| 59 | 59 | 29 | Darryl Middleton |
| 60 | 60 | 30 | Gene Bridges |
| 61 | 61 | 1 | Nuha Lloyd |
| 62 | 62 | 2 | Presley Barnard |
| 63 | 63 | 3 | Aryan Cain |
| 64 | 64 | 4 | Rhianne Clarkson |
| 65 | 65 | 5 | Hamish Rojas |
| 66 | 66 | 6 | Maverick Rice |

| 67 | 67 | 7 | Dion Cortez |
|----|----|----|----|
| 68 | 68 | 8 | Kya Martins |
| 69 | 69 | 9 | Taylan Hood |
| 70 | 70 | 10 | Ava-Mai Tyler |
| 71 | 71 | 11 | Yasmin Gill |
| 72 | 72 | 12 | Felicia Ferrell |
| 73 | 73 | 13 | Lola-Rose Underwood |
| 74 | 74 | 14 | Leja Owens |
| 75 | 75 | 15 | Agata Pacheco |
| 76 | 76 | 16 | Jac Sosa |
| 77 | 77 | 17 | Lyndsey Lopez |
| 78 | 78 | 18 | Isis Phan |
| 79 | 79 | 19 | Agatha Goulding |
| 80 | 80 | 20 | Kole Gardner |
| 81 | 81 | 21 | Jocelyn Allan |
| 82 | 82 | 22 | Nikki Gilbert |
| 83 | 83 | 23 | Kathy O'Gallagher |
| 84 | 84 | 24 | Gia Wallis |
| 85 | 85 | 25 | Camille Redman |
| 86 | 86 | 26 | Charlene Craig |
| 87 | 87 | 27 | Momina Bevan |
| 88 | 88 | 28 | Zakaria Calderon |
| 89 | 89 | 29 | Tehya Spencer |
| 90 | 90 | 30 | Shannan Bray |

```
CREATE TABLE Coach (
        staffID INT PRIMARY KEY,
        coachingYear INT,
        FOREIGN KEY (staffID) REFERENCES Staff(staffID) ON DELETE CASCADE
);
```

| STAFFID | COACHINGYEAR |
|---|---|
| 1 | 2 |
| 2 | 5 |
| 3 | 9 |
| 4 | 16 |
| 5 | 26 |
| 6 | 23 |
| 7 | 36 |
| 8 | 14 |
| 9 | 6 |
| 10 | 9 |
| 11 | 26 |
| 12 | 29 |
| 13 | 21 |
| 14 | 4 |
| 15 | 6 |
| 16 | 30 |
| 17 | 16 |
| 18 | 3 |
| 19 | 13 |
| 20 | 27 |
| 21 | 12 |
| 22 | 4 |
| 23 | 8 |
| 24 | 10 |
| 25 | 11 |
| 26 | 16 |
| 27 | 24 |
| 28 | 21 |
| 29 | 6 |
| 30 | 9 |

```
CREATE TABLE Analyst (
        staffID INT PRIMARY KEY,
        certificate CHAR(100),
        FOREIGN KEY (staffID) REFERENCES Staff(staffID) ON DELETE CASCADE,
        FOREIGN KEY (certificate) REFERENCES Certificate_Wage(certificate)
);
```

| | STAFFID | CERTIFICATE |
|---|---|---|
| 1 | 31 | Entry |
| 2 | 32 | Intermediate |
| 3 | 33 | Advanced |
| 4 | 34 | Proficient |
| 5 | 35 | Expert |
| 6 | 36 | Entry |
| 7 | 37 | Intermediate |
| 8 | 38 | Advanced |
| 9 | 39 | Proficient |
| 10 | 40 | Expert |
| 11 | 41 | Entry |
| 12 | 42 | Intermediate |
| 13 | 43 | Advanced |
| 14 | 44 | Proficient |
| 15 | 45 | Expert |
| 16 | 46 | Entry |
| 17 | 47 | Intermediate |
| 18 | 48 | Advanced |
| 19 | 49 | Proficient |
| 20 | 50 | Expert |
| 21 | 51 | Entry |
| 22 | 52 | Intermediate |
| 23 | 53 | Advanced |
| 24 | 54 | Proficient |
| 25 | 55 | Expert |
| 26 | 56 | Entry |
| 27 | 57 | Intermediate |
| 28 | 58 | Advanced |
| 29 | 59 | Proficient |
| 30 | 60 | Expert |

```
CREATE TABLE TeamDoctor (
        staffID INT PRIMARY KEY,
        specialist CHAR(100),
        FOREIGN KEY (staffID) REFERENCES Staff(staffID) ON DELETE CASCADE
);
```

| | STAFFID | SPECIALIST |
|---|---|---|
| 1 | 61 | Cardiology |
| 2 | 62 | Orthopedic Surgery |
| 3 | 63 | Psychiatry |
| 4 | 64 | Cardiology |
| 5 | 65 | Orthopedic Surgery |
| 6 | 66 | Psychiatry |
| 7 | 67 | Cardiology |
| 8 | 68 | Orthopedic Surgery |
| 9 | 69 | Psychiatry |
| 10 | 70 | Cardiology |
| 11 | 71 | Orthopedic Surgery |
| 12 | 72 | Psychiatry |
| 13 | 73 | Cardiology |
| 14 | 74 | Orthopedic Surgery |
| 15 | 75 | Psychiatry |
| 16 | 76 | Cardiology |
| 17 | 77 | Orthopedic Surgery |
| 18 | 78 | Psychiatry |
| 19 | 79 | Cardiology |
| 20 | 80 | Orthopedic Surgery |
| 21 | 81 | Psychiatry |
| 22 | 82 | Cardiology |
| 23 | 83 | Orthopedic Surgery |
| 24 | 84 | Psychiatry |
| 25 | 85 | Cardiology |
| 26 | 86 | Orthopedic Surgery |
| 27 | 87 | Psychiatry |
| 28 | 88 | Cardiology |
| 29 | 89 | Orthopedic Surgery |
| 30 | 90 | Psychiatry |

```
CREATE TABLE Match_Home_Guest (
        matchID INT PRIMARY KEY,
        homeTeamID INT NOT NULL,
        guestTeamID INT NOT NULL,
        winner CHAR(100),
        time TIMESTAMP,
        homeScore INT,
        guestScore INT,
        FOREIGN KEY (homeTeamID) REFERENCES Team_Sponsors_Stadium (teamID),
        FOREIGN KEY (guestTeamID) REFERENCES Team_Sponsors_Stadium (teamID),
        UNIQUE (time, homeTeamID, guestTeamID),
        UNIQUE (time, winner)
);
```

| MATCHID | HOMETEAMID | GUESTTEAMID | WINNER | TIME | HOMESCORE | GUESTSCORE |
|---|---|---|---|---|---|---|
| 1 | 1 | 2 | Boston Celtics | 2022-10-01 17:00:00.000000 | 90 | 83 |
| 2 | 2 | 3 | Brooklyn Nets | 2022-10-02 17:00:00.000000 | 106 | 86 |
| 3 | 3 | 4 | New York Knicks | 2022-10-03 17:00:00.000000 | 82 | 70 |
| 4 | 4 | 5 | Philadelphia 76ers | 2022-10-04 17:00:00.000000 | 84 | 82 |
| 5 | 5 | 6 | Toronto Raptors | 2022-10-05 17:00:00.000000 | 112 | 89 |
| 6 | 6 | 7 | Chicago Bulls | 2022-10-06 17:00:00.000000 | 102 | 97 |
| 7 | 7 | 8 | Cleveland Cavaliers | 2022-10-07 17:00:00.000000 | 104 | 83 |
| 8 | 8 | 9 | Detroit Pistons | 2022-10-08 17:00:00.000000 | 83 | 81 |
| 9 | 9 | 10 | Indiana Pacers | 2022-10-09 17:00:00.000000 | 90 | 87 |
| 10 | 10 | 11 | Milwaukee Bucks | 2022-10-10 17:00:00.000000 | 121 | 90 |
| 11 | 11 | 12 | Atlanta Hawks | 2022-10-11 17:00:00.000000 | 98 | 87 |
| 12 | 12 | 13 | Charlotte Hornets | 2022-10-12 17:00:00.000000 | 97 | 79 |
| 13 | 13 | 14 | Miami Heat | 2022-10-13 17:00:00.000000 | 81 | 80 |
| 14 | 14 | 15 | Orlando Magic | 2022-10-14 17:00:00.000000 | 83 | 76 |
| 15 | 15 | 16 | Washington Wizards | 2022-10-15 17:00:00.000000 | 98 | 92 |
| 16 | 16 | 17 | Denver Nuggets | 2022-10-16 17:00:00.000000 | 90 | 79 |
| 17 | 17 | 18 | Minnesota Timberwolves | 2022-10-17 17:00:00.000000 | 91 | 73 |
| 18 | 18 | 19 | Oklahoma City Thunder | 2022-10-18 17:00:00.000000 | 83 | 80 |
| 19 | 19 | 20 | Portland Trail Blazers | 2022-10-19 17:00:00.000000 | 102 | 83 |
| 20 | 20 | 21 | Utah Jazz | 2022-10-20 17:00:00.000000 | 110 | 97 |
| 21 | 21 | 22 | Golden State Warriors | 2022-10-21 17:00:00.000000 | 98 | 81 |
| 22 | 22 | 23 | Los Angeles Clippers | 2022-10-22 17:00:00.000000 | 93 | 86 |
| 23 | 23 | 24 | Los Angeles Lakers | 2022-10-23 17:00:00.000000 | 109 | 80 |
| 24 | 24 | 25 | Phoenix Suns | 2022-10-24 17:00:00.000000 | 98 | 94 |
| 25 | 25 | 26 | Sacramento Kings | 2022-10-25 17:00:00.000000 | 81 | 72 |
| 26 | 26 | 27 | Dallas Mavericks | 2022-10-26 17:00:00.000000 | 91 | 89 |
| 27 | 27 | 28 | Houston Rockets | 2022-10-27 17:00:00.000000 | 82 | 80 |
| 28 | 28 | 29 | Memphis Grizzlies | 2022-10-28 17:00:00.000000 | 92 | 79 |
| 29 | 29 | 30 | New Orleans Pelicans | 2022-10-29 17:00:00.000000 | 121 | 92 |
| 30 | 30 | 1 | San Antonio Spurs | 2022-10-30 17:00:00.000000 | 94 | 89 |

## SQL Query List

### INSERT Operation

We first put data into a nested array:

```
$tuple = array (
    ":bind1" => rand(100, 999),
    ":bind2" => $_POST['teamID'],
    ":bind3" => $_POST['name'],
    ":bind4" => $_POST['email']
);

$alltuples = array (
    $tuple
);
```

Then, we execute the query with:

executeBoundSQL(INSERT INTO Fan VALUES (:bind1, :bind2, :bind3, :bind4)", $alltuples):

### DELETE Operation

DELETE FROM Staff
WHERE staffID = $value

### UPDATE Operation

UPDATE Fan SET fanName='" . $name . "', email='" . $email . "', teamID = '" . $teamID . "'
WHERE fanID='" . $fanID . "'

### Selection

SELECT playerName, jerseyNum
FROM Player
WHERE teamID = $teamID

### Projection

Please see Join. We have 4 attributes in Join.

### Join

SELECT playerName, jerseyNum, teamName, awardName
FROM Player p, AwardsAndHonors a, Team_Sponsors_Stadium t
WHERE p.playerID = a.playerID AND p.teamID = t.teamID AND a.season = $season

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---

### Aggregation with Group By
SELECT teamName, sum(salary)
FROM Player p, Team_Sponsors_Stadium t
WHERE p.teamID = t.teamID
GROUP BY teamName


### Aggregation with Having
SELECT teamName, max(appearance)
FROM Player p, Team_Sponsors_Stadium t
WHERE p.teamID = t.teamID AND appearance > 200
GROUP BY teamName
HAVING COUNT(*) >= 2


### Nested Aggregation with Group By
SELECT teamName, avg(salary)
FROM Player p, Team_Sponsors_Stadium t
WHERE p.teamID = t.teamID
GROUP BY teamName
HAVING avg(salary) >= all (SELECT avg(p.salary)
                          FROM Player p, Team_Sponsors_Stadium t
                          WHERE p.teamID = t.teamID
                          GROUP BY teamName)

### Division
SELECT playerName
FROM Player p
WHERE NOT EXISTS ((SELECT a.awardName
                   FROM AwardsAndHonors a
                   GROUP BY a.awardName)
                   MINUS
                   (SELECT b.awardName
                   FROM AwardsAndHonors b
                   WHERE b.playerID = p.playerID))

## Sample output of queries

### INSERT Operation

Initially, there are 3 fans:

Back to main page

| Name | Email | Favorite Team | Update Button |
|------|-------|---------------|---------------|
| Jia Lu | jialu@gmail.com | Boston Celtics | Update |
| Yingquan Wang | yingquanwang@gmail.com | Brooklyn Nets | Update |
| Qiyu Zhou | qiyuzhou@gmail.com | New York Knicks | Update |

Then, users go to the fan registration page and input information of fans:

Back to main page

**Fan Registration**

Name: Grover Meyer

Email: grovermeyer@gmail.com

Favorite Team: Philadelphia 76ers    Insert

Then, users click "Insert" button:

Back to main page

**Fan Registration**

Name: [                    ]

Email: [                 ]

Favorite Team: [--Please choose a team-- ▾] [Insert]

Registration successed!

Finally, users can see a new fan is added to the database:

Back to main page

| Name | Email | Favorite Team | Update Button |
|---|---|---|---|
| Jia Lu | jialu@gmail.com | Boston Celtics | Update |
| Yingquan Wang | yingquanwang@gmail.com | Brooklyn Nets | Update |
| Qiyu Zhou | qiyuzhou@gmail.com | New York Knicks | Update |
| Grover Meyer | grovermeyer@gmail.com | Philadelphia 76ers | Update |

## DELETE Operation

Initially, there are a bunch of staff (there are more below the page, but it would be too many screenshots if capture all of them):

| Name | Team | Delete Button |
|------|------|---------------|
| Back to main page | | |
| Joe Mazzulla | Boston Celtics | Delete |
| Jacque Vaughn | Brooklyn Nets | Delete |
| Tom Thibodeau | New York Knicks | Delete |
| Doc Rivers | Philadelphia 76ers | Delete |
| Nick Nurse | Toronto Raptors | Delete |
| Billy Donovan | Chicago Bulls | Delete |
| J. B. Bickerstaff | Cleveland Cavaliers | Delete |
| Dwane Casey | Detroit Pistons | Delete |
| Rick Carlisle | Indiana Pacers | Delete |
| Mike Budenholzer | Milwaukee Bucks | Delete |
| Nate McMillan | Atlanta Hawks | Delete |

Then, users click the "Delete" button after the first staff named "Joe Mazzulla", this staff is deleted:

| Name | Team | Delete Button |
|------|------|---------------|
| Back to main page | | |
| Jacque Vaughn | Brooklyn Nets | Delete |
| Tom Thibodeau | New York Knicks | Delete |
| Doc Rivers | Philadelphia 76ers | Delete |
| Nick Nurse | Toronto Raptors | Delete |
| Billy Donovan | Chicago Bulls | Delete |
| J. B. Bickerstaff | Cleveland Cavaliers | Delete |
| Dwane Casey | Detroit Pistons | Delete |
| Rick Carlisle | Indiana Pacers | Delete |
| Mike Budenholzer | Milwaukee Bucks | Delete |
| Nate McMillan | Atlanta Hawks | Delete |
| Steve Clifford | Charlotte Hornets | Delete |

## UPDATE Operation

Initially, users can see there are 4 fans:

Back to main page

| Name | Email | Favorite Team | Update Button |
|------|-------|---------------|---------------|
| Jia Lu | jialu@gmail.com | Boston Celtics | Update |
| Yingquan Wang | yingquanwang@gmail.com | Brooklyn Nets | Update |
| Qiyu Zhou | qiyuzhou@gmail.com | New York Knicks | Update |
| Grover Meyer | grovermeyer@gmail.com | Philadelphia 76ers | Update |

Then, users click the "Update" button after the 4th fan, named "Grover Meyer", the page jumps to the update page with prefilled data:

Back fan list page

**Fan Information Update**

Name: Grover Meyer

Email: grovermeyer@gmail.com

Favorite Team: Philadelphia 76ers    Update

Then, users update the email and favorite team of Grover Meyer:

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Back fan list page

**Fan Information Update**

Name: Grover Meyer

Email: grovermeyer@outlook.com

Favorite Team: Toronto Raptors ⌄  Update

Finally, users click "Update" button, the information of Grover Meyer is updated:

Back to main page

| Name | Email | Favorite Team | Update Button |
|------|-------|---------------|---------------|
| Jia Lu | jialu@gmail.com | Boston Celtics | Update |
| Yingquan Wang | yingquanwang@gmail.com | Brooklyn Nets | Update |
| Qiyu Zhou | qiyuzhou@gmail.com | New York Knicks | Update |
| Grover Meyer | grovermeyer@outlook.com | Toronto Raptors | Update |

## Selection

Users can search which players are in a particular team, such as "Boston Celtics":

Back to main page

### Search Player

Team Name: Boston Celtics ⌄   search

Users click "search" button, the players in Boston Celtics are displayed:

Back to main page

### Search Player

Team Name: --Please choose a team-- ⌄   search

| Name | jerseyNum |
|------|-----------|
| Brown, Jaylen | 7 |
| Fitts, Malik | 8 |
| Hauser, Sam | 30 |

## Projection

Please see Join. We have 4 attributes in Join.

## Join

Users can search winners of awards and honors for a particular season, such as season "2019-2020":

Back to main page

**Awards and Honors**

Season: 2019-2020 ▽ search

Then, users click "search" button, the winners of awards and honors in season "2019-2020" are displayed:

Back to main page

**Awards and Honors**

Season: --Please choose a season-- ▽ search

**Season:'2019-2020'**

| Player | Jersey Number | Team | Award |
|---|---|---|---|
| Achiuwa, Precious | 5 | Toronto Raptors | Rookie of the Year |
| Ball, Lonzo | 2 | Chicago Bulls | Most Improved |
| Allen, Jarrett | 31 | Cleveland Cavaliers | Sixth Man |
| Bey, Saddiq | 41 | Detroit Pistons | Defensive Player of Year |
| Jokic, Nikola | 15 | Denver Nuggets | MVP |

## Aggregation with Group By

Users can check the total money that each team expense on its players:

Back to main page

**Current total expense on players for each team**

get expense

Then, users click "get expense" button, the total expense on players for each team is displayed:

Back to main page

**Current total expense on players for each team**

get expense

| Team Name | Total Salary |
|---|---|
| Detroit Pistons | 750.00 |
| San Antonio Spurs | 950.00 |
| Washington Wizards | 850.00 |
| Oklahoma City Thunder | 1450.00 |
| Sacramento Kings | 900.00 |
| Indiana Pacers | 950.00 |
| Memphis Grizzlies | 1000.00 |
| Toronto Raptors | 700.00 |
| Denver Nuggets | 1950.00 |
| Minnesota Timberwolves | 1050.00 |
| Dallas Mavericks | 950.00 |
| Houston Rockets | 1150.00 |
| New Orleans Pelicans | 1050.00 |
| Philadelphia 76ers | 1500.00 |
| Chicago Bulls | 1300.00 |

## Aggregation with Having

Users can check the highest appearance of each team:

Back to main page

**Highest Appearance in Each Team**

get

Then, users click "get" button, the highest appearance of each team is displayed, excluding teams that are too young with not enough experienced players:

Back to main page

**Highest Appearance in Each Team**

get

Result excludes young teams with less than 2 players who have more than 200 appearance.

| Team | Highest Appearance |
|------|-------------------|
| Detroit Pistons | 289 |
| San Antonio Spurs | 426 |
| Oklahoma City Thunder | 643 |
| Sacramento Kings | 479 |
| Washington Wizards | 378 |
| Indiana Pacers | 472 |
| Memphis Grizzlies | 502 |
| Toronto Raptors | 231 |
| Denver Nuggets | 648 |
| Minnesota Timberwolves | 578 |
| Dallas Mavericks | 583 |
| Houston Rockets | 694 |
| New Orleans Pelicans | 425 |
| Philadelphia 76ers | 693 |

## Nested Aggregation with Group By

Users can check which team has the highest average player salary:

Back to main page

**Team with highest average salary**

get

Then, users click "get" button, the team with highest average salary is displayed:

Back to main page

**Team with highest average salary**

get

| Team Name | Average Salary |
|---|---|
| Golden State Warriors | 916.67 |

## Division

Users can check players who have won all possible awards and honors in their career:

Back to main page

**Player who have won all AwardsAndHonors**

get

Users click "get" button, the players who have won all possible awards and honors are displayed:

Back to main page

**Player who have won all AwardsAndHonors**

get

**Player Name**
Jokic, Nikola