University of British Columbia
Department of Computer Science

CPSC 304 2020

Summer Term1

Group Project - Implementation of a Relational Database

Project Title:	NBA Database
Project Milestone:	Milestone 3 (FD and Normalization)

#	Student Name	Student Number	Email Address
1	Mike Powar	81430993	mike.powar@gmail.com
2	Daniel Au	78934767	ubc.danielau@gmail.com
3	Justin Sohnne	77575520	justin.sohn08@gmail.com

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 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

1. Functional Dependencies (FDs)

Season(Year, Type, startDate, endDate, Duration)

Functional Dependencies

startDate -> Year

endDate -> Year (Not required)

startDate, endDate -> Duration

Duration -> Type

Candidate Keys

(startDate, endDate)

Team(Conference, Founded, Arena, Division, Name)

Functional Dependencies

Name -> Founded, Arena, Division

Division -> Conference

Candidate Keys

Name

Match(matchID,Result, Location)

Functional Dependencies

matchID -> Result, Location

Candidate Keys

matchID

Player Statistic (Date, pname, FT attempted, FG made, 3P made , total rebounds , FG percentage , FT percentage , steals , minutes played , offensive rebounds, defensive rebound, FG attempted, points , plus minus , personal fouls , FT made , 3P percentage ,turnovers , blocks , assist, 3P attempted)

Functional Dependencies

Date, pname -> FT attempted, FG made, 3P made , total rebounds , FG percentage , FT percentage , steals , minutes played , offensive rebounds, defensive rebound, FG attempted, points , plus minus , personal fouls , FT made , 3P percentage ,turnovers , blocks , assist, 3P attempted

Candidate Keys

(Date, pname)

Team Statistic (Date, tname, FT attempted, FG made, 3P made , total rebounds , FG percentage , FT percentage , steals , offensive rebounds, defensive rebound, FG attempted, points , personal fouls , FT made , 3P percentage ,turnovers , blocks , assist, 3P attempted, Games played, Wins, Losses)

Functional Dependencies

Date, tname -> FT attempted, FG made, 3P made , total rebounds , FG percentage , FT percentage , steals , offensive rebounds, defensive rebound, FG attempted, points , personal fouls , FT made , 3P percentage ,turnovers , blocks , assist, 3P attempted, Games played, Wins, Losses

Candidate Keys

(Date, tname)

Player(playerID, tname, Age, Height, Salary, Position, Number, DOB, Weight, Name)

Functional Dependencies

playerID -> Age, Height, DOB, Weight, Name

tname -> Salary, Position, Number

Candidate Keys

(playerID, tname)

Staff(staffID, name, tname)

Functional Dependencies

staffID -> name, tname

Candidate Keys

(staffID)

Owner(staffID, net worth)

Coach(staffID, wins, losses , position)

EndorsementDeal(eID, Value, playerID)

Functional Dependencies

eID -> Value, playerID

Candidate Keys

eID

Company(name)

Product(type)

2. Normalization

Season(Year, Type, startDate, endDate, Duration)

$$\text{startDate}^+ = \text{startDate, Year}$$

$$\text{Duration}^+ = \text{Type}$$

$$\text{startDate, endDate}^+ = \text{startDate, endDate, Year, Duration, Type}$$

Season(Year, Type, startDate, endDate, Duration)

Season₁(startDate, Year)

Season₂(Type, startDate, endDate, Duration)

Season₃(Duration, Type)

Season₄(startDate, endDate, Duration)

- startDate(startDate,Year)
- Duration(Duration,Type)
- Season(**startDate**,endDate,**Duration**)

Team(Conference, Founded, Arena, Division, Name)

$$\text{Name}^+ = \text{Name, Founded, Arena, Division}$$

$$\text{Division}^+ = \text{Division, Conference}$$

Team(Conference, Founded, Arena, Division, Name)

Division(Division, Conference)

Team(Founded, Arena, Division, Name)

- Division(Division, Conference)
- Team(Name, Founded, Arena, **Division**)

Player(playerID, tname, Age, Height, Salary, Position, Number, DOB, Weight, Name)

playerID⁺ = playerID, Age, Height, DOB, Weight, Name

tname⁺ = tname, Salary, Position, Number

Player(playerID, tname, Age, Height, DOB, Weight, Name, Salary, Position, Number)

playerID (playerID, Age, Height, DOB, Weight, Name)   Player(playerID, tname, Salary, Position, Number)

tname (tname, Salary, Position, Number)   Player(playerID, tname)

- playerID(playerID, Age, Height, DOB, Weight, Name)
- tname(tname, Salary, Position, Number)
- Player(**playerID,tname)**

3. The SQL DDL to create all the tables in SQL.

- Season Relation
  - create table StartDate (startDate date PRIMARY KEY, year INT);
  - create table Duration (duration int PRIMARY KEY, type char(10));
  - create table Season (startDate date, endDate date, duration int, PRIMARY KEY (startDate, endDate), FOREIGN KEY (startDate) REFERENCES SeasonStartDate (startDate), FOREIGN KEY (duration) REFERENCES SeasonDuration (duration));
- Team Relation
  - create table Division (division char(15) PRIMARY KEY, conference char(8) NOT NULL);
  - create table Team (name char(25) PRIMARY KEY, founded int, arena char(20), division char(15), FOREIGN KEY(division) REFERENCES Division(division));
- Player Relation
  - create table PlayerID (playerID int PRIMARY KEY, age int, height double(3, 2), dob date, weight int, name char(25));

- ○ create table Tname (tname char(25) PRIMARY KEY, salary int, position char(2), number int, FOREIGN KEY (tname) REFERENCES Team(name));
  - ○ create table Player (playerID int, tname char(25), PRIMARY KEY (playerID, tname), FOREIGN KEY (playerID) REFERENCES PlayerID(playerID), FOREIGN KEY (tname) REFERENCES Tname (tname));
- Staff Relation
  - ○ create table Staff (staffID int PRIMARY KEY, name char(25), tname char(25));
- Owner Relation
  - ○ create table Owner (staffID int PRIMARY KEY, net_worth int, FOREIGN KEY (staffID) REFERENCES Staff(staffID));
- Coach Relation
  - ○ create table Coach(staffID int PRIMARY KEY, wins int, losses int, position char(20), FOREIGN KEY (staffID) REFERENCES Staff(staffID));
- Match Relation
  - ○ create table Match (matchID int PRIMARY KEY, result char(1) NOT NULL, location char(20), FOREIGN KEY(location) REFERENCES Team(arena));
- Team Statistic Relation
  - ○ create table TeamStatistic (Date date, tname char(25), FT_attempted int, FG_made int, 3P_made int, total_rebounds int, FG_percent double(4, 1), FT_percent double(4, 1), steals int, offensive_rebounds int, defensive_rebounds int, FG_attempted int, points int, personal fouls int, FT made int, 3P_percent double (4, 1), turnovers int, blocks int, assist int, 3P_attempted int, games_played int, wins int, losses int, PRIMARY KEY(Date, tname));
- Player Statistic Relation
  - ○ create table PlayerStatistic (Date date, pname char(25), FT_attempted int, FG_made int, 3P_made int, total_rebounds int, FG_percent double(4, 1), FT_percent double(4, 1), steals int, minutes_played time(0), offensive_rebounds int, defensive_rebounds int, FG_attempted int, points int, plus_minus int, personal_fouls int, FT_made int, 3P_percent double(4, 1), turnovers int, blocks int, assists int, 3P_attempted int, PRIMARY KEY(Date, pname));
- Endorsement Deal Relation
  - ○ create table EndorsementDeal(eID int PRIMARY KEY, value int, playerID int, FOREIGN KEY (playerID) REFERENCES PlayerID(playerID));

- Company Relation
  - create table Company(name char(20) PRIMARY KEY);
- Product Relation
  - create table Product(type char(20) PRIMARY KEY);

4. Populate each table with at least 5 tuples.

StartDate

startDate	year
2018-10-16	2018
2017-10-17	2017
2017-04-15	2017
2015-10-27	2015
2014-10-04	2014

*year = year of start date

Duration

duration(days)	type
170	Regular
177	Regular
41	Playoffs
169	Regular
20	Preseason

*Playoff year = actual year of playoff games

Season

startDate	endDate	duration
2018-10-16	2019-04-10	170
2017-10-17	2019-04-11	177

2017-04-15	2018-05-25	41
2015-10-27	2016-04-13	169
2014-10-04	2014-10-24	20

Division

division	conference
ATLANTIC DIVISION	EASTERN CONFERENCE
CENTRAL DIVISION	EASTERN CONFERENCE
SOUTHEAST DIVISION	EASTERN CONFERENCE
NORTHWEST DIVISION	WESTERN CONFERENCE
PACIFIC DIVISION	WESTERN CONFERENCE

Team

name	founded	arena	**division**
Toronto Raptors	1995	Scotiabank Arena	ATLANTIC DIVISION
Los Angeles Lakers	1960	STAPLES Center	PACIFIC DIVISION
Clevland Cavaliers	1970	Rocket Mortgage FieldHouse	CENTRAL DIVISION
Milwaukee Bucks	1968	Fiserv Forum	CENTRAL DIVISION
Philadelphia 76ers	1963	Wells Fargo Center	ATLANTIC DIVISION

PlayerID

playerID	age	height	dob	weight	name
2456	32	6-0	1986-03-25	205	Kyle Lowry
184	21	6-6	1997-10-27	190	Lonzo Ball
1954	34	6-8	1984-12-30	250	Lebron James

| 107 | 24 | 6-11 | 1994-12-06 | 222 | Giannis Antetokounmpo |
| 1158 | 24 | 7-0 | 1994-03-16 | 250 | Joel Embiid |

Tname

tname	Salary	Position	Number
Toronto Raptors	31.20	G	7
Los Angeles Lakers	7.46	G	0
Clevland Cavaliers	35.65	F-G	23
Milwaukee Bucks	24.16	F-G	34
Philadelphia 76ers	25.47	C-F	24

Player

playerID	tname
2456	Toronto Raptors
184	Los Angeles Lakers
1954	Clevland Cavaliers
107	Milwaukee Bucks
1158	Philadelphia 76ers

Owner

staffID	tname
34567	Milwakee Bucks
421214	Brooklyn Nets
421315	LA Clippers
511111	Dallas Mavericks
622222	New Orleans Pelicans

Staff

staffID	tname
121212	Milwakee Bucks
121214	Brooklyn Nets
121315	LA Clippers
111111	Dallas Mavericks
222222	New Orleans Pelicans

Coach

staffID	Wins	Losses	Position
998899	500	200	Head
998898	400	200	Head
998897	444	111	Head
998896	444	80	Assistant
998895	44	50	Assistant

Match

matchID	Result(Home-Away)	Location
S1828-2	116-104	Scotiabank Arena
O1816-1	115-124	STAPLES Center
A1913-3	111-133	Rocket Mortgage FieldHouse
S1930-4	118-101	Fiserv Forum

S1730-5	127-108	Wells Fargo Center

TeamStatistic

Date	tname
2018-10-17	Toronto Raptors
2018-10-20	Los Angeles Lakers
2018-10-21	Clevland Cavaliers
2018-10-19	Milwaukee Bucks
2018-10-18	Philadelphia 76ers

FT_attempted	FG_made	3P_made	total_rebounds	FG_percent
50	25	40	500	0.50
50	25	40	500	0.50
50	25	40	500	0.50
50	25	40	500	0.50
50	25	40	500	0.50

FT_percent	steals	offensive_rebounds	defensive_rebounds	FG_attempted
0.50	25	40	500	0.50
0.75	25	40	500	0.50
0.80	25	40	500	0.50
0.90	25	40	500	0.50
0.90	25	40	500	0.50

points	personal_fouls	FT_made	3P_percent	turnovers
5000	400	50	0.90	400
5000	400	50	0.90	400
800	40	25	0.50	02
500	40	5	0.80	40
50	44	30	0.74	20
blocks	**assist**	**3P_attempted**	**games_played**	**wins**
5000	400	50	55	20
5000	400	50	54	24
800	40	25	60	44
500	40	5	90	44
50	44	30	88	8
losses				
35				
30				
24				
54				
80				

PlayerStatistic

Date	Pname
2018-10-17	Toronto Raptors

2018-10-20	Los Angeles Lakers
2018-10-21	Clevland Cavaliers
2018-10-19	Milwaukee Bucks
2018-10-18	Philadelphia 76ers

FT_attempted	FG_made	3P_made	total_rebounds	FG_percent
50	25	40	500	0.50
50	25	40	500	0.50
50	25	40	500	0.50
50	25	40	500	0.50
50	25	40	500	0.50

FT_percent	steals	offensive_rebounds	defensive_rebounds	FG_attempted
0.50	25	40	500	50
0.75	25	40	500	50
0.80	25	40	500	30
0.90	25	40	500	40
0.90	25	40	500	10

points	personal_fouls	FT_made	3P_percent	turnovers
5000	400	50	0.90	400
5000	400	50	0.90	400
800	40	25	0.50	02
500	40	5	0.80	40
50	44	30	0.74	20

blocks	assists	3P_attempted		
5000	400	50		
5000	400	50		
800	40	25		
500	40	5		
540	23	22		

EndorsementDeal

eID	value	playerID
James651	30	333454
Harden56	25	444452
Curry21	20	555542
Jordan99	130	666452
Westbrook56	15	285422

Product

name
Nike
Adidas
Under Armour
Mountain Dew
Gatorade

Company

Type
Ball Shoes
Runners
Sports Wear
Soda
Energy Drink