Knicks' Resurrection Project

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CIS 9340

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Thurs 6pm – 9pm

Group 3

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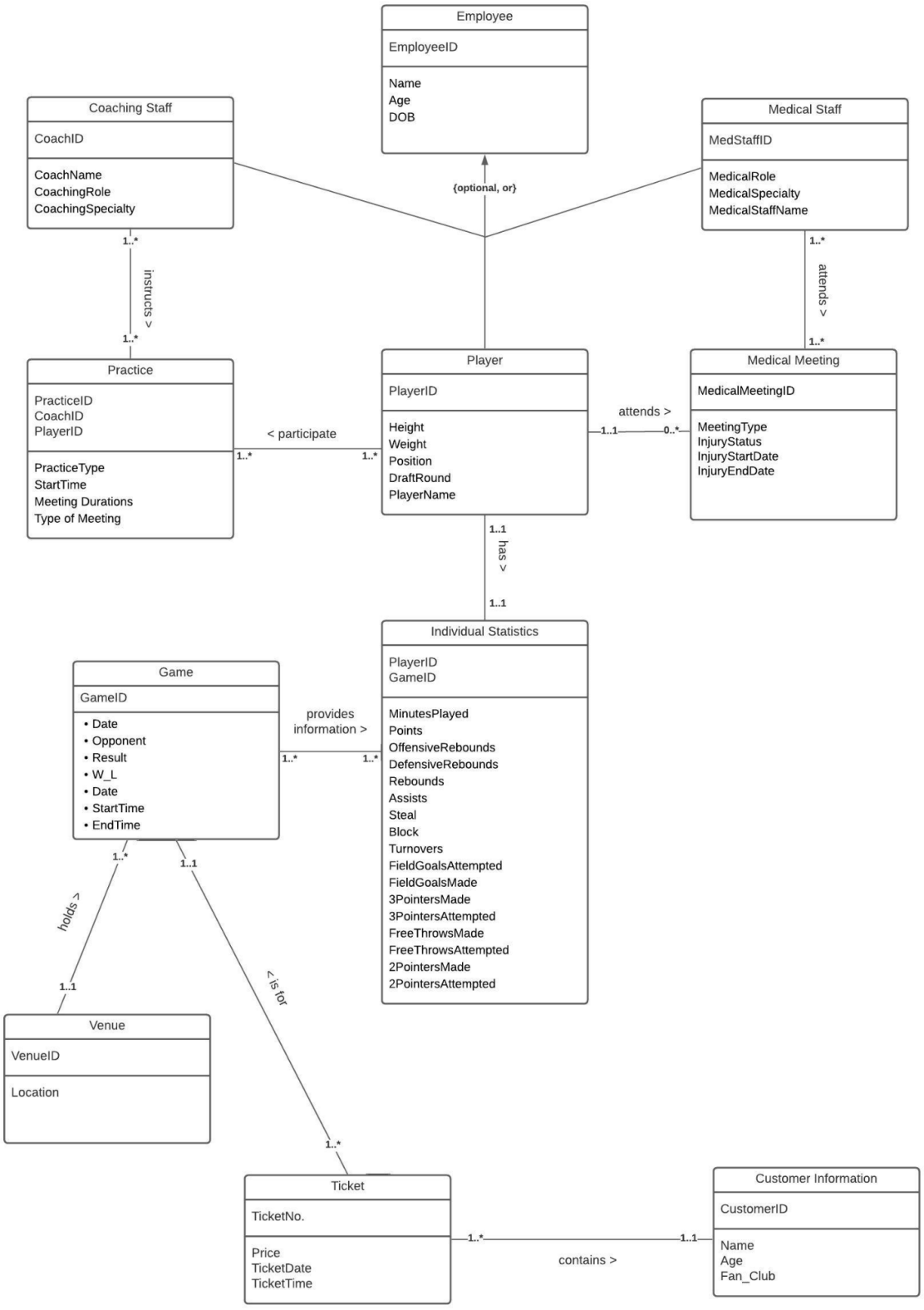
I. Executive Summary

The New York Knicks have since fallen behind their competitors in the NBA. For the last 7 consecutive seasons, they have failed to make it to the NBA Playoffs, and it seems that 2020-2021 will not be an exception either. The board has met with the head coach and his staff to discuss a solution to this ongoing problem. The team realized that not keeping proper data storage has created massive inefficiencies for the team in training players, analyzing competitors. We have been brought on to help build a database that keeps track of the player's performance, staff utilization, and other metrics that can result in useful findings down the road. The Knicks hope that by modernizing their data they will be able to extract key insights and help them get back to their winning ways.

We will start by collecting detailed information on all the players including both physical characteristics and seasonal statistics. We will have data on the coaching staff including relevant characteristics and season-long appointments. The data for the players will be recorded in 2 main focuses, player attributes (name, height, weight, age, draft round, etc.) and game statistics (points per game, assists per game, rebounds per game, steal per game, minutes per game, etc.). These data points will be used to analyze player's performance along with making predictions and strategies, formations, and player selection for upcoming games. The data for coaching and medical staff will focus on their role and specialties. Furthermore, to ensure that all the staff is being utilized to the best of their abilities, we will record the data for the coaching and medical sessions, with information regarding the type of sessions, which team staff and players attended, and the purpose of each meeting.

Main business scenarios will include examining game statistics to see how players are performing and tracking player injury and medical meetings to know who is currently healthy or dealing with injuries. These medical meetings and doctor patient meetings will be available to the team for internal reference.

II. Entity Relationship Model Diagram



Based on the needs of the Knicks described, we developed the Entity Relationship model above. The model not only provides a transparent view of all attributes but also facilitates the creation of relationship sentences to finalize the conceptual ER model.

Relationship Sentences:

One **Employee** *must be* a **Coaching Staff, Medical Staff,** or **Player**.

One **Coaching Staff** *must* instruct one or more **Practice**.

One **Practice** *must be* instructed by one or more **Coaching Staff.**

One **Medical Staff** *must* attend one or more **Medical Meeting.**

One **Medical Meeting** *must be* attended by one or more **Medical Staff.**

One **Player** *must* participate in one or more **Practice.**

One **Player** *may* attend one or more **Medical Meeting.**

One **Medical Meeting** *must be* attended by one and only one **Player.**

One **Player** *must* have one and only one **Individual Statistics.**

One **Individual Statistics** *must* belong to one and only one **Player.**

One **Game** *must* provide one or more **Individual Statistics.**

One **Individual Statistics** *must be* provided by one or more **Game.**

One **Venue** *must* hold one or more **Game.**

One **Game** *must be* held in one and only one **Venue**.

One **Ticket** *must be* for one and only one **Game.**

One **Game** *must* have one or more **Ticket.**

One **Customer Information** *must be* contained in one or more **Ticket.**

One **Ticket** *must* contain one or more Customer Information

III. Conversion to Relational Model

Following the ER model and the relationship sentences, our next step was to convert our conceptual ER model to a logical Relational model. Below is our initial set of relations with each Entity's identifying attribute dictated by the primary key and the entity's relationships mapped as foreign keys.

- Employee (EmployeeID (pk), PracticeID (fk), MedicalMeetingID (fk), CoachID, MedStaffID, PlayerID, Name, Age, DOB, CoachingRole, CoachingSpecialty, MedicalRole, MedicalSpecialty, Height, Weight, Position, DraftRound, PlayerName, CoachName, MedStaffName)

- MedicalMeeting (MedicalMeetingID (pk), MedStaffID (fk), PlayerID (fk), MeetingType, InjurySatus, InjuryStartDate, InjuryEndDate, MedStaffName (fk))

- Practice (PracticeID (pk), CoachID (fk), PlayerID (fk), PracticeType, CoachName (fk), PlayerName (fk), StartTime, Meeting Durations, Type of Meeting)

- IndividualStatistics (PlayerID (pk) (fk), GameID (fk), MinutesPlayed, Points, OffensiveRebounds, DefensiveRebounds, Rebounds Assists, Steal Block, Turnovers, FieldGoalsAttempted, FieldGoalsMade, FieldGoalPercentage, 3PointersMade, 3PointersAttempted, FreeThrowsMade, FreeThrowsAttempted, 2PointersMade, 2PointersAttempted,)

- Game (GameID (pk), PlayerID (fk), VenueID (fk), Date, Opponent, Result, W-L, StartTime, EndTime)

- Ticket(TicketNo(pk), VenueID(fk), Price, Date, Time)

- Venue (VenueID(pk), GameID(fk), TicketNo(fk),CustomerID (fk), Location, Date)

- CustomerInformation (CustomerID (pk), TicketNo (fk), Name, Age, Fan Club)

IV. Normalization

Before we can use the set of relations to create the database, we had to normalize each relation from 1NF up to BCNF. By normalizing the relations up to BCNF, we ensure that each relation is the following:

1NF: Meets the definition of a relation
2NF: Will have no partial dependencies
3NF: Will have no transitive dependencies
BCNF: Will have all determinants as candidate keys.

Employee

Employee (EmployeeID(pk), Name, Age, DOB, MedStaffID(fk), MedStaffName, MedicalRole, MedicalSpecialty, CoachID(fk), CoachName, CoachingRole, CoachingSpecialty, Players(fk), PlayerName, Height, DraftRound

PK EmployeeID

FD1: EmployeeID -> MedStaffID, CoachID, PlayerID, Name, Age, DOB, MedStaffName, MedicalRole, MedicalSpecialty, CoachName, CoachingRole, CoachingSpecialty, PlayerName, Height, Draftround

FD2: EmployeeID -> Name, Age, DOB

FD3: MedStaffID -> MedStaffName, MedicalRole, MedicalSpecialty

FD4: CoachID -> CoachName, CoachingRole, CoachingSpecialty

FD5: PlayerID -> PlayerName, Height, Weight, DraftRound,

1NF: Meets the definition of a relation

There is partial dependency so we are not at 2NF yet

R1(EmployeeID, Name, Age, DOB)

R2(EmployeeID, MedStaffID, CoachID, PlayerID, MedStaffName, MedicalRole, MedicalSpecialty, CoachName, CoachingRole, CoachingSpecialty, PlayerName, Height, Draftround)

FD3: MedStaffID -> MedStaffName, MedicalRole, MedicalSpecialty

FD4: CoachID -> CoachName, CoachingRole, CoachingSpecialty

FD5: PlayerID -> PlayerName, Height, Weight, DraftRound

2NF: There is no partial dependency so we are at 2NF

There are transitive dependencies so we are not at 3NF yet

R3(MedStaffID, MedStaffName, MedicalRole, MedicalSpecialty,)

R4(CoachID, CoachName, CoachingRole, CoachingSpecialty)

R5(PlayerID, PlayerName, Height, Weight, DraftRound,)

R6(EmployeeID, CoachID, PlayerID, MedStaffID)

3NF: No transitive dependency

BCNF: all determinants are candidate key

Medical Meeting

MedicalMeeting (MedicalMeetingID(pk), MedStaffID(fk), PlayerID (fk), MeetingType, InjurySatus, InjuryStartDate, InjuryEndDate)

PK: MedicalMeetingID

FD1: MedicalMeetingID -> MedStaffID, PlayerID, MeetingType, InjuryStatus, InjuryStartDate, InjuryEndDate,

FD2: MedStaffID -> MedStaffName

1NF: Meets the definition of a relation

2NF: No partial dependency

There are transitive dependencies so we are not at 3NF

R1 (MedStaffID, MedStaffName)

FD1: MedStaffID -> MedStaffName

R2 (MedicalMeetingID(pk), MedStaffID(fk), PlayerID(fk), MeetingType, InjuryStatus, InjuryStartDate, InjuryEndDate)

FD1: MedicalMeetingID -> MedStaffID, PlayerID, MeetingType, InjuryStatus, InjuryStartDate, InjuryEndDate)

3NF: No transitive dependency

BCNF: all determinants are candidate key

Practice

Practice (PracticeID (pk), CoachID (pk)(fk), PlayerID (pk)(fk), PracticeType, CoachName, PlayerName, StartTime, PracticeDurations, PracticeDate)

PK: PracticeID

FD1: PracticeID -> CoachID, PlayerID, PracticeType, CoachName, PlayerName, StartTime, PracticeDurations, PracticeDate

FD2: CoachID -> CoachName

FD3: PlayerID -> PlayerName

1NF: Meets the definition of a relation

2NF: No partial dependency

There are transitive dependencies so we are not at 3NF

R1(CoachID, CoachName)

FD1: CoachID -> CoachName

R2(PlayerID, PlayerName)

FD1: PlayerID -> PlayerName

R3(PracticeID(pk), CoachID(fk), PlayerID(fk), PracticeType, StartTime, Meeting Durations, Type of Meeting)

FD1: PracticeID -> CoachID, PlayerID, PracticeType, StartTime, Meeting Durations, Type of Meeting

3NF: No transitive dependency

BCNF: all determinants are candidate key

Individual Statistics

IndividualStatistics (PlayerID (pk) (fk), GameID (fk), MinutesPlayed, Points, OffensiveRebounds, DefensiveRebounds, Rebounds, Assists, Steals, Blocks, Turnovers, FieldGoalsAttempted, FieldGoalsMade, 3PointersMade, 3PointersAttempted, FreeThrowsMade, FreeThrowsAttempted, 2PointersMade, 2PointersAttempted)

PK: PlayerID

FD1: PlayerID -> GameID, MinutesPlayed, Points, OffensiveRebounds, DefensiveRebounds, Rebounds Assists, Steal Block, Turnovers, FieldGoalsAttempted, FieldGoalsMade, 3PointersMade, 3PointersAttempted, FreeThrowsMade, FreeThrowsAttempted, 2PointersMade, 2PointersAttempted)

1NF: Meets the definition of a relation

2NF: No partial dependency

3NF: No transitive dependency

BCNF: all determinants are candidate key

Game

Game (GameID (pk), VenueID (fk), GameDate, Opponent, Result, W-L, StartTime, EndTime)

PK: GameID

FD: GameID -> PlayerID, VenueID, GameDate, Opponent, Result, W-L, StartTime, EndTime

1NF: Meets the definition of a relation

2NF: No partial dependency

3NF: No transitive dependency

BCNF: all determinants are candidate key

Venue

Venue (VenueID(pk), Location)

PK: VenueID

FD: VenueID -> Location

1NF: Meets the definition of a relation

2NF: No partial dependency

3NF: No transitive dependency

BCNF: all determinants are candidate key

Ticket

Ticket(TicketNo.(pk), CustomerID(fk), GameID (fk), Price, TicketDate, TicketTime)

PK: TicketNo.

FD: TicketNo. -> CustomerID, GameID, Price, TicketDate, TicketTime

1NF: Meets the definition of a relation

2NF: No partial dependency

3NF: No transitive dependency

BCNF: all determinants are candidate key

Customer Information

CustomerInformation (CustomerID (pk), Name, Age, Fan Club)

PK: CustomerID

FD: CustomerID -> Name, Age, Fan Club

1NF: Meets the definition of a relation

2NF: No partial dependency

3NF: No transitive dependency

BCNF: all determinants are candidate key

Final Set of Relations:

Employee (EmployeeID(pk), Name, Age, DOB, MedStaffID(fk), MedStaffName, MedicalRole, MedicalSpecialty, CoachID(fk), CoachName, CoachingRole, CoachingSpecialty, Players(fk), PlayerName, Height, DraftRound)

MedicalMeeting (MedicalMeetingID(pk), MedStaffID(fk), PlayerID (fk), MeetingType, InjurySatus, InjuryStartDate, InjuryEndDate)

Practice (PracticeID (pk), CoachID (pk)(fk), PlayerID (pk)(fk), PracticeType, CoachName, PlayerName, StartTime, PracticeDurations, PracticeDate)

IndividualStatistics (PlayerID (pk) (fk), GameID (fk), MinutesPlayed, Points, OffensiveRebounds, DefensiveRebounds, Rebounds, Assists, Steals, Blocks, Turnovers, FieldGoalsAttempted, FieldGoalsMade, 3PointersMade, 3PointersAttempted, FreeThrowsMade, FreeThrowsAttempted, 2PointersMade, 2PointersAttempted)

Game (GameID (pk), VenueID (fk), GameDate, Opponent, Result, W-L, StartTime, EndTime)

Venue (VenueID(pk), Location)

Ticket (TicketNo.(pk), CustomerID(fk), GameID (fk), Price, TicketDate, TicketTime)

CustomerInformation (CustomerID (pk), Name, Age, Fan Club)

V. Creating Tables

Now that we have our normalized set of relations, we can move on to the creation of the database using the following SQL code:

```
CREATE TABLE Employee (
EmployeeID VARCHAR(10) NOT NULL,
Name VARCHAR(100) NOT NULL,
Age NUMBER NOT NULL,
DOB DATE NOT NULL
)
```

EmployeeID	Name	Age	DOB
1001	Tom Thibodeau	55	5/7/1966
1002	Johnnie Bryant	45	8/7/1976
1003	Darren Erman	62	1/19/1959
1004	Mike Woodson	60	1/13/1961
1005	Kenny Payne	45	12/12/1975
1006	Larry Greer	46	7/2/1974
1007	Andy Greer	39	11/16/1981
1008	Richard Willian	49	2/15/1972
1009	Aaron Brooks	36	3/17/1985
1010	Daisuke Yoshin	47	10/22/1973
1011	Frederick Cofie	29	10/25/1991
1012	Matt Harding	35	8/16/1985
1013	John Halas	41	1/19/1980
1014	Reggie Johnson	58	3/13/1963
1015	Alex Kline	52	3/7/1969
2001	Dr. Lisa Callaha	52	3/8/1969

```
CREATE TABLE Coaching_Staff (
CoachID VARCHAR(10) NOT NULL,
CoachName VARCHAR(100) NOT NULL,
CoachingRole VARCHAR(40) NOT NULL,
```

CoachingSpecialty VARCHAR(50) NOT NULL,
EmployeeID VARCHAR(10) NOT NULL
)

CoachID	CoachName	CoachingRol	CoachingSpe	EmployeeID
101	Tom Thibodeau	Head Coach	Coach	1001
102	Johnnie Bryant	Associate Heac	Coach	1002
103	Darren Erman	Assistant Coacl	Coach	1003
104	Mike Woodson	Assistant Coacl	Coach	1004
105	Kenny Payne	Assistant Coacl	Coach	1005
106	Larry Greer	Assistant Coacl	Coach	1006
107	Andy Greer	Assistant Coacl	Coach	1007
108	Richard Willian	Strength & Cor	Coach	1008
109	Aaron Brooks	Two-Way Liaisc	Coach	1009
110	Daisuke Yoshin	Assistant to He	Coach	1010
111	Frederick Cofie	Assistant to Ge	Personel	1011
112	Matt Harding	Advanced Scou	Scout	1012
113	John Halas	Basketball Scou	Scout	1013
114	Reggie Johnson	Basketball Scou	Scout	1014
115	Alex Kline	Basketball Scou	Scout	1015

CREATE TABLE Medical_Staff (
MedStaffID VARCHAR(10) NOT NULL,
MedStaffName VARCHAR(100) NOT NULL,
MedicalRole VARCHAR(40) NOT NULL,
MedicalSpecialty VARCHAR(50) NOT NULL,
EmployeeID VARCHAR(10) NOT NULL
)

MedStaffID	MedStaffNa	MedicalRole	MedicalSpec	EmployeeID
201	Dr. Lisa Callaha	Chief Medical (	Injury	2001
202	Dr. Answorth A	Team Orthope	Injury	2002
203	Erwin Benedict	Director Trainir	Performance	2003
204	Roger Hinds	Head Athletic T	Performance	2004
205	Anthony Goen	Head Athletic T	Performance	2005
206	Erin Silberberg	Massage Thera	Injury	2006
207	Erika Whitman	Team Sports Di	Performance	2007
208	Shimon Ishikav	Performance A	Performance	2008
209	Karen Wynn	Executive Adm	Performance	2009

```
CREATE TABLE Players (
PlayerID VARCHAR(10) NOT NULL,
PlayerName VARCHAR(40) NOT NULL,
Height NUMBER NOT NULL,
DraftRound NUMBER NOT NULL,
EmployeeID VARCHAR(10) NOT NULL
)
```

PlayerID	PlayerName	Height	DraftRound	EmployeeID
301	RJ Barrett	6.6	1	3001
302	Julius Randle	6.8	1	3002
303	Immanuel Quic	6.3	1	3003
304	Reggie Bullock	6.6	1	3004
305	Nerlens Noel	6.11	1	3005
306	Elfrid Payton	6.3	2	3006
307	Obi Toppin	6.9	1	3007
308	Alec Burks	6.6	2	3008
309	Kevin Knox	6.7	1	3009
310	Taj Gibson	6.9	1	3010
311	Mitchell Robin	7	1	3011
312	Derrick Rose	6.2	1	3012
313	Frank Ntilikina	6.4	1	3013

```
CREATE TABLE Medical_Meetings (
MedicalMeetingID VARCHAR(10) NOT NULL,
MedStaffID VARCHAR(10) NOT NULL,
PlayerID VARCHAR(10) NOT NULL,
MeetingType VARCHAR(80) NOT NULL,
InjuryStatus VARCHAR(80) NOT NULL,
InjuryStartDate DATE NOT NULL,
InjuryEndDate DATE
)
```

MedicalMeet	MedStaffID	PlayerID	MeetingType	InjuryStatus	InjuryStartDa	InjuryEndDat
100001	201	306	Injury	Out	4/15/2021	
100002	205	304	Injury	Day-To-Day	4/15/2021	4/17/2021
100003	201	306	Injury	Out	4/17/2021	
100004	202	312	Rehab	Day-To-Day	4/15/2021	4/20/2021
100005	201	306	Injury	Out	4/22/2021	4/25/2021
100006	206	306	Massage	Performance	4/21/2021	
100007	206	308	Massage	Performance	4/25/2021	4/25/2021
100008	206	304	Massage	Performance	4/16/2021	4/16/2021
100009	206	309	Massage	Performance	4/26/2021	4/26/2021
100010	206	306	Massage	Performance	4/27/2021	
100011	201	308	Rehab	Day-To-Day	4/27/2021	
100012	201	308	Rehab	Day-To-Day	4/28/2021	
100013	205	306	Rehab	Day-To-Day	5/3/2021	5/4/2021
100014	201	308	Rehab	Day-To-Day	4/29/2021	4/29/2021
100015	201	309	Injury	Out	5/1/2021	
100016	205	301	Injury	Day-To-Day	5/3/2021	5/4/2021
100017	205	309	Injury	Out	5/2/2021	5/3/2021

```
CREATE TABLE Practice (
PracticeID VARCHAR(10) NOT NULL,
CoachID VARCHAR(10) NOT NULL,
PlayerID VARCHAR(10) NOT NULL,
PracticeType VARCHAR(50) NOT NULL,
StartTime TIME NOT NULL,
PracticeDurations NUMBER NOT NULL,
PracticeDate DATE NOT NULL
)
```

PracticeID	CoachID	PlayerID	PracticeType	StartTime	PracticeDura	PracticeDate
200001	101	301	Off Day Run Thr	9:00:00 AM	30	4/26/2021
200001	101	302	Off Day Run Thr	9:00:00 AM	30	4/26/2021
200001	101	303	Off Day Run Thr	9:00:00 AM	30	4/26/2021
200001	101	304	Off Day Run Thr	9:00:00 AM	30	4/26/2021
200001	101	305	Off Day Run Thr	9:00:00 AM	30	4/26/2021
200001	101	306	Off Day Run Thr	9:00:00 AM	30	4/26/2021
200001	101	307	Off Day Run Thr	9:00:00 AM	30	4/26/2021
200001	101	308	Off Day Run Thr	9:00:00 AM	30	4/26/2021
200001	101	309	Off Day Run Thr	9:00:00 AM	30	4/26/2021
200001	101	310	Off Day Run Thr	9:00:00 AM	30	4/26/2021
200001	101	311	Off Day Run Thr	9:00:00 AM	30	4/26/2021
200001	101	312	Off Day Run Thr	9:00:00 AM	30	4/26/2021
200001	101	313	Off Day Run Thr	9:00:00 AM	30	4/26/2021
200002	104	301	Shooting Drills	10:00:00 AM	60	4/26/2021
200002	104	302	Shooting Drills	10:00:00 AM	60	4/26/2021
200002	104	303	Shooting Drills	10:00:00 AM	60	4/26/2021
200002	104	304	Shooting Drills	10:00:00 AM	60	4/26/2021
200002	104	305	Shooting Drills	10:00:00 AM	60	4/26/2021

CREATE TABLE IndividualStatistics (
PlayerID VARCHAR(10) NOT NULL,
GameID VARCHAR(10) NOT NULL,
MinutesPlayed NUMBER,
Points NUMBER,
OffensiveRebounds NUMBER,
DefensiveRebounds NUMBER,
Rebounds NUMBER,
Assists NUMBER,
Steals NUMBER,
Blocks NUMBER,
Turnovers NUMBER,
FieldGoalsMade NUMBER,
FieldGoalsAttempted NUMBER,
3PointersMade NUMBER,
3PointersAttempted NUMBER,
FreeThrowsMade NUMBER,
FreeThrowsAttempted NUMBER,
2PointersMade NUMBER,
2PointersAttempted NUMBER
)

PlayerID	GameID	MinutesPlaye	Points	OffensiveReb	DefensiveRel	Rebounds	Assists	Steals	Blocks	Turnovers	FieldGoalsMa	FieldGoalsAtt	3PointersMa	3PointersAtt	FreeThrowsA	FreeThrowsA
301	11	33	19	0	1	1	5	2	0	0	7	12	3	6	2	3
301	12	33	7	0	3	3	3	2	1	1	2	11	0	4	3	4
301	13	28	6	1	3	4	1	2	1	1	2	10	1	3	1	1
302	11	38	26	1	7	8	5	0	0	5	7	19	1	8	11	11
302	12	39	34	2	8	10	4	2	1	7	13	23	2	6	6	7
302	13	42	32	2	6	8	5	0	0	4	11	26	5	8	5	5
303	11	18	3	0	5	5	0	0	0	0	1	8	1	6	0	0
303	12	15	5	0	0	0	0	0	0	2	2	6	0	2	1	1
303	13	11	7	0	0	0	0	0	0	0	2	5	2	2	1	1
304	11	27	10	0	3	3	0	4	0	1	4	11	2	8	0	0
304	12	31	12	0	2	2	3	2	0	0	4	12	3	10	1	1
304	13	35	16	0	4	4	2	0	0	1	6	10	4	7	0	0
305	11	28	9	5	8	13	1	1	4	0	4	7	0	0	1	2
305	12	30	6	5	4	9	2	4	2	1	2	3	0	0	2	2
305	13	13	4	1	2	3	0	1	1	0	2	3	0	0	0	0
306	11	17	11	1	3	4	3	0	0	1	5	7	1	2	0	0
306	12	27	20	1	2	3	3	1	0	2	9	12	0	0	2	4
306	13	20	11	2	5	7	4	0	0	0	5	11	0	1	1	2
307	11	5	2	1	2	3	0	0	0	0	1	2	0	0	0	0
307	12	9	3	0	2	2	0	1	0	1	1	2	0	1	1	2
307	13	6	0	0	1	1	0	0	0	0	0	1	0	1	0	0
308	11	26	8	0	2	2	2	0	0	3	2	9	1	4	3	4
308	12	16	2	0	5	5	2	0	1	0	1	5	0	3	0	0
308	13	22	21	0	7	7	1	1	0	0	7	12	4	7	3	3
309	11	5	1	1	1	2	0	1	0	0	0	0	0	0	1	2

CREATE TABLE Game (
GameID VARCHAR(10) NOT NULL,
VenueID VARCHAR(10) NOT NULL,
GameDate DATE,
Opponent VARCHAR(30),
Result VARCHAR(10),

W_L VARCHAR(10),
StartTime TIME,
EndTime TIME
)

GameID	VenueID	GameDate	Opponent	Result	W_L	StartTime	EndTime
11	10000001	4/27/2021	Raptors	102-96	22-20	7:00:00 PM	10:00:00 PM
12	10000022	4/29/2021	Lakers	111-96	23-20	7:00:00 PM	10:00:00 PM
13	10000001	5/1/2021	Pelicans	116-106	24-20	7:00:00 PM	10:00:00 PM

CREATE TABLE Ticket (
TicketNo VARCHAR(10) NOT NULL,
CustomerID VARCHAR(10) NOT NULL,
GameID VARCHAR(10) NOT NULL,
Price VARCHAR(10) NOT NULL,
TicketDate DATE,
TicketTime TIME NOT NULL
)

TicketNo	CustomerID	GameID	Price	TicketDate	TicketTime
100000001	20000001	11	24.99	4/27/2021	7:00:00 PM
100000002	20000002	11	24.99	4/27/2021	7:00:00 PM
100000003	20000003	11	24.99	4/27/2021	7:00:00 PM
100000004	20000004	11	55.99	4/27/2021	7:00:00 PM
100000005	20000005	11	55.99	4/27/2021	7:00:00 PM
100000006	20000006	11	55.99	4/27/2021	7:00:00 PM
100000007	20000007	11	55.99	4/27/2021	7:00:00 PM
100000008	20000008	11	89.99	4/27/2021	7:00:00 PM
100000009	20000009	11	89.99	4/27/2021	7:00:00 PM
100000010	20000010	11	89.99	4/27/2021	7:00:00 PM
100000011	20000011	11	89.99	4/27/2021	7:00:00 PM
100000012	20000012	11	89.99	4/27/2021	7:00:00 PM
100000013	20000013	11	149.99	4/27/2021	7:00:00 PM

CREATE TABLE Venue (
VenueID VARCHAR(10) NOT NULL,
Location VARCHAR(40) NOT NULL,
)

VenueID	Location
10000001	New York
10000022	Los Angeles

```
CREATE TABLE Customer_Information (
CustomerID VARCHAR(10) NOT NULL,
Name VARCHAR(40) NOT NULL,
Age NUMBER NOT NULL,
Fan_Club VARCHAR(40) NOT NULL
)
```

CustomerID	Name	Age	Fan_Club
20000001	Caleb Castillo	51	Yes
20000002	Diana Lindsey	41	No
20000003	Dexter Montgor	48	Yes
20000004	Rufus Nunez	29	Yes
20000005	Betsy Arnold	42	No
20000006	Lucia Cooper	24	Yes
20000007	Malcolm Keller	48	Yes
20000008	Benjamin Henry	83	Yes
20000009	Tyrone Alvarez	48	Yes
20000010	Stewart Cannon	28	Yes
20000011	Linda Thompsor	48	No
20000012	Denise Frank	38	No

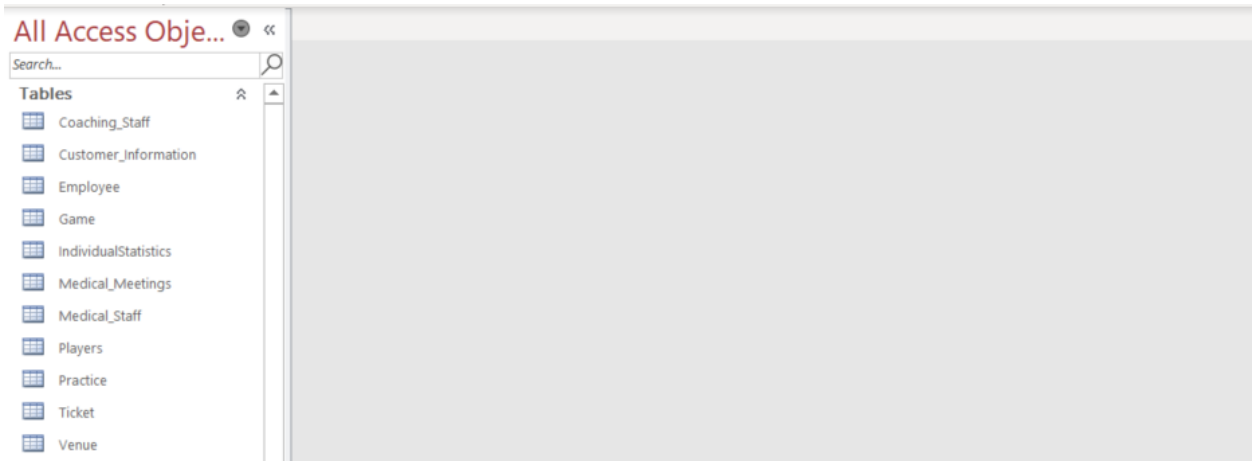
Adding Primary and Foreign Keys

```
ALTER TABLE Employee
        ADD CONSTRAINT pk_employees PRIMARY KEY (EmployeeID)

ALTER TABLE Coaching_Staff
        ADD CONSTRAINT pk_coaching_staff PRIMARY KEY (CoachID),
        CONSTRAINT fk_coaching_staff FOREIGN KEY (EmployeeID) REFERENCES
        Employee (EmployeeID)

ALTER TABLE Medical_Staff
```

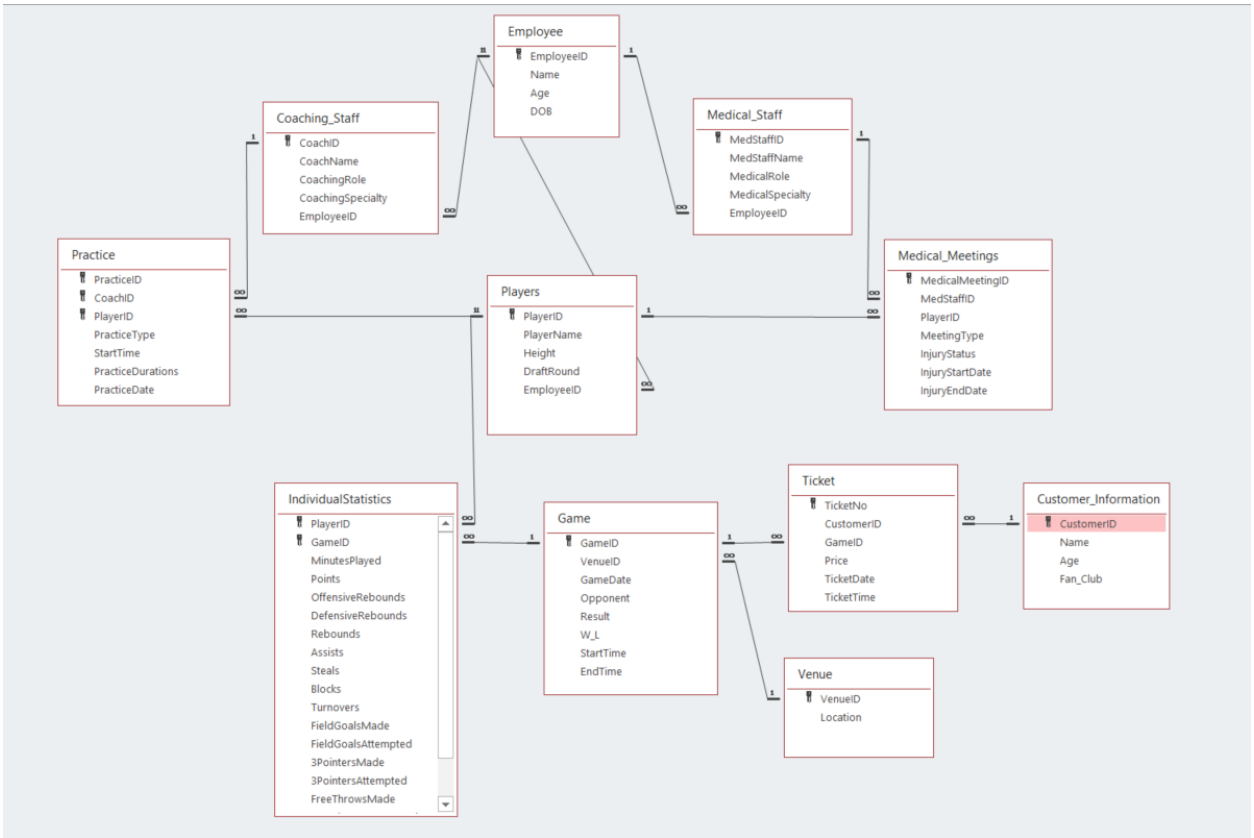
```
    ADD CONSTRAINT pk_medical_staff PRIMARY KEY (MedStaffID),
    CONSTRAINT fk_medical_staff FOREIGN KEY (EmployeeID) REFERENCES
    Employee (EmployeeID)

ALTER TABLE Players
    ADD CONSTRAINT pk_players PRIMARY KEY (PlayerID),
    CONSTRAINT fk_player FOREIGN KEY (EmployeeID) REFERENCES
    Employee (EmployeeID)

ALTER TABLE Practice
    ADD CONSTRAINT pk_practice PRIMARY KEY (PracticeID, PlayerID,
CoachID),
    CONSTRAINT fk1_practice FOREIGN KEY (PlayerID) REFERENCES Players
    (PlayerID),
    CONSTRAINT fk2_practice FOREIGN KEY (CoachID) REFERENCES
    Coaching_Staff(CoachID)

ALTER TABLE Medical_Meetings
    ADD CONSTRAINT pk_medical_meeting PRIMARY KEY (MedicalMeetingID),
    CONSTRAINT fk1_medical_meeting FOREIGN KEY (PlayerID) REFERENCES
    Players (PlayerID),
    CONSTRAINT fk2_medical_meeting FOREIGN KEY (MedStaffID)
    REFERENCES Medical_Staff (MedStaffID)

ALTER TABLE Venue
    ADD CONSTRAINT pk_venue PRIMARY KEY (VenueID)

ALTER TABLE Game
    ADD CONSTRAINT pk_game PRIMARY KEY (GameID)

ALTER TABLE Game
    ADD CONSTRAINT fk_game FOREIGN KEY (VenueID) REFERENCES Venue
    (VenueID)

ALTER TABLE Customer_Information
    ADD CONSTRAINT pk_Customer_Information PRIMARY KEY (CustomerID)

ALTER TABLE Ticket
    ADD CONSTRAINT pk_Ticket PRIMARY KEY (TicketNo),
```

```
        CONSTRAINT fk1_Ticket FOREIGN KEY (CustomerID) REFERENCES
        Customer_Information (CustomerID)
        CONSTRAINT fk2_Ticket FOREIGN KEY (GameID) REFERENCES Game
(GameID)

ALTER TABLE IndividualStatistics
        ADD CONSTRAINT pk_individual_statistics PRIMARY KEY (PlayerID, GameID),
        CONSTRAINT fk1_individual_statistics FOREIGN KEY (PlayerID)
        REFERENCES Players (PlayerID),
        CONSTRAINT fk2_individual_statistics FOREIGN KEY (GameID)
        REFERENCES Game (GameID)
```

Database Schema



Relationship View



Adding Data to the table using SQL INSERT statements

INSERT INTO Employee VALUES ("1001", "Tom Thibodeau", 45, "5/7/1966");

INSERT INTO Coaching_Staff VALUES ("101", "Tom Thibodeau", "Head Coach", "Coach", "1001");

INSERT INTO Players VALUES ("301", "RJ Barrett", 6.6, 1, "3001");

INSERT INTO Medical_Staff VALUES ("201", "Dr. Lisa Callahan", "Chief Medical Officer, "Injury", "2001");

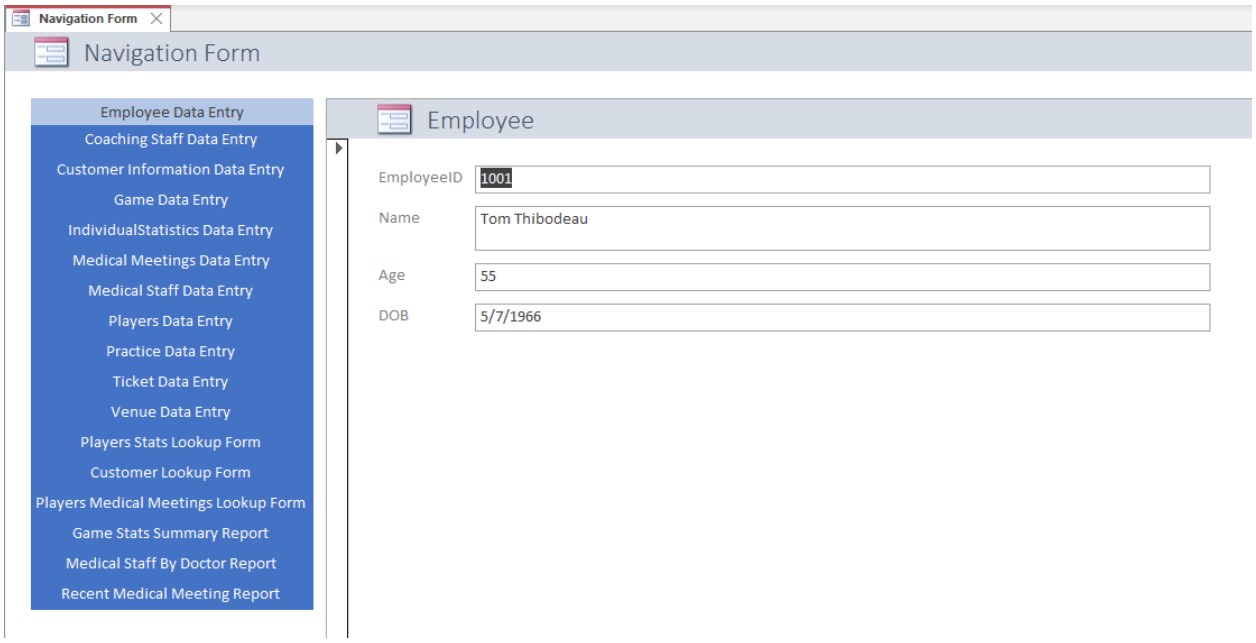
INSERT INTO Practice VALUES ("200001", "101", "301", "Off Day Run Through", "9:00, 30, "4/26/2021");

INSERT INTO Medical_Meeting VALUES ("100001", "201", "301", "Injury", "Out", 4/15/2021");

```
INSERT INTO IndividualStatistics VALUES ("301", "11", 33, 19, 0, 1, 1, 5, 2, 0, 0, 7, 12, 3, 6, 2, 3, 4, 6);

INSERT INTO Game VALUES ("11", "301", "10000001", "4/27/2021", "Raptors", "102-96", "22-20", "19:00", "22:00");

INSERT INTO Customer_Information VALUES ("20000001", "100000001", "Caleb Castillo", 51, "Yes");

INSERT INTO Ticket VALUES ("100000001", "20000001", "11", 24.99, "4/27/2011", "19:00");

INSERT INTO Venue VALUES ("10000001", "New York");
```

VI. Application Implementation

NAVIGATION FORM



QUERIES

The queries are developed for the data analyst to support the coaches, medical staff, and the players with the latest statistics, information and insights into each player, each opponent. Therefore, we have created a few example of those:

Information for players with highest PPG:

PlayerName	Height	DraftRound	"AVERAGE POINTS PER GAME"
Julius Randle	6.8	1	31
Elfrid Payton	6.3	2	14
Reggie Bullock	6.6	1	13
Derrick Rose	6.2	1	12
RJ Barrett	6.6	1	11
Alec Burks	6.6	2	10
Nerlens Noel	6.11	1	6
Taj Gibson	6.9	1	6
Immanuel Quickley	6.3	1	5
Obi Toppin	6.9	1	2
Kevin Knox	6.7	1	0
Frank Ntilikina	6.4	1	0
Mitchell Robinson	7	1	0

```
SELECT Players.PlayerName, Players.Height, Players.DraftRound, ROUND(AVG(Points)) AS ["AVERAGE POINTS PER GAME"]
FROM IndividualStatistics, Players
WHERE Players.PlayerID = IndividualStatistics.PlayerID
GROUP BY Players.PlayerID, Players.PlayerName, Players.Height, Players.DraftRound
ORDER BY AVG(Points) DESC;
```

Information for players with highest APG:

PlayerName	Height	DraftRound	"AVERAGE ASSISTS PER GAME"
Julius Randle	6.8	1	5
Elfrid Payton	6.3	2	3
RJ Barrett	6.6	1	3
Derrick Rose	6.2	1	3
Alec Burks	6.6	2	2
Reggie Bullock	6.6	1	2
Taj Gibson	6.9	1	1
Nerlens Noel	6.11	1	1
Frank Ntilikina	6.4	1	0
Mitchell Robinson	7	1	0
Kevin Knox	6.7	1	0
Obi Toppin	6.9	1	0
Immanuel Quickley	6.3	1	0

```
SELECT Players.PlayerName, Players.Height, Players.DraftRound, ROUND(AVG(Assists)) AS ["AVERAGE ASSISTS PER GAME"]
FROM IndividualStatistics, Players
WHERE Players.PlayerID = IndividualStatistics.PlayerID
GROUP BY Players.PlayerID, Players.PlayerName, Players.Height, Players.DraftRound
ORDER BY AVG(Assists) DESC;
```

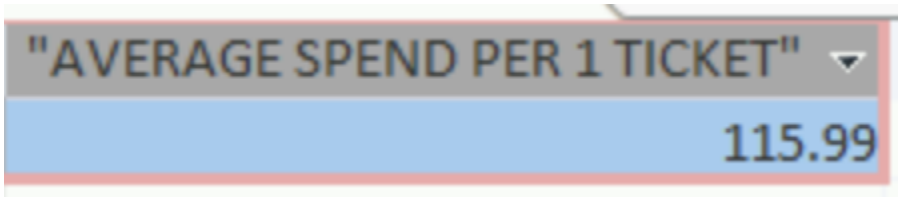
Information for players who are recovered from injury:

PlayerName	Height	DraftRound
Alec Burks	6.6	2
Derrick Rose	6.2	1
Elfrid Payton	6.3	2
Kevin Knox	6.7	1
Reggie Bullock	6.6	1
RJ Barrett	6.6	1

```
SELECT DISTINCT Players.PlayerName, Players.Height, Players.DraftRound
FROM Medical_Meetings, Players
WHERE Players.PlayerID = Medical_Meetings.PlayerID AND InjuryEndDate IS NOT NULL;
```

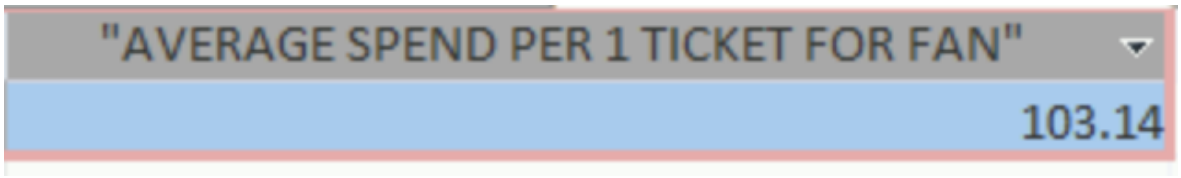
We also developed queries to be used to analyze revenue. In this, you can see that we are calculating average spend on 1 ticket among fans and non-fans and everyone. In order to do this, we are able to see if we can leverage any activities to engage with fan betters to increase the team revenue or to see if we need to focus on non-fans in the near future.

Average Spend per 1 Ticket:



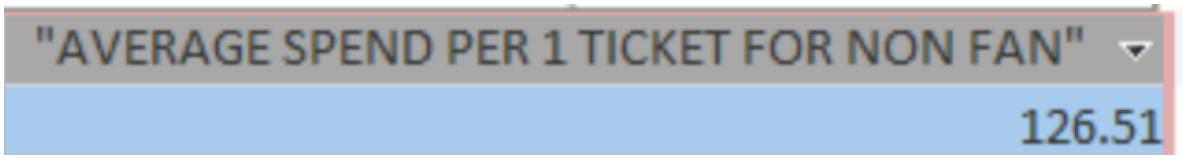

```
SELECT ROUND(AVG(Price),2) AS ["AVERAGE SPEND PER 1 TICKET"]
FROM Ticket;
```

Average Spend per 1 Ticket by Fans:




```
SELECT ROUND(AVG(Price),2) AS ["AVERAGE SPEND PER 1 TICKET FOR FAN"]
FROM Ticket, Customer_Information
WHERE Ticket.CustomerID = Customer_Information.CustomerID AND Customer_Information.Fan_Club = "Yes";
```

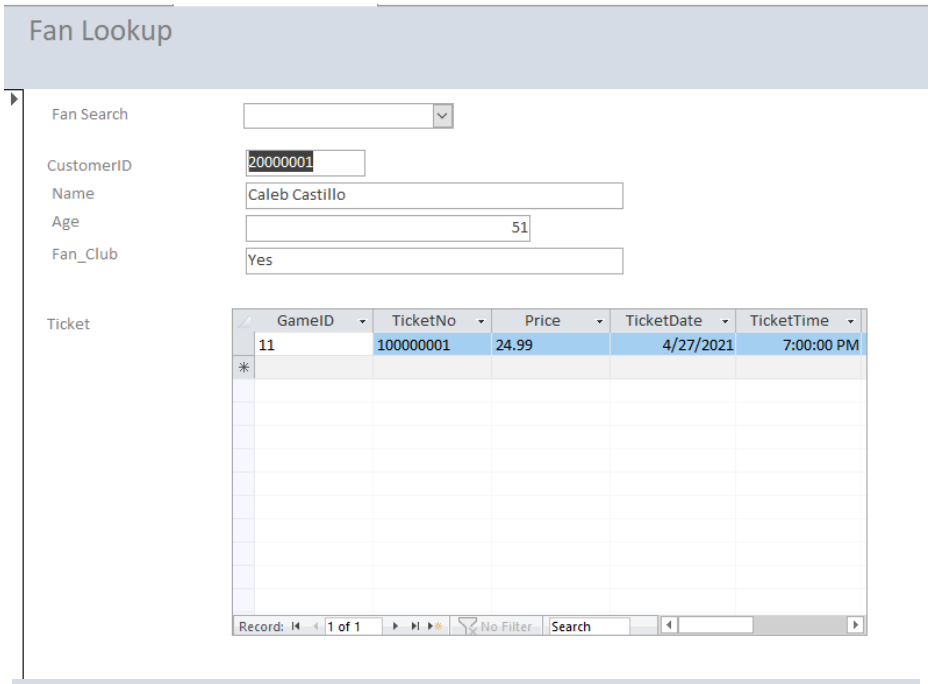
Average Spend per 1 Ticket by non-Fans:



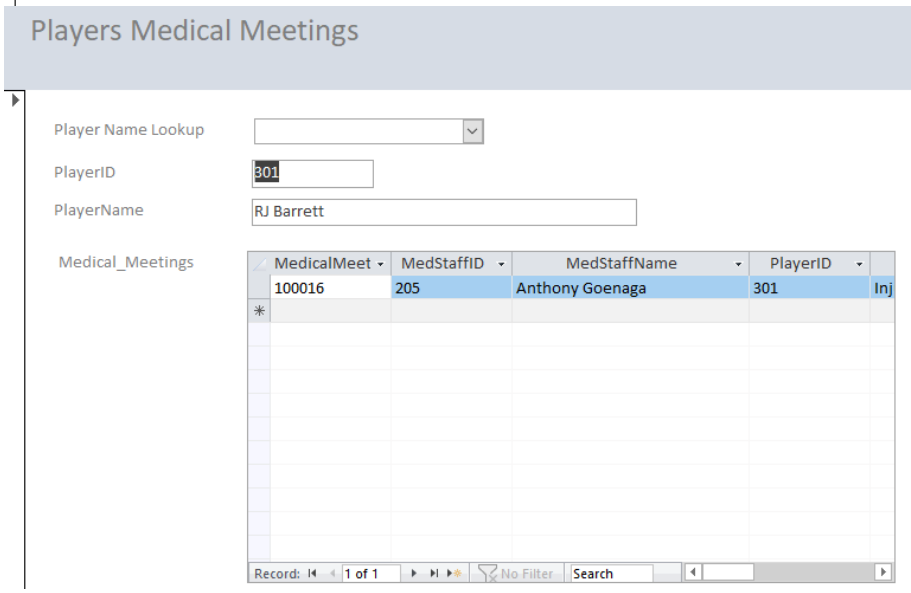

```
SELECT ROUND(AVG(Price),2) AS ["AVERAGE SPEND PER 1 TICKET FOR NON FAN"]
FROM Ticket, Customer_Information
WHERE Ticket.CustomerID = Customer_Information.CustomerID AND Customer_Information.Fan_Club = "No";
```

Lookup Forms

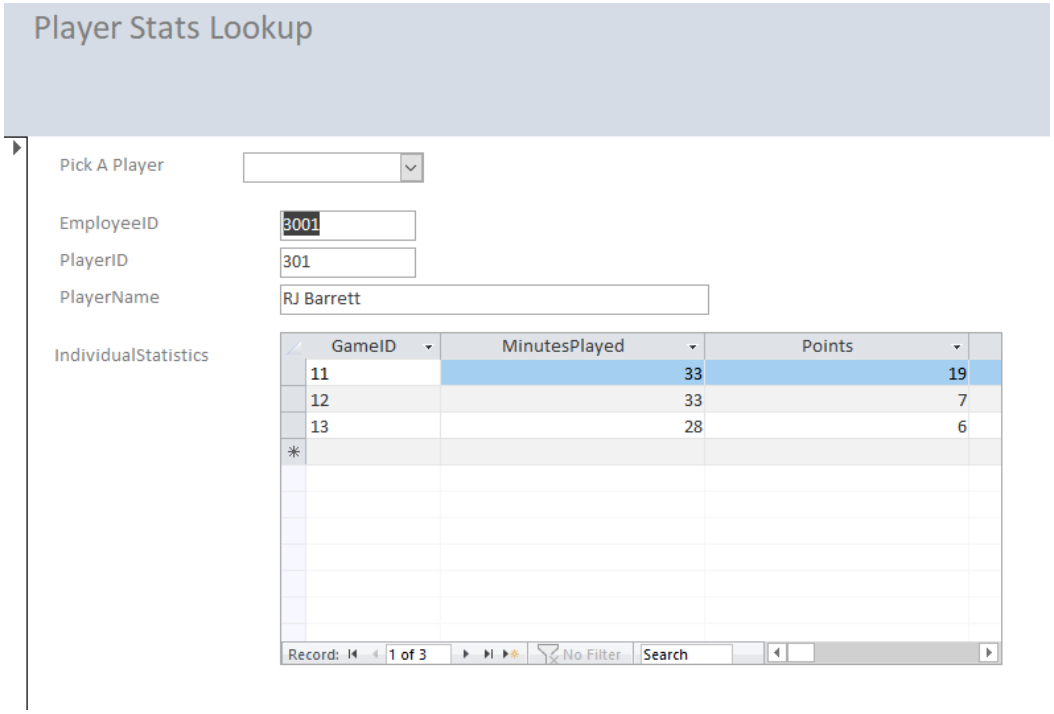
Customer Lookup Form: The Fan lookup form pulls all information from the customer ID, and ticket table. This allows the Knicks team staff to search for information by client name. This has many potential useful cases; if a fan has been selected for an event, any promotional marketing, as well as keeping track of VIP customers, keeping close track of customer information is very valuable for the organization.



Players Medical Meeting: The player medical meeting form allows for all recent medical meetings to be shown for the player selected. The player name lookup provides a drop down of the names on the team and selecting a player shows their meeting info. This is useful for a medical staff to reference to see a players recent injury history, as well as the coaching staff to reference and monitor what is happening with the player.



Player Stats Lookup Form: This is the most fundamental of forms for the team to have. The player stats is important for the coaches to monitor to understand performance, as well as keeping track of usage time. All stats are monitored and displayed for all of the players' games. The Pick a Player is a drop down menu that allows for a player to be selected. These statistics are also published on the team site and available to the media.



Reports

Game Statistics Report: The game statistic report shows the most recent game information with the nested individual statistics. This report is incredibly useful for the media and coaches after the game as well as referencing to review performance. It is common for players to be given the stat sheets when they are interviewed after the game. This report is sorted by most recent games at the top and by players usage number at the top.

Game Statistics

Game	VenueID	GameDate	Opponent	Result	W_L	StartTime	EndTime	PlayerID	PlayerName	MIns_Played	Points	O_Rbds	D_Rbds	Rbd	Assists	Steals	Blocks	Turnovers	FG_Made	FG_Attempted	3PT_Made
13	10000001	5/1/2021	Pelicans	116-106	24-20	7:00:00 PM	10:00:00 PM														
								302	Julius Randle	42	32	2	6	8	5	0	0	4	11	26	5
								304	Reggie Bullock	35	16	0	4	4	2	0	0	1	6	10	4
								310	Taj Gibson	35	8	4	6	10	2	0	2	0	4	5	0
								312	Derrick Rose	28	11	1	3	4	4	2	1	0	5	14	1
								301	RJ Barrett	28	6	1	3	4	1	2	1	1	2	10	1
								308	Alec Burks	22	21	0	7	7	1	1	0	0	7	12	4
								306	Elfrid Payton	20	11	2	5	7	4	0	0	0	5	11	0
								305	Nerlens Noel	13	4	1	2	3	0	1	1	0	2	3	0
								303	Immanuel Quickley	11	7	0	0	0	0	0	0	0	2	5	2
								307	Obi Toppin	6	0	0	1	1	0	0	0	0	0	1	0
								311	Mitchell Robinson	0	0	0	0	0	0	0	0	0	0	0	0
								309	Kevin Knox	0	0	0	0	0	0	0	0	0	0	0	0
								313	Frank Ntilikina	0	0	0	0	0	0	0	0	0	0	0	0
12	10000022	4/29/2021	Lakers	111-96	23-20	7:00:00 PM	10:00:00 PM														
								302	Julius Randle	39	34	2	8	10	4	2	1	7	13	23	2
								301	RJ Barrett	33	7	0	3	3	3	2	1	1	2	11	0
								304	Reggie Bullock	31	12	0	2	2	3	2	0	0	4	12	3
								305	Nerlens Noel	30	6	5	4	9	2	4	2	1	2	3	0
								306	Elfrid Payton	27	20	1	2	3	3	1	0	2	9	12	0
								312	Derrick Rose	20	14	1	2	3	2	0	1	1	5	9	0
								310	Taj Gibson	17	8	6	4	10	0	2	3	0	3	5	0
								308	Alec Burks	16	2	0	5	5	2	0	1	0	1	5	0
								303	Immanuel Quickley	15	5	0	0	0	0	0	0	2	2	6	0
								307	Obi Toppin	9	3	0	2	2	0	1	0	1	1	2	0
								309	Kevin Knox	1	0	0	0	0	0	1	0	0	0	1	0
								311	Mitchell Robinson	0	0	0	0	0	0	0	0	0	0	0	0

Medical Staff Report: The medical staff report shows the most recent medical meeting by each doctor. This information allows for an organized viewpoint of who each doctor is currently treating and on top of that allows for seeing the progression of players treatment’s by the doctor.
(shown on next page)

Medical_Staff

MedStaffName	Medical	Medical_Me	PlayerI	PlayerName	MeetingType	InjuryStatus	InjuryStartDate	InjuryEndDate
Dr. Lisa Callahan								
	100015	201	309	Kevin Knox	Injury	Out	5/1/2021	
	100014	201	308	Alec Burks	Rehab	Day-To-Day	4/29/2021	4/29/2021
	100012	201	308	Alec Burks	Rehab	Day-To-Day	4/28/2021	
	100011	201	308	Alec Burks	Rehab	Day-To-Day	4/27/2021	
	100005	201	306	Elfrid Payton	Injury	Out	4/22/2021	4/25/2021
	100003	201	306	Elfrid Payton	Injury	Out	4/17/2021	
	100001	201	306	Elfrid Payton	Injury	Out	4/15/2021	
Dr. Answorth Allen								
	100004	202	312	Derrick Rose	Rehab	Day-To-Day	4/15/2021	4/20/2021
Anthony Goenaga								
	100013	205	306	Elfrid Payton	Rehab	Day-To-Day	5/3/2021	5/4/2021
	100016	205	301	RJ Barrett	Injury	Day-To-Day	5/3/2021	5/4/2021
	100017	205	309	Kevin Knox	Injury	Out	5/2/2021	5/3/2021
	100002	205	304	Reggie Bullock	Injury	Day-To-Day	4/15/2021	4/17/2021
Erin Silberberg								
	100010	206	306	Elfrid Payton	Massage	Performance	4/27/2021	
	100009	206	309	Kevin Knox	Massage	Performance	4/26/2021	4/26/2021
	100007	206	308	Alec Burks	Massage	Performance	4/25/2021	4/25/2021
	100006	206	306	Elfrid Payton	Massage	Performance	4/21/2021	
	100008	206	304	Reggie Bullock	Massage	Performance	4/16/2021	4/16/2021

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Medical Meeting Report:

This report shows the Medical Meetings sorted by most recent. This is a more general form for the coaches so they can constantly be updated on the medical meetings going on, and have enough of the recent information to see the previous meetings.

Medical_Meetings

Tuesday, May 18, 2021
5:44:17 PM

MedicalMeetingID	MedStaffID	PlayerID	MeetingType	InjuryStatus	InjuryStartDate	InjuryEndDate
100016	205	301	Injury	Day-To-Day	5/3/2021	5/4/2021
100013	205	306	Rehab	Day-To-Day	5/3/2021	5/4/2021
100017	205	309	Injury	Out	5/2/2021	5/3/2021
100015	201	309	Injury	Out	5/1/2021	
100014	201	308	Rehab	Day-To-Day	4/29/2021	4/29/2021
100012	201	308	Rehab	Day-To-Day	4/28/2021	
100010	206	306	Massage	Performance	4/27/2021	
100011	201	308	Rehab	Day-To-Day	4/27/2021	
100009	206	309	Massage	Performance	4/26/2021	4/26/2021
100007	206	308	Massage	Performance	4/25/2021	4/25/2021
100005	201	306	Injury	Out	4/22/2021	4/25/2021
100006	206	306	Massage	Performance	4/21/2021	
100003	201	306	Injury	Out	4/17/2021	
100008	206	304	Massage	Performance	4/16/2021	4/16/2021
100001	201	306	Injury	Out	4/15/2021	
100004	202	312	Rehab	Day-To-Day	4/15/2021	4/20/2021
100002	205	304	Injury	Day-To-Day	4/15/2021	4/17/2021

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VII. Conclusion

The database created for the Knicks allows for optimal control over the data for the coaches and medical employees. In order to keep track of player performance and health it is important to have the information organized and readily available for usage. The queries, lookups, and reports, serve to help enable the team to be as informed as possible. The queries provide the manipulation available to give more advanced stats and select necessary sections of the data. The lookups allow for ease of reference for the coaches, medical team, and executives to see any necessary information. And the reports provide daily detailed data necessary to the team.