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IST 659 Database Admin. Project

Hockey Team Database

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Part 1: Design

Project Narrative

A local college hockey team wants to establish itself as the premier team in the Northeast. They play games weekly from September through March, and if they finish at the top of their division, they have a chance to make it to the national tournament to face off against the best teams in the country. The competition is fierce, so recruiting the best players is a major focus. Part of the appeal for college hockey players is the "professional" feel of keeping accurate stats on games and players, such as goals, assists, and penalty minutes. This also allows the team to use data to make lineup choices and prepare for upcoming games. Currently, the stats for all games and players are recorded on paper, with no online record of game stats or a player's total points scored throughout the season. To encourage team growth, appeal to new recruits, and potentially improve game strategy, the team has decided to hire a database administrator to create a database for the team to store data throughout the season.

Data Dictionary

After speaking with the players and coaches, we have identified the following entities and attributes that will need to be recorded in the database.

Entity	Attribute	Properties
Players	Name	Required, composite of first and last
	Email	Required, unique
	Address	Required
	Phone Number	Required
	Position	Required
	Number	Required
	Year	required
Opponents	Name	Required
	Location	Required
	Home Rink	Required
Games	Date	Required
	Home/Away	Required
	Win / Loss	Required
	Dressed Players	Required, multivalued, composite list of player names
	Ice Time	Required, default to 0
Goals (Could be called: Goals For)	Scored By	Required, composite of first and last name
	Assisted By	Composite of first and last name
	Type of goal (shorthanded / power play / even strength)	Required
Goals Against	Opposing Team	Required

| (Could be called: Goalies)	Goalie Name	Required, composite of first and last name

Data Questions

Some common questions we would ask:

1. Who has scored the most Goals this season?
    a. Who are the top 5 goal scorers this season? (in R)
2. How many wins/losses does the team have this season?
3. Which goalie has the highest GAA (goals against average)?
4. Which team did we score the most goals on?
5. Who has taken the most penalty minutes on the team?

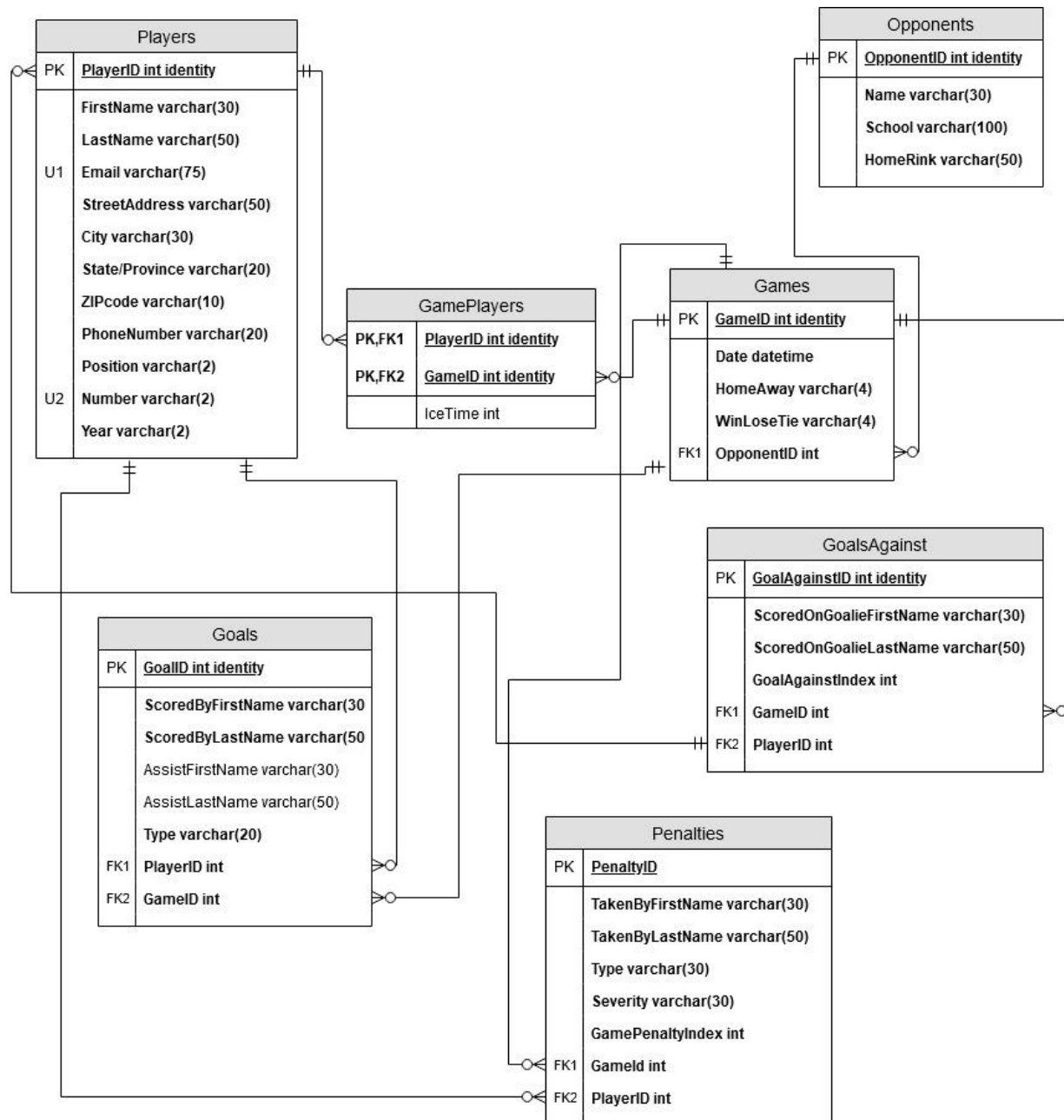# Entity Relationship Diagram

The entities and their relationships are modeled in the below figure:
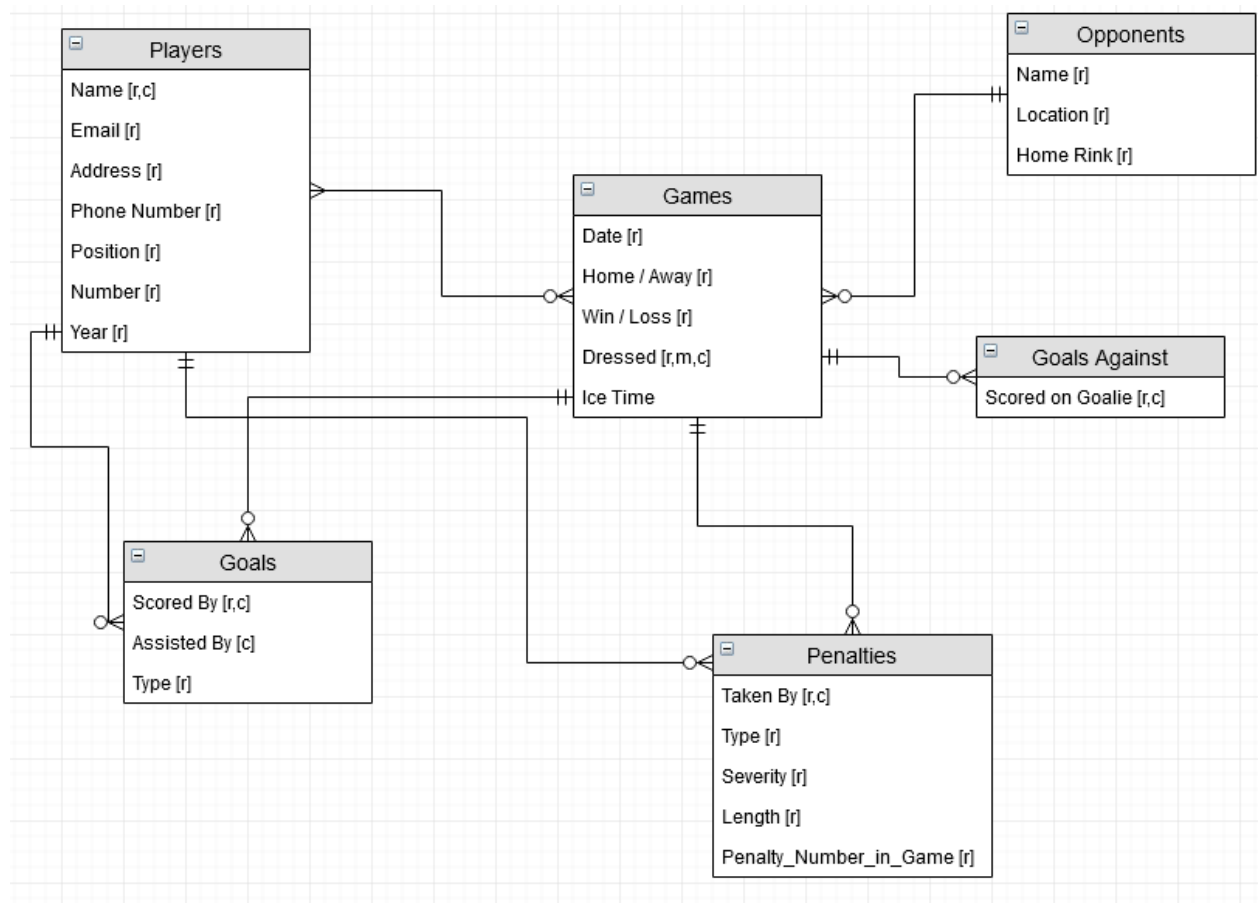
The business rules associated with the team are as follows:

1. A player can play in 0 or many games, and each game must have many players (21 to be precise)
2. Each game can be only against 1 opponent, but an Opponent can be played many times.
3. Many penalties can be taken during a game, but each penalty taken must be from only 1 game. (A player may repeat the type of penalty, even within the same game. But that will be called the "2nd" penalty of that type for that game for that player)
4. Each goal can be referenced back to a specific game, but a game may have 0 or many goals.
5. Each goal can only be scored by 1 player, but a player can have many goals in a game.
6. A Player can only assist each goal once but can assist many goals in a game.
7. Each goal scored against the team can only be scored against 1 goalie, but a goalie can be scored on many times within the same game (similar to Penalties, an "index" must be kept for each Game-GoalAgainst-Goalie to uniquely identify each goal against a goalie in a game).
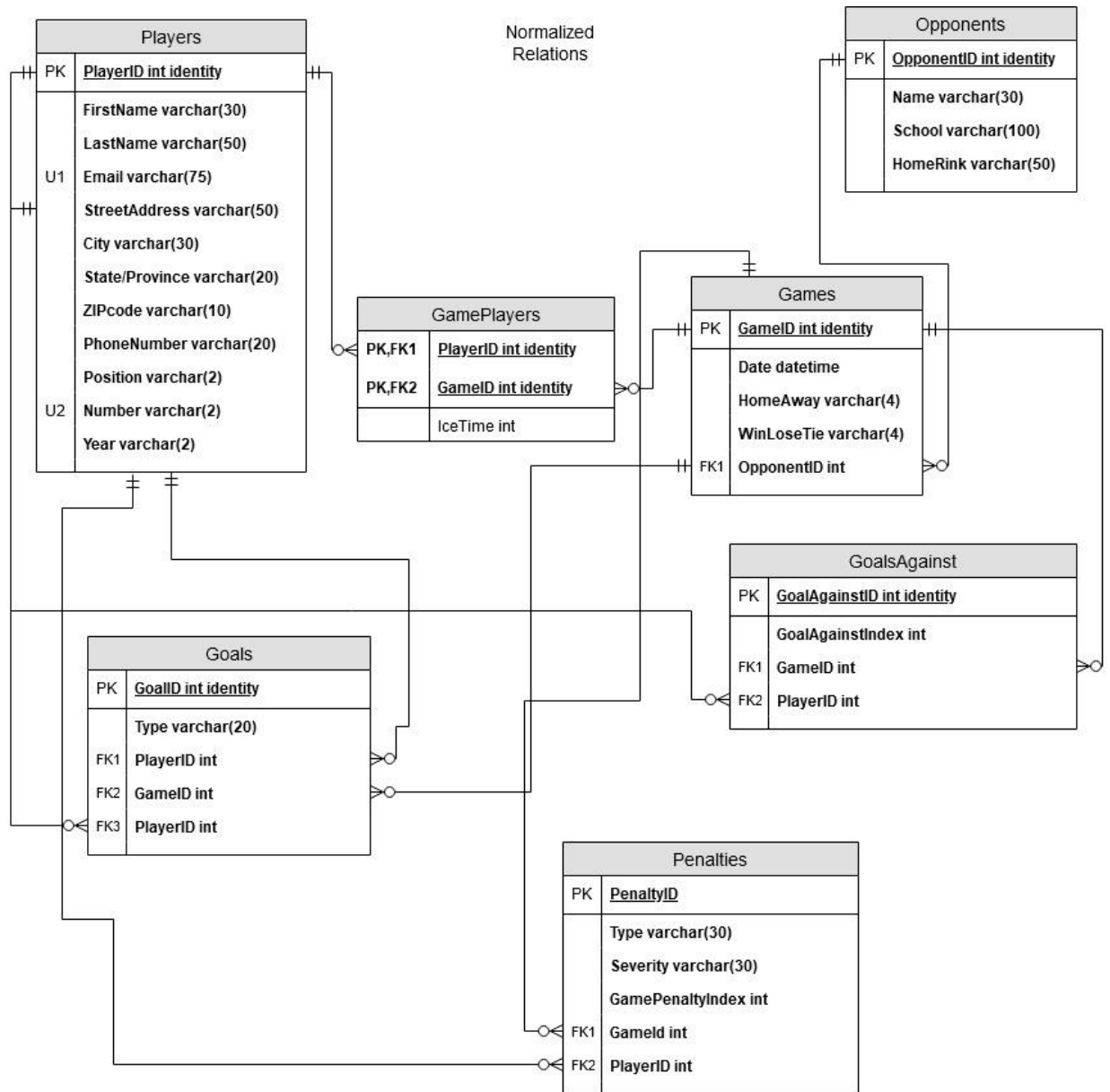
Logical Model Diagram

Players

PK	**PlayerID int identity**	
	FirstName varchar(30)	
	LastName varchar(50)	
U1	Email varchar(75)	
	StreetAddress varchar(50)	
	City varchar(30)	
	State/Province varchar(20)	
	ZIPcode varchar(10)	
	PhoneNumber varchar(20)	
	Position varchar(2)	
U2	Number varchar(2)	
	Year varchar(2)	

Opponents

PK	**OpponentID int identity**
	Name varchar(30)
	School varchar(100)
	HomeRink varchar(50)

GamePlayers

PK,FK1	**PlayerID int identity**
PK,FK2	**GameID int identity**
	IceTime int

Games

PK	**GameID int identity**
	Date datetime
	HomeAway varchar(4)
	WinLoseTie varchar(4)
FK1	OpponentID int

GoalsAgainst

PK	**GoalAgainstID int identity**
	ScoredOnGoalieFirstName varchar(30)
	ScoredOnGoalieLastName varchar(50)
	GoalAgainstIndex int
FK1	GameID int
FK2	PlayerID int

Goals

PK	**GoalID int identity**
	ScoredByFirstName varchar(30
	ScoredByLastName varchar(50
	AssistFirstName varchar(30)
	AssistLastName varchar(50)
	Type varchar(20)
FK1	PlayerID int
FK2	GameID int

Penalties

PK	**PenaltyID**
	TakenByFirstName varchar(30)
	TakenByLastName varchar(50)
	Type varchar(30)
	Severity varchar(30)
	GamePenaltyIndex int
FK1	GameId int
FK2	PlayerID int

Normalized Model

To be in 1st normal form, the logical model must not have any multi-valued attributes. Since this model does not have any multivalued attribues, each cell in the table will have a discrete value, thus it is already in 1st normal form. To get to 2nd normal form, all partial functional dependencies must be removed. Since only 1 table has more than 1 candidate key, GamePlayers, there is no way for this model to have any partial function dependencies. Therefore, it is in 2nd normal form. For 3rd normal form, we must look for determinants that are not candidate keys which uniquely identify an attribute within a table. The model that is currently set up does not have such cases of transitive dependencies, so we can be sure that our model is in 3rd normal form as is.

Below is an updated image of the relations, but with duplicate FirstName and LastName attributes removed from the Goals, GoalsAgainst, and Penalties tables. FK3 PlayerID in Goals references PlayerID in the Players table, in the physical design this column will be named to AssistID in the Goals table, as this is the record of the player who assisted that goal.

Normalized Relations

Players

PK	PlayerID int identity
	FirstName varchar(30)
	LastName varchar(50)
U1	Email varchar(75)
	StreetAddress varchar(50)
	City varchar(30)
	State/Province varchar(20)
	ZIPcode varchar(10)
	PhoneNumber varchar(20)
	Position varchar(2)
U2	Number varchar(2)
	Year varchar(2)

GamePlayers

PK,FK1	PlayerID int identity
PK,FK2	GameID int identity
	IceTime int

Opponents

PK	OpponentID int identity
	Name varchar(30)
	School varchar(100)
	HomeRink varchar(50)

Games

PK	GameID int identity
	Date datetime
	HomeAway varchar(4)
	WinLoseTie varchar(4)
FK1	OpponentID int

GoalsAgainst

PK	GoalAgainstID int identity
	GoalAgainstIndex int
FK1	GameID int
FK2	PlayerID int

Goals

PK	GoalID int identity
	Type varchar(20)
FK1	PlayerID int
FK2	GameID int
FK3	PlayerID int

Penalties

PK	PenaltyID
	Type varchar(30)
	Severity varchar(30)
	GamePenaltyIndex int
FK1	GameId int
FK2	PlayerID int

Part 2: Implementation

SQL DDL

```
/*
      DDL Statements for Hockey Team Database

      Author: Charles Vanleuvan
      December 2019
      IST 659 Database Admin. Projects
*/
/*
      Drop the tables first if they exist
      Drop in reverse order of creation to avoid any problems with foreign key
references
      Drop in this order:
      Goals
      Penalties
      GoalsAgainst
      GamePlayers
      Games
      Opponents
      Players
*/

/*
      drop table code....
      drop table if exists

*/
drop table Goals
drop table Penalties
drop table GoalsAgainst
drop table GamePlayers
drop table Games
drop table Opponents
drop table Players
/*
      Create tables
      create strong entities first
      In this order:
      Players
      Opponents
      Games
      GamePlayers
      GoalsAgainst
      Penalties
      Goals
*/
--Players Table
create table Players (
      PlayerID int identity primary key,
      FirstName varchar(30) not null,
      LastName varchar(50) not null,
      Email varchar(75) not null,
      StreetAddress varchar(50) not null,
      City varchar(30) not null,
```

```sql
        StateOrProvince varchar(20) not null,
        ZIPcode varchar(10) not null,
        PhoneNumber varchar(20) not null,
        Position varchar(2) not null,
        Number varchar(2) not null,
        SchoolYear varchar(2) not null,
        constraint U1_Players unique (Email)
        )

--Opponents Table
create table Opponents (
        OpponentID int identity primary key,
        TeamName varchar(30) not null,
        SchoolName varchar(100) not null,
        HomeRinkTown varchar(50) not null
        )

--Games Table
create table Games (
        GameID int identity primary key,
        GameDate datetime not null,
        HomeOrAway varchar(4) not null,
        Result varchar(4) not null,
        OpponentID int foreign key references Opponents(OpponentID)
        )

--GamePlayers Table
create table GamePlayers (
        GamePlayerID int identity primary key,
        PlayerID int foreign key references Players(PlayerID),
        GameID int foreign key  references Games(GameID),
        IceTime int not null default(0),
        constraint U1_GamePlayers unique (PlayerID,GameID)
        )

--GoalsAgainst table
create table GoalsAgainst (
        GoalsAgainstID int identity primary key,
        GameID int foreign key references Games(GameID),
        PlayerID int foreign key references Players(PlayerID)
        )

--Penalties Table
create table Penalties (
        PenaltyID int identity primary key,
        PenaltyType varchar(30) not null,
        Severity varchar(30) not null,
        GameID int foreign key references Games(GameID),
        PlayerID int foreign key references Players(PlayerID)
        )

--Needed to alter Penalties Table to make Severity an int
alter table Penalties
        alter column Severity int

--Goals Table
create table Goals(
```

```
        GoalID int identity primary key,
        GoalType varchar(20) not null,
        GoalScorerID int foreign key references Players(PlayerID),
        GameID int foreign key references Games(GameID),
        FirstAssistID int foreign key references Players(PlayerID),
        SecondAssistID int foreign key references Players(PlayerID),
        constraint U1_UniqueAssisters check (FirstAssistID != SecondAssistID)
              )
```

SQL DDL

Insert statements

```
/*
        Mock Players data to enter into Players table
        Taken from mockaroo.com
        If any failures on insert, then run:
        delete Players
        select * from Players -- to confirm all rows are deleted

        Then retry to insert values into table
*/

insert into Players (FirstName, LastName, Email, StreetAddress, City, StateOrProvince,
ZIPcode, PhoneNumber, Position, Number, SchoolYear) values ('Corrie', 'Peevor', 'cpeevor0@e-
recht24.de', '13 Hoepker Lane', 'Springfield', 'Illinois', '62711', '217-607-4702', 'D', 98,
'Sr');
insert into Players (FirstName, LastName, Email, StreetAddress, City, StateOrProvince,
ZIPcode, PhoneNumber, Position, Number, SchoolYear) values ('Arman', 'Tink',
'atink1@ox.ac.uk', '94 Straubel Park', 'Sacramento', 'California', '94250', '916-349-1467',
'G', 54, 'Sr');
insert into Players (FirstName, LastName, Email, StreetAddress, City, StateOrProvince,
ZIPcode, PhoneNumber, Position, Number, SchoolYear) values ('Lion', 'Perton',
'lperton2@hp.com', '89373 Twin Pines Avenue', 'Peoria', 'Illinois', '61640', '309-957-3936',
'C', 86, 'Sr');
insert into Players (FirstName, LastName, Email, StreetAddress, City, StateOrProvince,
ZIPcode, PhoneNumber, Position, Number, SchoolYear) values ('Bailey', 'Broadbury',
'bbroadbury3@ow.ly', '029 Lien Junction', 'Aurora', 'Colorado', '80015', '303-270-1170', 'D',
27, 'Fr');
insert into Players (FirstName, LastName, Email, StreetAddress, City, StateOrProvince,
ZIPcode, PhoneNumber, Position, Number, SchoolYear) values ('Fraze', 'Stayt',
'fstayt4@vinaora.com', '91 Daystar Park', 'Washington', 'District of Columbia', '20370', '202-
541-9545', 'G', 28, 'Sr');
insert into Players (FirstName, LastName, Email, StreetAddress, City, StateOrProvince,
ZIPcode, PhoneNumber, Position, Number, SchoolYear) values ('Walton', 'Pettendrich',
'wpettendrich5@netscape.com', '91 Division Circle', 'Harrisburg', 'Pennsylvania', '17110',
'717-600-5293', 'C', 57, 'Fr');
insert into Players (FirstName, LastName, Email, StreetAddress, City, StateOrProvince,
ZIPcode, PhoneNumber, Position, Number, SchoolYear) values ('Riley', 'Gledhill',
'rgledhill6@booking.com', '3 Eliot Parkway', 'Washington', 'District of Columbia', '20029',
'202-560-2841', 'D', 72, 'Fr');
insert into Players (FirstName, LastName, Email, StreetAddress, City, StateOrProvince,
ZIPcode, PhoneNumber, Position, Number, SchoolYear) values ('Irvin', 'Havik',
'ihavik7@bravesites.com', '9307 Knutson Street', 'Fresno', 'California', '93762', '559-377-
9258', 'RW', 21, 'So');
insert into Players (FirstName, LastName, Email, StreetAddress, City, StateOrProvince,
ZIPcode, PhoneNumber, Position, Number, SchoolYear) values ('Wilfred', 'Slopier',
```

```sql
'wslopier8@lulu.com', '69128 Sommers Plaza', 'Irvine', 'California', '92717', '714-310-6110',
'D', 20, 'Jr');
insert into Players (FirstName, LastName, Email, StreetAddress, City, StateOrProvince,
ZIPcode, PhoneNumber, Position, Number, SchoolYear) values ('Trev', 'Leith-Harvey',
'tleithharvey9@wsj.com', '76257 Steensland Street', 'Charlotte', 'North Carolina', '28247',
'704-239-1950', 'LW', 68, 'Jr');
insert into Players (FirstName, LastName, Email, StreetAddress, City, StateOrProvince,
ZIPcode, PhoneNumber, Position, Number, SchoolYear) values ('Karel', 'McIntosh',
'kmcintosha@apache.org', '1760 Sachtjen Drive', 'Atlanta', 'Georgia', '31119', '770-448-1159',
'RW', 41, 'Jr');
insert into Players (FirstName, LastName, Email, StreetAddress, City, StateOrProvince,
ZIPcode, PhoneNumber, Position, Number, SchoolYear) values ('Bruis', 'Logue',
'blogueb@businessweek.com', '08 Memorial Plaza', 'Austin', 'Texas', '78732', '512-370-9203',
'RW', 48, 'Sr');
insert into Players (FirstName, LastName, Email, StreetAddress, City, StateOrProvince,
ZIPcode, PhoneNumber, Position, Number, SchoolYear) values ('Alair', 'Kingsmill',
'akingsmillc@linkedin.com', '809 Buell Street', 'Dallas', 'Texas', '75358', '214-633-1377',
'C', 75, 'Fr');
insert into Players (FirstName, LastName, Email, StreetAddress, City, StateOrProvince,
ZIPcode, PhoneNumber, Position, Number, SchoolYear) values ('Bevin', 'Officer',
'bofficerd@oracle.com', '5991 Mayfield Alley', 'Washington', 'District of Columbia', '20073',
'202-619-5688', 'G', 89, 'Jr');
insert into Players (FirstName, LastName, Email, StreetAddress, City, StateOrProvince,
ZIPcode, PhoneNumber, Position, Number, SchoolYear) values ('Raimund', 'Creane',
'rcreanee@cdc.gov', '40 Nelson Avenue', 'Englewood', 'Colorado', '80150', '303-531-5921',
'RW', 84, 'Sr');
insert into Players (FirstName, LastName, Email, StreetAddress, City, StateOrProvince,
ZIPcode, PhoneNumber, Position, Number, SchoolYear) values ('Thor', 'Shord',
'tshordf@domainmarket.com', '5965 Ridgeview Alley', 'Cincinnati', 'Ohio', '45238', '513-828-
8289', 'D', 42, 'So');
insert into Players (FirstName, LastName, Email, StreetAddress, City, StateOrProvince,
ZIPcode, PhoneNumber, Position, Number, SchoolYear) values ('Hubey', 'Dower',
'hdowerg@hc360.com', '078 Eliot Place', 'Seattle', 'Washington', '98133', '206-283-8112', 'C',
43, 'So');
insert into Players (FirstName, LastName, Email, StreetAddress, City, StateOrProvince,
ZIPcode, PhoneNumber, Position, Number, SchoolYear) values ('Gradeigh', 'Mongeot',
'gmongeoth@cornell.edu', '64 Cordelia Point', 'Bradenton', 'Florida', '34210', '941-432-0001',
'RW', 59, 'Jr');
insert into Players (FirstName, LastName, Email, StreetAddress, City, StateOrProvince,
ZIPcode, PhoneNumber, Position, Number, SchoolYear) values ('Piggy', 'Mullord',
'pmullordi@joomla.org', '94 Carey Trail', 'Newton', 'Massachusetts', '02162', '508-131-7837',
'D', 11, 'Sr');
insert into Players (FirstName, LastName, Email, StreetAddress, City, StateOrProvince,
ZIPcode, PhoneNumber, Position, Number, SchoolYear) values ('Carleton', 'Whapple',
'cwhapplej@w3.org', '17188 Lindbergh Avenue', 'Akron', 'Ohio', '44393', '234-811-8115', 'C',
23, 'Jr');
insert into Players (FirstName, LastName, Email, StreetAddress, City, StateOrProvince,
ZIPcode, PhoneNumber, Position, Number, SchoolYear) values ('Jay', 'Stealey',
'jstealeyk@upenn.edu', '554 Sommers Terrace', 'Duluth', 'Georgia', '30096', '404-457-0444',
'C', 71, 'Sr');
insert into Players (FirstName, LastName, Email, StreetAddress, City, StateOrProvince,
ZIPcode, PhoneNumber, Position, Number, SchoolYear) values ('Bran', 'Manthroppe',
'bmanthroppel@yale.edu', '25 Lakeland Park', 'Johnstown', 'Pennsylvania', '15906', '814-648-
1070', 'C', 53, 'Fr');
insert into Players (FirstName, LastName, Email, StreetAddress, City, StateOrProvince,
ZIPcode, PhoneNumber, Position, Number, SchoolYear) values ('Jarib', 'Schottli',
'jschottlim@goo.gl', '8129 Monica Place', 'Youngstown', 'Ohio', '44511', '330-110-4827', 'G',
96, 'Sr');
insert into Players (FirstName, LastName, Email, StreetAddress, City, StateOrProvince,
ZIPcode, PhoneNumber, Position, Number, SchoolYear) values ('Brit', 'Bilbrook',
```

```
'bbilbrookn@hud.gov', '62716 Hanover Terrace', 'Fresno', 'California', '93740', '559-665-
3609', 'RW', 15, 'Jr');
insert into Players (FirstName, LastName, Email, StreetAddress, City, StateOrProvince,
ZIPcode, PhoneNumber, Position, Number, SchoolYear) values ('Alistair', 'Sutterby',
'asutterbyo@admin.ch', '9 Orin Way', 'Virginia Beach', 'Virginia', '23454', '757-921-3571',
'C', 5, 'So');
insert into Players (FirstName, LastName, Email, StreetAddress, City, StateOrProvince,
ZIPcode, PhoneNumber, Position, Number, SchoolYear) values ('Tucker', 'Boot',
'tbootp@etsy.com', '1384 Gerald Alley', 'Sioux Falls', 'South Dakota', '57198', '605-889-
2797', 'C', 10, 'Jr');
insert into Players (FirstName, LastName, Email, StreetAddress, City, StateOrProvince,
ZIPcode, PhoneNumber, Position, Number, SchoolYear) values ('Ignace', 'Farnell',
'ifarnellq@wikispaces.com', '7747 Lyons Avenue', 'Austin', 'Texas', '78703', '512-591-3811',
'LW', 90, 'Fr');
insert into Players (FirstName, LastName, Email, StreetAddress, City, StateOrProvince,
ZIPcode, PhoneNumber, Position, Number, SchoolYear) values ('Theodore', 'Allston',
'tallstonr@sphinn.com', '9 Warrior Terrace', 'Omaha', 'Nebraska', '68117', '402-917-9671',
'RW', 97, 'So');
insert into Players (FirstName, LastName, Email, StreetAddress, City, StateOrProvince,
ZIPcode, PhoneNumber, Position, Number, SchoolYear) values ('Rowen', 'Vedenyapin',
'rvedenyapins@geocities.com', '673 Kingsford Road', 'Colorado Springs', 'Colorado', '80940',
'719-552-0574', 'D', 75, 'So');
insert into Players (FirstName, LastName, Email, StreetAddress, City, StateOrProvince,
ZIPcode, PhoneNumber, Position, Number, SchoolYear) values ('Saxe', 'Artus',
'sartust@sina.com.cn', '004 Village Court', 'Miami', 'Florida', '33158', '305-518-1221', 'RW',
58, 'Sr');


/*
        Mock data for Opponents table
        taken from Mockaroo.com
*/

insert into Opponents (TeamName, SchoolName, HomeRinkTown) values ('Red-Capped
Cardinals', 'Novosibirsk State Technical University', 'Lanigan');
insert into Opponents (TeamName, SchoolName, HomeRinkTown) values ('Mexican Boas',
'Soonchunhyang University', 'Orurillo');
insert into Opponents (TeamName, SchoolName, HomeRinkTown) values ('Roadrunners',
'Technische Universität Berlin', 'Luokeng');
insert into Opponents (TeamName, SchoolName, HomeRinkTown) values ('Cattle', 'Universidad
Nacional de La Libertad, Trujillo', 'Reims');
insert into Opponents (TeamName, SchoolName, HomeRinkTown) values ('Wallabies', 'Tehran
University of Medical Sciences', 'Sasebo');
insert into Opponents (TeamName, SchoolName, HomeRinkTown) values ('Silver Gulls',
'Strayer University', 'Tieshan');
insert into Opponents (TeamName, SchoolName, HomeRinkTown) values ('Galah', 'University
of Plovdiv', 'Halmstad');
insert into Opponents (TeamName, SchoolName, HomeRinkTown) values ('Squirrel', 'Tokyo
International University', 'Semeljci');
insert into Opponents (TeamName, SchoolName, HomeRinkTown) values ('Lizards', 'Centenary
College of Louisiana', 'Puerto Boyacá');
insert into Opponents (TeamName, SchoolName, HomeRinkTown) values ('Red-Billed Toucans',
'University of Zagreb', 'Xiaoguwei');
insert into Opponents (TeamName, SchoolName, HomeRinkTown) values ('Quolls', 'Ryazan
State Pedagogical University', 'Dong'ao');
insert into Opponents (TeamName, SchoolName, HomeRinkTown) values ('Red Squirrels',
'Ashland University', 'Orós');
insert into Opponents (TeamName, SchoolName, HomeRinkTown) values ('Little Cormorants',
'Sulaimani Polytechnic University', 'Mosfilotí');
```

```sql
insert into Opponents (TeamName, SchoolName, HomeRinkTown) values ('Shrikes', 'Karolinska
Institute Stockholm', 'Medicine Hat');
insert into Opponents (TeamName, SchoolName, HomeRinkTown) values ('Tigers', 'King''s
College', 'Banepa');
insert into Opponents (TeamName, SchoolName, HomeRinkTown) values ('Porcupines',
'Universidad Católica Boliviana, Cochabamba', 'Al Maḥwīt');
insert into Opponents (TeamName, SchoolName, HomeRinkTown) values ('Cockatoos', 'Blue
Nile University', 'Anxiang');
insert into Opponents (TeamName, SchoolName, HomeRinkTown) values ('Screaming Eagles',
'The Government Sadiq College Women University Bahawalpur', 'Jastrzębia Góra');
insert into Opponents (TeamName, SchoolName, HomeRinkTown) values ('Lab Rats', 'Gifu
Pharmaceutical University', 'Xiadong');
insert into Opponents (TeamName, SchoolName, HomeRinkTown) values ('Hawks', 'Asian
University of Science and Technology', 'Ad Dujayl');
/*
        Insert 20 games into Games table
        Each opponent is played once
*/


insert into Games (GameDate, HomeOrAway, Result, OpponentID) values ('10/24/2018',
'Home', 'Loss', 1);
insert into Games (GameDate, HomeOrAway, Result, OpponentID) values ('02/10/2019',
'Away', 'Win', 2);
insert into Games (GameDate, HomeOrAway, Result, OpponentID) values ('10/24/2018',
'Home', 'Loss', 3);
insert into Games (GameDate, HomeOrAway, Result, OpponentID) values ('10/01/2018',
'Away', 'Win', 4);
insert into Games (GameDate, HomeOrAway, Result, OpponentID) values ('02/05/2019',
'Home', 'Win', 5);
insert into Games (GameDate, HomeOrAway, Result, OpponentID) values ('11/27/2018',
'Away', 'Loss', 6);
insert into Games (GameDate, HomeOrAway, Result, OpponentID) values ('12/30/2018',
'Home', 'Loss', 7);
insert into Games (GameDate, HomeOrAway, Result, OpponentID) values ('12/14/2018',
'Away', 'Loss', 8);
insert into Games (GameDate, HomeOrAway, Result, OpponentID) values ('12/15/2018',
'Home', 'Loss', 9);
insert into Games (GameDate, HomeOrAway, Result, OpponentID) values ('10/06/2018',
'Away', 'Win', 10);
insert into Games (GameDate, HomeOrAway, Result, OpponentID) values ('01/14/2019',
'Home', 'Win', 11);
insert into Games (GameDate, HomeOrAway, Result, OpponentID) values ('02/13/2019',
'Away', 'Loss', 12);
insert into Games (GameDate, HomeOrAway, Result, OpponentID) values ('12/05/2018',
'Home', 'Loss', 13);
insert into Games (GameDate, HomeOrAway, Result, OpponentID) values ('01/13/2019',
'Away', 'Loss', 14);
insert into Games (GameDate, HomeOrAway, Result, OpponentID) values ('01/20/2019',
'Home', 'Win', 15);
insert into Games (GameDate, HomeOrAway, Result, OpponentID) values ('12/26/2018',
'Away', 'Loss', 16);
insert into Games (GameDate, HomeOrAway, Result, OpponentID) values ('12/01/2018',
'Home', 'Win', 17);
insert into Games (GameDate, HomeOrAway, Result, OpponentID) values ('01/15/2019',
'Away', 'Win', 18);
```

```
insert into Games (GameDate, HomeOrAway, Result, OpponentID) values ('01/13/2019',
'Home', 'Win', 19);
        insert into Games (GameDate, HomeOrAway, Result, OpponentID) values ('01/20/2019',
'Away', 'Win', 20);



/*
        GamePlayers with IceTime
        Goalies are player IDs 2,5,14,23

*/
```

(around 600 lines of INSERT code for GamePlayers Table, showing a snippet below to save space)

```
insert into GamePlayers (GameID, PlayerID, IceTime) values (1, 1, 14);
--insert into GamePlayers (GameID, PlayerID, IceTime) values (1, 2, 31);
insert into GamePlayers (GameID, PlayerID, IceTime) values (1, 3, 53);
insert into GamePlayers (GameID, PlayerID, IceTime) values (1, 4, 25);
--insert into GamePlayers (GameID, PlayerID, IceTime) values (1, 5, 7);
insert into GamePlayers (GameID, PlayerID, IceTime) values (1, 6, 51);
insert into GamePlayers (GameID, PlayerID, IceTime) values (1, 7, 27);
insert into GamePlayers (GameID, PlayerID, IceTime) values (1, 8, 12);
insert into GamePlayers (GameID, PlayerID, IceTime) values (1, 9, 48);
insert into GamePlayers (GameID, PlayerID, IceTime) values (1, 10, 18);
insert into GamePlayers (GameID, PlayerID, IceTime) values (1, 11, 31);
insert into GamePlayers (GameID, PlayerID, IceTime) values (1, 12, 5);
insert into GamePlayers (GameID, PlayerID, IceTime) values (1, 13, 35);
--insert into GamePlayers (GameID, PlayerID, IceTime) values (1, 14, 30);
insert into GamePlayers (GameID, PlayerID, IceTime) values (1, 15, 50);
insert into GamePlayers (GameID, PlayerID, IceTime) values (1, 16, 47);
insert into GamePlayers (GameID, PlayerID, IceTime) values (1, 17, 32);
insert into GamePlayers (GameID, PlayerID, IceTime) values (1, 18, 57);
insert into GamePlayers (GameID, PlayerID, IceTime) values (1, 19, 9);
insert into GamePlayers (GameID, PlayerID, IceTime) values (1, 20, 37);
insert into GamePlayers (GameID, PlayerID, IceTime) values (1, 21, 46);
insert into GamePlayers (GameID, PlayerID, IceTime) values (1, 22, 31);
insert into GamePlayers (GameID, PlayerID, IceTime) values (1, 23, 60);
insert into GamePlayers (GameID, PlayerID, IceTime) values (1, 24, 41);
insert into GamePlayers (GameID, PlayerID, IceTime) values (1, 25, 37);
insert into GamePlayers (GameID, PlayerID, IceTime) values (1, 26, 14);
insert into GamePlayers (GameID, PlayerID, IceTime) values (1, 27, 42);
insert into GamePlayers (GameID, PlayerID, IceTime) values (1, 28, 46);
insert into GamePlayers (GameID, PlayerID, IceTime) values (1, 29, 47);
insert into GamePlayers (GameID, PlayerID, IceTime) values (1, 30, 52);
insert into GamePlayers (GameID, PlayerID, IceTime) values (2, 1, 54);
        insert into GamePlayers (GameID, PlayerID, IceTime) values (2, 2, 60);

/*
        Insert statements for Goals table
        FirstAssistID and SecondAssistID can not match
        Neither AssistID can match GoalScorerID
*/
```

        (Cutting code snippet down to save space in the document, rest of the 60 lines of code follow as below with minor changes to player IDs)

```sql
insert into Goals (GoalType, GoalScorerID, GameID, FirstAssistID, SecondAssistID) values
('Shorthanded', 16, 19, 1, 6);
insert into Goals (GoalType, GoalScorerID, GameID, FirstAssistID, SecondAssistID) values
('Shorthanded', 21, 10, 20, 3);
insert into Goals (GoalType, GoalScorerID, GameID, FirstAssistID, SecondAssistID) values
('Powerplay', 20, 8, 18, 15);
insert into Goals (GoalType, GoalScorerID, GameID, FirstAssistID, SecondAssistID) values
('Even Strength', 15, 14, 8, 12);
insert into Goals (GoalType, GoalScorerID, GameID, FirstAssistID, SecondAssistID) values
('Powerplay', 20, 1, 19, 8);
insert into Goals (GoalType, GoalScorerID, GameID, FirstAssistID, SecondAssistID) values
('Even Strength', 6, 10, 3, 20);


/*
        Insert GoalsAgainst for the 20 games played
        Goalies are PlayerIDs 2,5,14,23
*/
```
(Cutting code snippet down to save space in the document, rest of the 50 lines of code follow as below with minor changes to player IDs)

```sql
insert into GoalsAgainst (GameID, PlayerID) values (1, 23);
insert into GoalsAgainst (GameID, PlayerID) values (1, 23);
insert into GoalsAgainst (GameID, PlayerID) values (1, 23);
insert into GoalsAgainst (GameID, PlayerID) values (2, 2);
insert into GoalsAgainst (GameID, PlayerID) values (3, 5);
insert into GoalsAgainst (GameID, PlayerID) values (3, 5);
insert into GoalsAgainst (GameID, PlayerID) values (4, 14);
insert into GoalsAgainst (GameID, PlayerID) values (4, 14);


/*
        Insert statements for Penalties Table
*/
```
(Cutting code snippet down to save space in the document, rest of the 50 lines of code follow as below with minor changes to player IDs)

```sql
insert into Penalties (PenaltyType, Severity, GameID, PlayerID) values ('High-Sticking',
5, 17, 28);
insert into Penalties (PenaltyType, Severity, GameID, PlayerID) values ('Charging', 5, 5,
27);
insert into Penalties (PenaltyType, Severity, GameID, PlayerID) values ('Roughing', 4, 9,
26);
```

```sql
insert into Penalties (PenaltyType, Severity, GameID, PlayerID) values ('Interference',
4, 20, 24);
insert into Penalties (PenaltyType, Severity, GameID, PlayerID) values ('Slashing', 4, 9,
3);
insert into Penalties (PenaltyType, Severity, GameID, PlayerID) values ('Hooking', 4, 7,
24);
insert into Penalties (PenaltyType, Severity, GameID, PlayerID) values ('High-Sticking',
5, 12, 6);
insert into Penalties (PenaltyType, Severity, GameID, PlayerID) values ('Slashing', 5,
13, 20);
insert into Penalties (PenaltyType, Severity, GameID, PlayerID) values ('Boarding', 2,
10, 20);
```

Answers to Data Questions

1. **Who has scored the most goals this season?**

```sql
/*
      Create view to see who is leading in goal scoring
*/
go
create view TopGoalScorer as
select
      count(GoalID) as TotalGoals,
      FirstName,
      LastName
from Goals join Players on Goals.GoalScorerID = Players.PlayerID
group by FirstName,LastName
go

select *
from TopGoalScorer
order by TotalGoals desc
```

	TotalGoals	First Name	Last Name
1	5	Raimund	Creane
2	5	Carleton	Whapple
3	4	Bran	Manthroppe
4	4	Corrie	Peevor
5	3	Lion	Perton
6	3	Walton	Pettendrich
7	3	Hubey	Dower

Raimund Creane is quite a prolific scorer with 5 goals in 20 games.

Visualizing the scoring title race in R, we can depict the team's top 5 leaders with a simple bar chart. Since the R script is running the view that was just created, the barplot will update to reflect new changes in scoring throughout the season.

Scoring Leaders
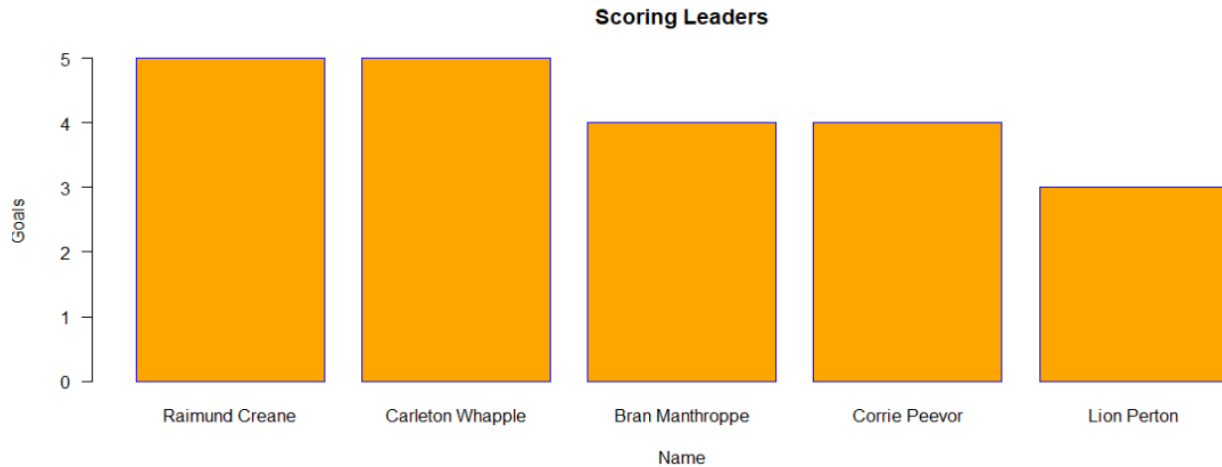
2. How many wins/losses does the team have this year?

```
/*
       Create a function to return the wins and losses
*/

go
create function dbo.TeamRecord()
returns @ReturnTable table(Wins Int, Losses Int) as
begin
       declare @wins int
       declare @losses int

       --calculate wins
       select
               @wins = count(GameID)
       from Games
       where Result = 'Win'

       --calculate losses
       select
               @losses = count(GameID)
       from Games
       where Result = 'Loss'

       --Add wins and losses to @ReturnTable
       insert into @ReturnTable (Wins, Losses)
       values (@wins, @losses)

       return
end
go
--Test function
select * from dbo.TeamRecord()
```

	Wins	Losses
1	10	10

The team is standing at .500 for the season.

3. **Which Goalie has the highest GAA (Goals against Average)?**
   a. **GAA is Goals Allowed * 60 minutes / Minutes of Ice Time**

```
/*
      Calculate a goalies Goals Against Average (GAA)
      GAA = Goals Against * 60.00 / Ice Time
*/

go
create function dbo.CalculateGAA(@firstname varchar(30),@lastname varchar(30))
returns numeric(18,2) as
begin
      declare @goalsagainst numeric(18,2)
      declare @icetime numeric(18,2)

      --calculate goals against
      select @goalsagainst = count(GoalsAgainstID)
      from GoalsAgainst
      join Players on GoalsAgainst.PlayerID = Players.PlayerID
      where FirstName = @firstname and LastName = @lastname

      --calculate ice time
      select @icetime = sum(IceTime)
      from GamePlayers
      join Players on GamePlayers.PlayerID = Players.PlayerID
      where FirstName = @firstname and LastName = @lastname

      return (@goalsagainst * 60 / @icetime )
end
go


/* Goalies are:
      Arman Tink
      Fraze Stayt
      Bevin Officer
      Jarib Schottli
*/
select dbo.CalculateGAA('Arman','Tink')
select dbo.CalculateGAA('Fraze','Stayt')
select dbo.CalculateGAA('Bevin','Officer')
select dbo.CalculateGAA('Jarib','Schottli')
```

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(No column name)
2.50

(No column name)
4.29

(No column name)
2.34

(No column name)
2.20

Since lower GAA is better, Jarib Schottli is currently leading the tendies in GAA this season.

4. Which team did we score the most goals on?

```
/*
	Team that was scored on the most

*/
go
create view GoalsScoredOnOpponents as
select
	SchoolName,
	TeamName,
	GameDate,
	Result,
	count(GoalID) as GoalsScored
from Games
join Opponents on Games.OpponentID = Opponents.OpponentID
join Goals on Games.GameID = Goals.GameID
group by SchoolName,TeamName,GameDate,Result
go

select * from GoalsScoredOnOpponents order by GoalsScored desc
```

	SchoolName	TeamName	GameDate	Result	GoalsScored
1	Ashland University	Red Squirrels	2019-02-13 00:00:00.000	Loss	8
2	Karolinska Institute Stockholm	Shrikes	2019-01-13 00:00:00.000	Loss	6
3	University of Zagreb	Red-Billed Toucans	2018-10-06 00:00:00.000	Win	6
4	Universidad Nacional de La Libertad, Trujillo	Cattle	2018-10-01 00:00:00.000	Win	5
5	Tokyo International University	Squirrel	2018-12-14 00:00:00.000	Loss	4
6	Universidad Católica Boliviana, Cochabamba	Porcupines	2018-12-26 00:00:00.000	Loss	4
7	Novosibirsk State Technical University	Red-Capped Cardinals	2018-10-24 00:00:00.000	Loss	4
8	Ryazan State Pedagogical University	Quolls	2019-01-14 00:00:00.000	Win	3
9	Soonchunhyang University	Mexican Boas	2019-02-10 00:00:00.000	Win	2
10	Strayer University	Silver Gulls	2018-11-27 00:00:00.000	Loss	2
11	Asian University of Science and Technology	Hawks	2019-01-20 00:00:00.000	Win	2
12	Blue Nile University	Cockatoos	2018-12-01 00:00:00.000	Win	2

Although the team scored 8 goals against the Red Squirrels, they still lost the match

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5. Who has taken the most penalties this season?

```
/*
        Create a view to show who has the most penalty minutes
*/

go
create view MostPenalties as
        select
                sum(Severity) as PenaltiesInMinutes,
                FirstName,
                LastName
        from Penalties
        join Players on Penalties.PlayerID = Players.PlayerID
        group by FirstName, LastName
go

select *
from MostPenalties
order by PenaltiesInMinutes desc
```

	PenaltiesInMinutes	FirstName	LastName
1	21	Carleton	Whapple
2	17	Brit	Bilbrook
3	17	Tucker	Boot
4	16	Karel	McIntosh
5	16	Thor	Shord
6	15	Wilfred	Slopier

Carleton has overtaken notorious tough guys Tucker and Thor for spending the most time in the sin bin.

GUI Prototype

For gamekeeping, the team managers will want to have a simple way to insert game stats, such as penalties, for the players. Recently, Thor has been on a tear and won't stop slashing other teams. In Access, we have a spreadsheet set up for easy addition of his penalties:

Players

PenaltyID	PenaltyType	Severity	dbo_Penaltie	P
12 Hooking		4	14	
16 Fighting		5	20	
20 Hooking		2	19	
33 High-Sticking		5	16	
(New)				

PlayerID: 16
FirstName: Thor
LastName: Shord

Penalties

Record: 1 of 4   No Filter   Search

In the most recent game, Thor took a 4 minute slashing penalty then a 5 minute Slashing penalty. The team managers have added his penalties through Access and can verify in SQL server that they are stored in the database.

PlayerID: 16
FirstName: Thor
LastName: Shord

Penalties

PenaltyID	PenaltyType	Se	dbo_Pena	PlayerID	dbo_Games
12	Hooking	4	14	16	14
16	Fighting	5	20	16	20
20	Hooking	2	19	16	19
33	High-Sticking	5	16	16	16
61	Slashing	4	20	16	20
62	Slashing	5	20	16	20
(New)					(New)

	FirstName	LastName	PenaltyType	Severity	GameID
1	Thor	Shord	Fighting	5	20
2	Thor	Shord	Slashing	4	20
3	Thor	Shord	Slashing	5	20

The same can be setup for recording the team's goals and assists each game. Carleton Whapple was able to add two more gino's during the last game to complete the hatty, so the team managers are

making sure to get those added so he can be in the running for MVP this season. The Goals form looks as such:

(continue to next page)

For Carelton's 2ⁿᵈ goal that game, he was assisted by Piggy and Trev, and for the second goal, he was assisted by Corrie and Lion. This can be confirmed with a simple sql query in SSMS:

```sql
22   select
23       GameID,
24       p.FirstName,
25       p.LastName,
26       p1.FirstName as FirstAssistFirstName,
27       p1.LastName as FirstAssistLastName,
28       p2.FirstName as SecondAssistFirstName,
29       p2.LastName as SecondAssistLastName
30   from Goals
31   join Players p on Goals.GoalScorerID = p.PlayerID
32   join Players p1 on Goals.FirstAssistID = p1.PlayerID
33   join Players p2 on Goals.SecondAssistID = p2.PlayerID
34   order by GameID desc
35
```

Results | Messages

GameID	FirstName	LastName	FirstAssistFirstName	FirstAssistLastName	SecondAssistFirstName	SecondAssistLastName
20	Wilfred	Slopier	Gradeigh	Mongeot	Thor	Shord
20	Carleton	Whapple	Riley	Gledhill	Irvin	Havik
20	Carleton	Whapple	Piggy	Mullord	Trev	Leith-Harvey
20	Carleton	Whapple	Corrie	Peevor	Lion	Perton
19	Thor	Shord	Corrie	Peevor	Walton	Pettendrich

By saving the forms in Access, the team can easily enter data during or after games to keep accurate statistics throughout the season.

Reflection

Looking back at this project, I should have created each portion of the database alongside each lab throughout the weeks. I found myself too often looking back to ensure I was writing insert statements correctly and writing functions correctly. I also wish that I had planned the conceptual and logical modeling better, or at least had the foresight to think about how difficult the queries I wanted to run would be. For example, looking at the way that Assists are stored in the Goals table, it is difficult to query that table for a specific player and return the total number of assists he has, since he could have assists in FirstAssist column or SecondAssist column. This gets more difficult when trying to compile a select statement that returns the top Assists getters. With more time and video watching, I think I would be able to write a view, but I just did not have the time.

When I look at the NHL website and see how in depth the statistics recorded are, it makes me wonder how large and complex those databases have to be to keep records of literally every play going back to the 1910's in some cases.

I would like to update my table creation procedure and solidify the checks for entering data into the database automatically. With more time, I would look to understand how I can ensure that, for example, that the IceTime per game recorded is possible. It is not possible to have 10 players all with over 50 minutes of ice time (only 5 skaters and 1 goalie on the ice allowed), but that would make manual data entry very tedious.