Database Design Project

Team Members

- Eric Sheehan
- Joshua Cherian
- Sarang Deshpande
- Reid Ankarstran
- Mark Jarrett
- Zach Beale
- Abhish Singh
- Andrew Randall
- Mason Burns

Overview

- The proposal aims to outline the benefits and implementation of creating a comprehensive database for the NHL Hockey League.
- With a centralized database, the teams will have access to valuable player and game statistics, allowing for improved performance analysis and decision-making.
- To build a database for an NHL hockey team, you will need to gather information about the team, such as player statistics, game schedules, and team history. This information can be stored in a relational database management system (RDBMS) such as MySQL or MS ACCESS

Strengths

- High demand: Hockey fans are passionate about their sport, and there is a strong demand for comprehensive NHL statistics and data.
- Limited competition: There are some existing databases and websites that offer NHL statistics, but there is still room for a high-quality, comprehensive database that offers unique features and insights.
- Large data sources: There are many sources of NHL data available, including official NHL statistics, player/team websites, fan forums, and social media. With proper data mining and analysis, a comprehensive database could offer valuable insights into player and team performance.

Weaknesses

- Technical complexity: Building a comprehensive database for the NHL would require significant technical expertise and resources. It may be difficult to maintain the database and keep it up-to-date as the league and teams make changes.
- Data accuracy and reliability: Not all data sources may be accurate or reliable, which could impact the quality of the database. Ensuring data quality would require significant effort and resources.
- Limited monetization opportunities: It may be challenging to monetize the database, as users may be unwilling to pay for access or advertising revenue may be limited.

Opportunities

- Expansion to other sports: If successful, a comprehensive NHL database could be expanded to cover other sports leagues, which could increase the potential user base and revenue streams.
- Partnerships with NHL teams/league: Partnering with the NHL and/or individual teams could provide access to additional data sources and increase the visibility and credibility of the database.
- Data analytics services: The insights and analysis provided by the database could be sold as a separate service to teams, sports analysts, and media companies.

Threats

- Legal issues: There may be legal and ethical issues associated with accessing and using NHL data, which could result in lawsuits or other legal action.
- Established competitors: Existing competitors may have a stronger market presence and better-established relationships with users, making it difficult to gain market share.
- Limited market: The market for a comprehensive NHL database may be smaller than expected, resulting in limited revenue potential.

Project Objectives

- Improve performance analysis and decision-making with detailed player and game statistics
- Enhance fan engagement with interactive statistics and personalized content
- Increase revenue through targeted marketing and advertising efforts

Methods for Data Capture

- Online Forms:
- Score Sheets:
- Surveys:
- Social Media:
- Analytics Tools:
- Forms used by NHL Teams:
  - Player Information Form
  - Game Report Form
  - Scouting Report Form
  - Injury Report Form
  - Travel Itinerary Form
  - Media Relations Form

Business Reports

- NHL Attendance
- Sponsorship
- Salaries
- Broadcast Revenue
- Total Revenue

Business Rules

Our business rules are based on simplified tables we created in order to store data from the NHL League. The tables were created based on different sections of the league such as Ticket Sales, Venues and Merchandise.

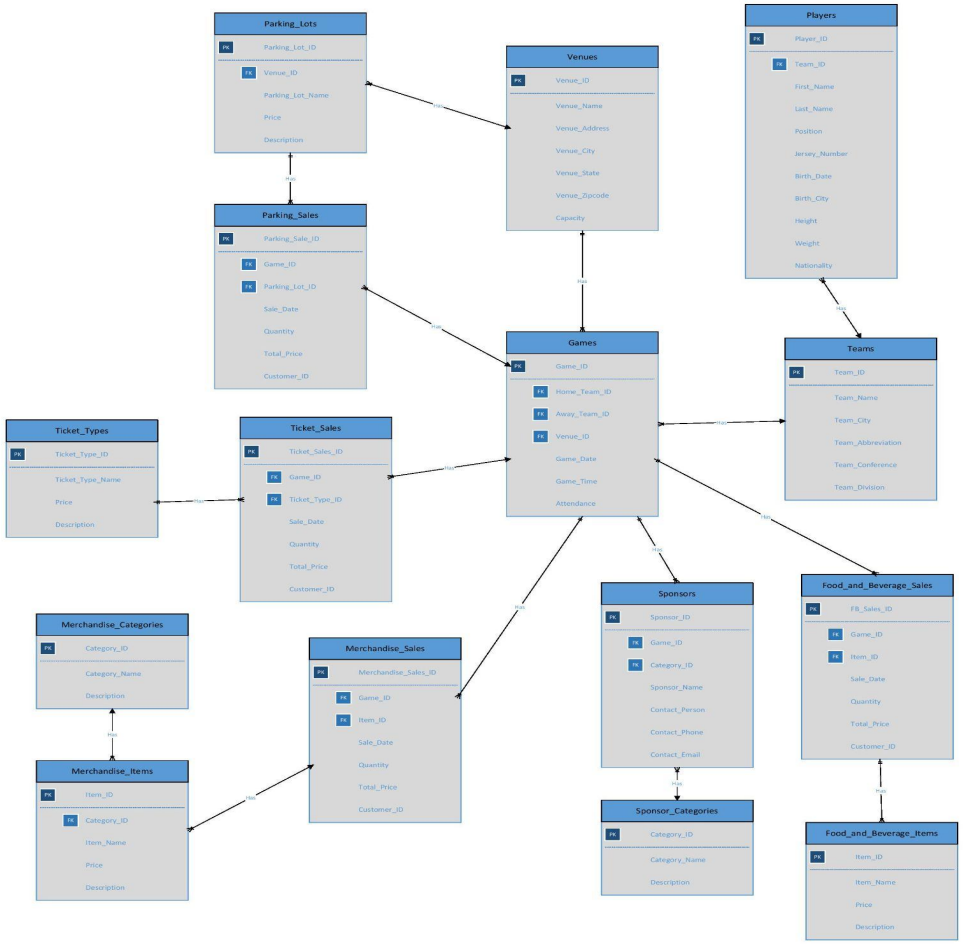
Examples:

- One Ticket_Type can have multiple Ticket_Sales
- One Ticket_Sale relates to only one game
- Many Games can have the same Venue
- One Venue can have many Parking_Lots
- One Parking_Lot can have many Parking_Sales
- One Game can have many Parking_Sales
- One Game has many Teams

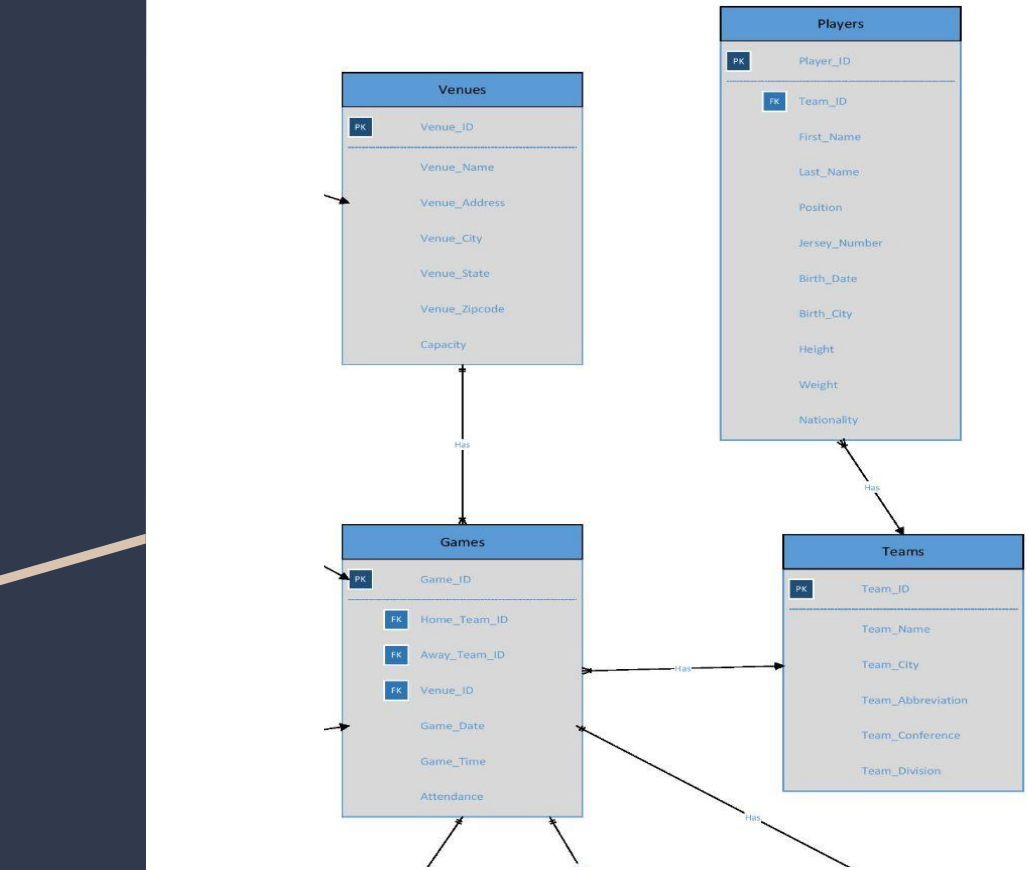
Design Decisions and Assumptions

- When designing the ERD, we realized that all of our data was simple enough to not warrant the use of supertypes/subtypes
- This is because we covered multiple different aspects relating to the NHL, such as the actual games, merchandise sales, parking sales, venues, etc.
- We also didn’t need to use any bridge entities, as we ensured that all of our data was either 1:1 or 1:M.

ERD Diagram


Parking_Lots
Parking_Lot_ID
Venue_ID
Parking_Lot_Name
Price
Description
Venues
Venue_ID
Venue_Name
Venue_Address
Venue_City
Venue_State
Venue_Zipcode
Capacity
Players
Player_ID
Team_ID
First_Name
Last_Name
Position
Jersey_Number
Birth_Date
Birth_City
Height
Weight
Nationality
Parking_Sales
Parking_Sale_ID
Game_ID
Parking_Lot_ID
Sale_Date
Quantity
Total_Price
Customer_ID
Games
Game_ID
Home_Team_ID
Away_Team_ID
Venue_ID
Game_Date
Game_Time
Attendance
Teams
Team_ID
Team_Name
Team_City
Team_Abbreviation
Team_Conference
Team_Division
Ticket_Types
Ticket_Type_ID
Ticket_Type_Name
Price
Description
Ticket_Sales
Ticket_Sales_ID
Game_ID
Ticket_Type_ID
Sale_Date
Quantity
Total_Price
Customer_ID
Merchandise_Categories
Category_ID
Category_Name
Description
Merchandise_Items
Item_ID
Category_ID
Item_Name
Price
Description
Merchandise_Sales
Merchandise_Sales_ID
Game_ID
Item_ID
Sale_Date
Quantity
Total_Price
Customer_ID
Sponsors
Sponsor_ID
Game_ID
Category_ID
Sponsor_Name
Contact_Person
Contact_Phone
Contact_Email
Sponsor_Categories
Category_ID
Category_Name
Description
Food_and_Beverage_Sales
FB_Sales_ID
Game_ID
Item_ID
Sale_Date
Quantity
Total_Price
Customer_ID
Food_and_Beverage_Items
Item_ID
Item_Name
Price
Description

ERD Diagram


Players
PK
Player_ID
FK
Team_ID
First_Name
Last_Name
Position
Jersey_Number
Birth_Date
Birth_City
Height
Weight
Nationality
Venues
PK
Venue_ID
Venue_Name
Venue_Address
Venue_City
Venue_State
Venue_Zipcode
Capacity
Has
Has
Games
PK
Game_ID
FK
Home_Team_ID
FK
Away_Team_ID
FK
Venue_ID
Game_Date
Game_Time
Attendance
Has
Has
Teams
PK
Team_ID
Team_Name
Team_City
Team_Abbreviation
Team_Conference
Team_Division

Normalization of Data

- 3NF Players (Player_ID, First Name, Last Name, Position, Jersey_Number, Birth_Date, Birth_City, Height, Weight, Nationality, Team_ID)
- 3NF Teams(Team_ID, Team_Name, Team_City, Team_Abbreviation, Team_Conference, Team_Division)
- 3NF Games(Game_ID, Game_Date, Game_Time, Attendance, Home_Team_ID, Away_Team_ID, Venue_ID)
- 3NF Venues (Venue_ID, Venue_Name, Venue_Address, Venue_City, Venue_State, Venue_Zipcode, Capacity)
- 3NF Parking_Lots (Parking_Lot_ID, Parking_Lot_Name, Price, Description, Venue_ID)
- 3NF Parking_Sales (Parking_Sale_ID, Sale_Date, Quantity, Total_Price, Customer_ID, Game_ID, Parking_Lot_ID)
- 3NF Ticket_Types (Ticket_Type_ID, Ticket_Type_Name, Price, Description)
- 3NF Ticket_Sales (Ticket_Sales_ID, Quantity, Total_Price, Customer_ID, Game_ID, Ticket_Type_ID)

Normalization of Data

- 3NF Merchandise_Sales (Merchandise_Sales_ID, Sale_Date, Quantity, Total_price, Customer_ID, Game_ID, Item_ID)
- 3NF Merchandise_Items (Item_ID, Item_Name, Price, Description, Category_ID)
- 3NF Merchandise_Categories (Category_ID, Category_Name, Description)
- 3NF Sponsors (Sponsor_ID, Sponsor_Name, Contact_Person, Contact_Phone, Contact_Email, Game_ID, Category_ID)
- 3NF Sponsor_Categories (Category_ID, Category_Name, Description)
- 3NF Food_and_Beverage_Sales (FB_Sales_ID, Sale_Date, Quantity, Total_Price, Customer_ID, Game_ID, Item_ID)
- 3NF Food_and_Beverage_Items (Item_ID, Item_Name, Price, Description)

Data Dictionary: Players

Player_ID	Player unique ID (PK)
Team_ID	ID of the team the player plays for (FK)
First Name	First Name
Last Name	Last Name
Position	Player’s position
Jersey_Number	Player’s jersey number
Birth_Date	Player’s DOB
Birth_City	Town the player was born in
Height	Player’s standing height (in feet/inches)
Weight	Player’s weight (in lbs)
Nationality	Player’s nationality

Data Dictionary: Team and Game

Team_ID	Unique team ID (PK)
Team_Name	Name of the hockey team
Team_City	City that the team plays in
Team_Abbreviation	2-3 letter abbreviation of the team
Team_Conference	Conference that the team plays in
Team_Division	Division that the team plays in

Game_ID	ID for the game (PK)
Home_Team_ID	Home team
Away_Team_ID	Away team
Venue_ID	Venue the game is being held at (FK)
Game_Date	Date of the game
Game_Time	Event start time
Attendance	Paid attendance for the game

Data Dictionary: Venue

Venue_ID	Unique ID for the venue (PK)
Venue_Name	Name of the arena
Venue_Address	Address of the venue
Venue_City	City that the venue is in
Venue_State	State that the venue is in
Venue_Zipcode	Zip code of the venue
Capacity	Seating capacity for a hockey game

Implementation - Tables

Game_ID	Home_Team	Away_Team	Venue_ID	Game_Date	Game_Time	Attendance
1	19	6	19	4/21/2023	7pm	17255
2	13	3	13	4/21/2023	7:30pm	20000
3	15	10	15	4/21/2023	9:30pm	20554
4	14	12	14	4/21/2023	10pm	20000
0	0	0	0			0

Player_ID	Team_ID	First_Name	Last_Name	Position	Jersey_Num	Birth_Date	Birth_City	Height	Weight	Nationality
1021	10	Jason	Robertson	RW	21	7/22/1999	Arcadia, CA	191	201	USA
1319	13	Matthew	Tkachuk	RW	19	12/11/1997	Scottsdale, AZ	188	201	USA
1411	14	Anze	Kopitar	C	11	8/24/1987	Jesenice, SLO	192	225	SLO
1913	19	Matt	Barzal	C	13	5/26/1997	Coquitlam, BC	185	187	CAN
0	0				0			0	0	

Team_ID	Team_Name	Team_City	Team_Abbre	Team_Confe	Team_Divisi
1	Anaheim Duck	Anaheim, CA	ANA	West	Pacific
2	Arizona Coyote	Glendale, AZ	ARZ	West	Central
3	Boston Bruins	Boston, MA	BOS	East	Atlantic
4	Buffalo Sabres	Buffalo, NY	BUF	East	Atlantic
5	Calgary Flames	Calgary, AB	CGY	West	Pacific
6	Carolina Hurric	Raleigh, NC	CAR	East	Metropolitan
7	Chicago Blackh	Chicago, IL	CHI	West	Central
8	Colorado Avala	Denver, CO	COL	West	Central
9	Columbus Blue	Columbus, OH	CBJ	East	Metropolitan
10	Dallas Stars	Dallas, TX	DAL	West	Central
11	Detroit Red Wi	Detroit, MI	DET	East	Atlantic
12	Edmonton Oile	Edmonton, AB	EDM	West	Pacific
13	Florida Panthe	Sunrise, FL	FLA	East	Atlantic
14	Los Angeles Ki	Los Angeles, C	LA	West	Pacific
15	Minnesota Wil	St. Paul, MN	MIN	West	Central
16	Montreal Cana	Montreal, QC	MTL	East	Atlantic
17	Nashville Pred	Nashville, TN	NSH	West	Central
18	New Jersey De	Newark, NJ	NJ	East	Metropolitan
19	New York Islan	Elmont, NY	NYI	East	Metropolitan
20	New York Rang	New York, NY	NYR	East	Metropolitan
21	Ottawa Senato	Ottawa, ON	OTT	East	Atlantic
22	Philadelphia Fl	Philadelphia, F	PHI	East	Metropolitan
23	Pittsburgh Pen	Pittsburgh, PA	PIT	East	Metropolitan
24	Seattle Kraken	Seattle, WA	SEA	West	Pacific
25	San Jose Shark	San Jose, CA	SJ	West	Pacific
26	St. Louis Blues	St. Louis, MO	STL	West	Central
27	Tampa Bay Ligh	Tampa, FL	TBL	East	Atlantic
28	Toronto Maple	Toronto, ON	TOR	East	Atlantic
29	Vancouver Can	Vancouver, BC	VAN	West	Pacific
30	Vegas Golden I	Las Vegas, NV	VGK	West	Pacific
31	Washington Ca	Washington, D	WSH	East	Metropolitan
32	Winnipeg Jets	Winnipeg, MB	WPG	West	Central
0					

Implementation – Queries and Forms

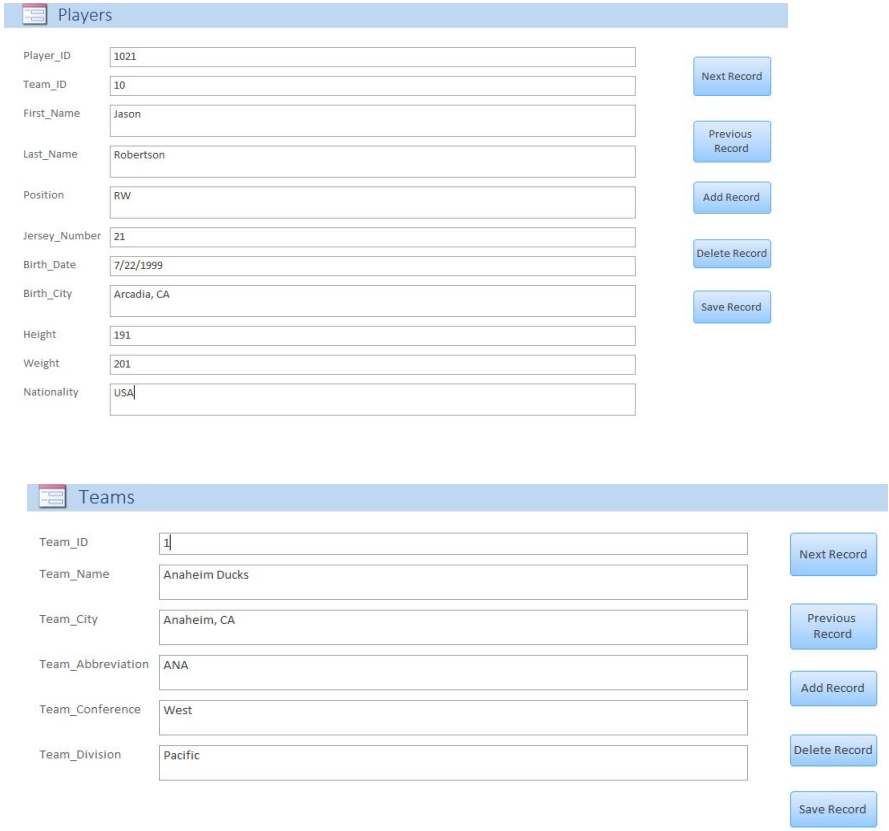
Venue_Nam	Home_Team	Away_Team	Game_Date	Game_Time
FLA Live Arena	13	3	4/21/2023	7:30pm
Crypto.com Are	14	12	4/21/2023	10pm
Xcel Energy Ce	15	10	4/21/2023	9:30pm
UBS Arena	19	6	4/21/2023	7pm

Team_Name	First_Name	Last_Name
Dallas Stars	Jason	Robertson
Florida Panthe	Matthew	Tkachuk
Los Angeles Kir	Anze	Kopitar
New York Islan	Matt	Barzal

Game_ID: 1
Home_Team_ID: 19
Away_Team_ID: 6
Venue_ID: 19
Game_Date: 4/21/2023
Game_Time: 7pm
Attendance: 17255

Next Record
Previous Record
Add Record
Delete Record
Save Record

Implementation – More Forms



Implementation - Reports

NHL Players

First_Name	Last_Name	Position	Jersey_Number	Height	Weight	Nationality
Jason	Robertson	RW	21	191	201	USA
Matthew	Tkachuk	RW	19	188	201	USA
Anze	Kopitar	C	11	192	225	SLO
Matt	Barzal	C	13	185	187	CAN

Schedule

Venue_Name	Team_Name	Game_Date	Game_Time
UBS Arena	New York Island	4/21/2023	7pm
FLA Live Arena	Florida Panthers	4/21/2023	7:30pm
Xcel Energy Center	Minnesota Wild	4/21/2023	9:30pm
Crypto.com Arena	Los Angeles King	4/21/2023	10pm

Event Parking

Parking_Lot_Name	Description	Price
East Deck	Parking east of arena	$7.50
West Deck	Parking west of arena	$5.00
General Lot	General parking lot	$5.00
Main Deck	Main deck	$9.00
Main Lot	Main parking lot	$5.00
Overflow Lot	Overflow lot	$5.00
General Lot	Main parking lot	$3.00
Lot Two	Secondary Lot	$3.00

Summary

The proposal suggests creating a comprehensive database for the NHL hockey league to improve performance analysis and decision-making for teams. The database would require significant technical expertise, resources, ensuring data accuracy, and reliability would be challenging. While there is a high demand for NHL statistics and data, the market may be smaller than expected. The database could be monetized by selling insights and analysis as a separate service, partnering with the NHL and/or individual teams, or expanding to cover other sports leagues. Business rules based on simplified tables have been created, covering different sections of the league, and the ERD did not require the use of supertypes/subtypes or bridge entities. Legal and ethical issues associated with accessing and using NHL data may arise, and established competitors may make it difficult to gain market share.

Questions?