CPSC 304 Project Cover Page

Milestone #: 2

Date: 2022/10/08

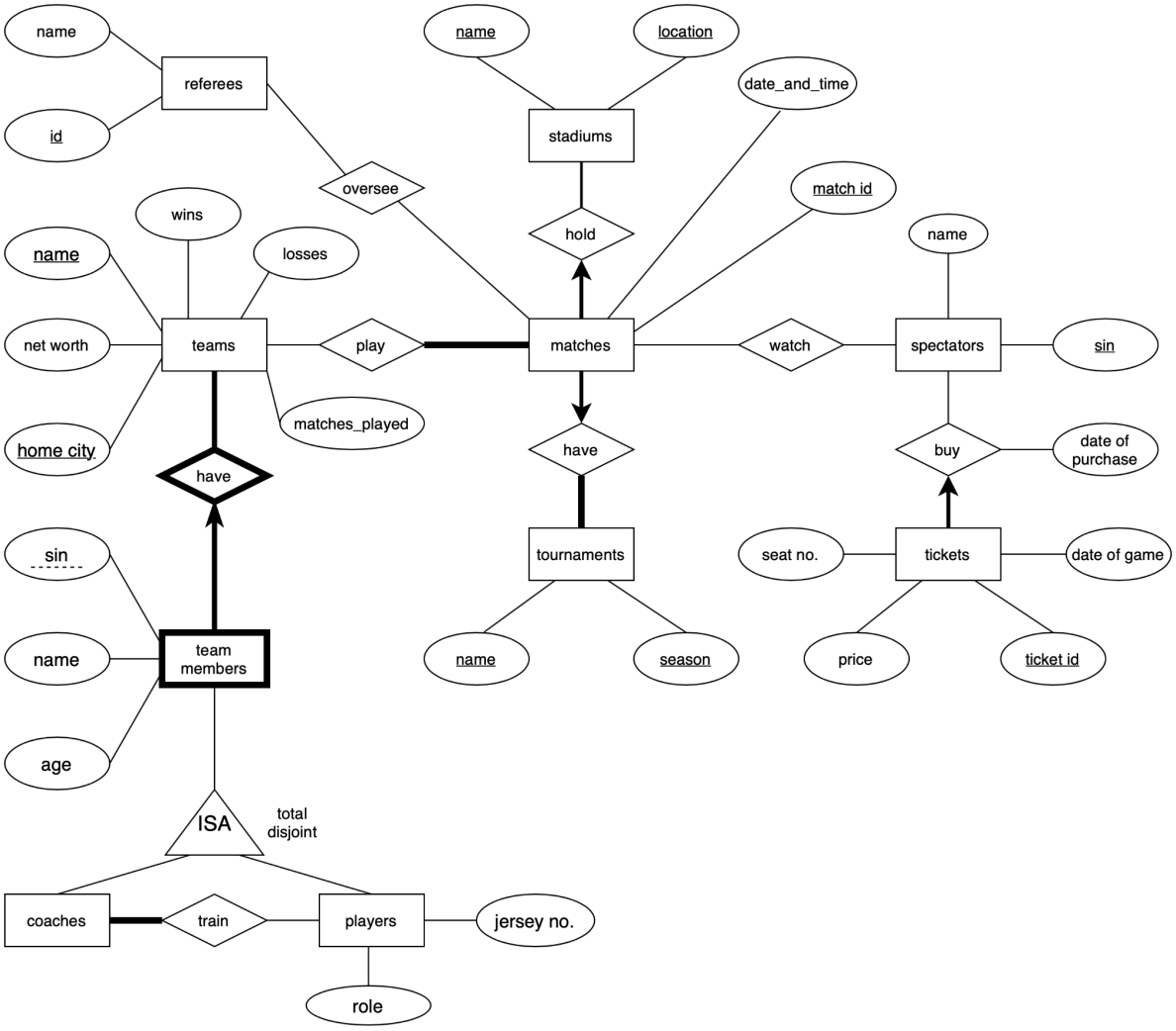
Group Number: 29

Name	Student Number	CS Alias (Userid)	Preferred E-mail Address
Gloria Mo	99556797	h5h3b	gloriamo321@gmail.com
Akash Raut	51475432	n4e0i	asraut29@gmail.com
Adrienne Chu	98338668	n9c3b	cadrienn368@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 the case of Project Milestone 0, the main purpose of this page is for you to let us know your e-mail address, and then let us assign you to a TA for your project supervisor.)

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

2. Update ER Diagram



I basically redid the entire diagram. Some of the changes are:

- matches are no longer a weak entity
- team members are now a weak entity under team
- changed a couple entities and relationships
- added a bunch of attributes

3. Schema

Underline = Primary Key/Candidate Key (we only have one candidate key each)
Bold = Foreign Key

Teams(home_city: string, name: string, net_worth: decimal, matches_played: int, wins: int, losses: int)

Team_Members(**home_city: string**, **team-name: string**, sin: int, member-name, age)

Coaches(**sin: int**)

Players(**sin: int,** jersey no.: int, role: string)

Play(**home_city: string**, **name: string**, **match_id: int**)

Train(**coach-sin: int**, **player-sin: int**)

Referees(id: int, name: string)

Oversee(**ref_id: int**, **match_id: int**)

Tickets(ticket_id: int, **sin.: int**, price: decimal, seat_no.: int, date_of_purchase: string, date_of_game: string)

Spectators(sin: int, name: string)

Watch(**match_id: int**, **sin: int**)

Matches(match_id: int, **tournament-name: string**, **season: int**, **stadium-name: string**, **location: string**, date_and_time: string)

Tournaments(name: string, season: int)

Stadiums(name: string, location: string)

4. Functional Dependencies

Teams:
home_city, name → net_worth
wins, losses → matches_played

Team_Members:
team-name, home_city, sin → member_name, age

Players:
sin → role, jersey_no.

Referees:
id → name

Tickets:
ticket_id → date_of_purchase, date_of_game, price
sin, date_of_game → seat_no.
seat_no → price

Spectators:
sin → name

Matches:
match_id → tournament_name, stadium_name, season, location, date_and_time

Tournaments:
season → name

Stadiums:
Location → name

5. Normalization

Teams:
home_city, name → net_worth
wins, losses → matches_played

home_city, name+ = {home_city, name, net_worth}
wins, losses+ = {wins, losses, matches_played}

Minimal Key: {home_city, name, wins, losses}

Neither or the dependencies are a superkey for Teams, so it is not in BCNF.
Neither net_worth nor matches_played are part of a minimal key, so it is not in 3NF.

We can normalize it into 3NF.

The FDs were already in minimal cover so we can skip that.

Add each FD with minimal cover to the decomposition.
R_1(home_city, name, net_worth)
R_2(wins, losses, matches_played)

Now add the the minimal key.
R_3(home_city, wins, losses)

The FDs were preserved so we don't need to do anything for that.

Together, we have:
R_1(home_city, name, net_worth)
R_2(wins, losses, matches_played)
R_3(home_city, wins, losses)

Teams_net_worth(home_city: string, name: string, net_worth: decimal)
Teams_matches_played(wins: int, losses: int, matches_played: int)
Teams_minimal(home_city: string, name: string, wins: int, losses: int)

Team_Members:
team-name, home_city, sin → member_name, age

This is already in BCNF. The FD is a superkey.

Coaches:
This is already in BCNF. The FD is a superkey.

Train:
This is already in BCNF. The FD is a superkey.

Players:
This is already in BCNF. The FD is a superkey.

Play:
This is already in BCNF. The FD is a superkey.

Referees:
This is already in BCNF. The FD is a superkey.

Oversee:
This is already in BCNF. The FD is a superkey.

Tickets:
ticket_id → date_of_purchase, date_of_game, price
sin, date_of_game → seat_no
seat_no → price

ticket_id+ = {ticket_id, date_of_purchase, date_of_game, price}
sin, date_of_game+ = {sin, date_of_game, seat_no, price}
seat_no+ = {seat_no, price}

Minimal Key:
{ticket_id, sin}

Since none of the FDs are superkeys, this is not in BCNF.
None of the attributes on the right are part of a minimal key. This is not in 3NF.

This is not in minimal cover, so we need to change it.

1. Put FDs in standard form
   ticket_id → date_of_purchase
   ticket_id → date_of_game
   ticket_id → price
   sin, date_of_game → seat_no
   seat_no → price
2. Minimize right hand side:
   Already done.
3. Delete redundant FDs
   Already done.

Minimal cover:
ticket_id → date_of_purchase

ticket_id → date_of_game
ticket_id → price
sin, date_of_game → seat_no
seat_no → price

Now we need to do the decomposition.

Start with:
(sin, date_of_game, seat_no, price, ticket_id, date_of_purchase)

Decompose ticket_id → date_of_purchase:
R_1(ticket_id, sin, date_of_game, seat_no, price)
R_2(ticket_id, date_of_purchase)

Decompose sin, date_of_game → seat_no from R_1
R_3(sin, date_of_game, ticket_id, price)
R_4(sin, date_of_game, seat_no.)

Decompose ticket_id → price from R_3
R_5(ticket_id, sin, date_of_game)
R_6(ticket_id, price.)

Decompose ticket_id → date_of_game from R_5
R_7(ticket_id, sin)
R_8(ticket_id, date_of_game.)

Result of decomposition:
R_2(ticket_id, date_of_purchase)
R_4(sin, date_of_game, seat_no.)
R_6(ticket_id, price.)
R_7(ticket_id, sin)
R_8(ticket_id, date_of_game.)

The minimal key is already there (R_7), so we don't need to add it.

Now we need to add relations for the FDs that weren't preserved.

R_9(seat_no., price)

Together, we have:
R_2(ticket_id, date_of_purchase)
R_4(sin, date_of_game, seat_no.)
R_6(ticket_id, price.)
R_7(ticket_id, sin)

R_8(ticket_id, date_of_game.)
R_9(seat_no., price)

Tickets_date_of_purchase(ticket_id: int, date_of_purchase: string)
Tickets_seat_no(**sin: int,** date_of_game: string, seat_no.: int)
Tickets_price(ticket_id: int, price: decimal)
Tickets_sin(ticket_id: int, **sin: int**)
Tickets_(ticket_id: int, date_of_game: string)
Tickets_seat_no_price(seat_no.: int, price: decimal)

Spectators:
sin → name
This is already in BCNF. The FD is a superkey.

Watch:
This is already in BCNF. The FD is a superkey.

Matches:
match_id → tournament_name, stadium_name, season, location, date_and_time
This is already in BCNF. The FD is a superkey.

Tournaments:
season → name
This is already in BCNF. The FD is a superkey.

Stadiums:
Location → name
This is already in BCNF. The FD is a superkey.

6. SQL DDL Statements

```
CREATE TABLE Teams_net_worth (
   home_city char(100),
   name      char(50),
   net_worth decimal,
   PRIMARY KEY (home_city, name)
);

CREATE TABLE Teams_matches_played (
   wins int,
   losses int,
   matches_played int,
   PRIMARY KEY (wins, losses)
);

CREATE TABLE Teams_minimal (
   home_city char(100),
   name      char(50),
   wins int,
   losses int,
   PRIMARY KEY (home_city, name, wins, losses)
);

CREATE TABLE Team_Members(
   home_city   char(100)   not NULL,
   team_name   char(50)    not NULL,
   sin         int,
   member_name char(50),
   age         int,
   PRIMARY KEY (home_city, team_name, sin),
   FOREIGN KEY (home_city, team_name) REFERENCES Teams_net_worth
(home_city, name)
       ON DELETE CASCADE
);

CREATE TABLE Coaches (
   home_city   char(100)   not NULL,
   team_name   char(50)   not NULL,
   sin         int,
   PRIMARY KEY (home_city, team_name, sin),
   FOREIGN KEY (home_city, team_name, sin) REFERENCES Team_Members
(home_city, team_name, sin)
       ON DELETE CASCADE
);
```

```
CREATE TABLE Players (
   home_city   char(100)   not NULL,
   team_name   char(50)   not NULL,
   sin         int,
   jersey_no   int,
   role        char(50),
   PRIMARY KEY (home_city, team_name, sin),
   FOREIGN KEY (home_city, team_name, sin) REFERENCES Team_Members
(home_city, team_name, sin)
       ON DELETE CASCADE
);

-- Assert coaches can only train players in the same team as them
CREATE TABLE Train(
   coach_home_city  char(100)   not NULL,
   coach_team_name  char(50)    not NULL,
   coach_sin        int,
   player_home_city char(100)   not NULL,
   player_team_name char(50)    not NULL,
   player_sin       int         not NULL,
   PRIMARY KEY (coach_home_city, coach_team_name, coach_sin,
       player_home_city, player_team_name, player_sin),
   FOREIGN KEY (coach_home_city, coach_team_name, coach_sin)
REFERENCES Team_Members (home_city, team_name, sin)
       ON DELETE CASCADE,
   FOREIGN KEY (player_home_city, player_team_name, player_sin)
REFERENCES Team_Members (home_city, team_name, sin)
       ON DELETE CASCADE
);

CREATE TABLE Referees (
   id      int,
   name    char(50),
   PRIMARY KEY (id)
);

CREATE TABLE Spectators (
   sin         int,
   name        char(50),
   PRIMARY KEY (sin)
);

CREATE TABLE Tournaments (
   name        char(100),
   season      int,
```

```
   PRIMARY KEY (name, season)
);

CREATE TABLE Stadiums (
   name        char(100),
   location    char(100),
   PRIMARY KEY (name, location)
);

CREATE TABLE Tickets_date_of_purchase (
   ticket_id int,
   date_of_purchase char(10),
   PRIMARY KEY (ticket_id)
);

CREATE TABLE Tickets_seat_no (
   sin          int        not NULL,
   date_of_game char(10),
   seat_no      int,
   PRIMARY KEY (sin, date_of_game),
   FOREIGN KEY (sin) REFERENCES Spectators (sin)
       ON DELETE CASCADE
);

CREATE TABLE Tickets_price (
   ticket_id int,
   price decimal,
   PRIMARY KEY (ticket_id)
);

CREATE TABLE Tickets_sin (
   ticket_id int,
   sin int not NULL,
   PRIMARY KEY (ticket_id),
   FOREIGN KEY (sin) REFERENCES Spectators (sin)
       ON DELETE CASCADE
);

CREATE TABLE Tickets_date_of_game (
   ticket_id int,
   date_of_game char(10),
   PRIMARY KEY (ticket_id)
);

CREATE TABLE Tickets_seat_no_price (
```

```
   seat_no int,
   price decimal,
   PRIMARY KEY (seat_no)
);

CREATE TABLE Matches (
   match_id         int,
   tournament_name  char(100)  not NULL,
   season           int        not NULL,
   stadium_name     char(100)  not NULL,
   location         char(100)  not NULL,
   date_and_time    char(16),
   PRIMARY KEY (match_id),
   FOREIGN KEY (tournament_name, season) REFERENCES Tournaments
(name, season)
       ON DELETE CASCADE,
   FOREIGN KEY (stadium_name, location) REFERENCES Stadiums (name,
location)
       ON DELETE CASCADE
);

CREATE TABLE Oversee (
   ref_id    int,
   match_id  int,
   PRIMARY KEY (ref_id, match_id),
   FOREIGN KEY (ref_id) REFERENCES Referees (id)
       ON DELETE CASCADE,
   FOREIGN KEY (match_id) REFERENCES Matches (match_id)
       ON DELETE CASCADE
);

CREATE TABLE Watch (
   match_id    int,
   sin         int,
   PRIMARY KEY (match_id, sin),
   FOREIGN KEY (match_id) REFERENCES Matches
       ON DELETE CASCADE,
   FOREIGN KEY (sin) REFERENCES Spectators
       ON DELETE CASCADE
);

CREATE TABLE Play (
   home_city   char(100)   not NULL,
   name        char(50)    not NULL,
   match_id    int,
```

```
    PRIMARY KEY (home_city, name, match_id),
    FOREIGN KEY (home_city, name) REFERENCES Teams_net_worth
        ON DELETE CASCADE,
    FOREIGN KEY (match_id) REFERENCES Matches
        ON DELETE CASCADE
);
```

7. INSERT statements

```
INSERT INTO Teams_net_worth VALUES ('Vancouver', 'Canucks',
100000.00);
INSERT INTO Teams_net_worth VALUES ('Toronto', 'Maple Leafs',
200000.00);
INSERT INTO Teams_net_worth VALUES ('Montreal', 'Canadians',
99999.99);
INSERT INTO Teams_net_worth VALUES ('Edmonton', 'Oilers', 5000.00);
INSERT INTO Teams_net_worth VALUES ('Calgary', 'Flames', 700000.00);

INSERT INTO Teams_matches_played VALUES (9, 4, 12);
INSERT INTO Teams_matches_played VALUES (5, 5, 10);
INSERT INTO Teams_matches_played VALUES (10, 0, 10);
INSERT INTO Teams_matches_played VALUES (7, 4, 11);
INSERT INTO Teams_matches_played VALUES (1, 12, 13);

INSERT INTO Teams_minimal VALUES ('Vancouver', 'Canucks', 9, 4);
INSERT INTO Teams_minimal VALUES ('Toronto', 'Maple Leafs', 5, 5);
INSERT INTO Teams_minimal VALUES ('Montreal', 'Canadians', 10, 0);
INSERT INTO Teams_minimal VALUES ('Edmonton', 'Oilers', 7, 4);
INSERT INTO Teams_minimal VALUES ('Calgary', 'Flames', 1, 12);

INSERT INTO Team_Members VALUES ('Vancouver', 'Canucks', 123456789,
'Some Coach', 44);
INSERT INTO Team_Members VALUES ('Toronto', 'Maple Leafs', 121212121,
'Sol Dudeguy', 28);
INSERT INTO Team_Members VALUES ('Montreal', 'Canadians', 884974349,
'Big Bob', 51);
INSERT INTO Team_Members VALUES ('Edmonton', 'Oilers', 000000001,
'Yoda', 100);
INSERT INTO Team_Members VALUES ('Calgary', 'Flames', 339483239,
'Gigachad', 69);

INSERT INTO Team_Members VALUES ('Vancouver', 'Canucks', 547932345,
'Some Player', 21);
INSERT INTO Team_Members VALUES ('Toronto', 'Maple Leafs', 987654321,
'Ky Kooskey', 23);
INSERT INTO Team_Members VALUES ('Montreal', 'Canadians', 007008009,
'Mudrock', 29);
INSERT INTO Team_Members VALUES ('Edmonton', 'Oilers', 400400400,
'Luke', 17);
INSERT INTO Team_Members VALUES ('Calgary', 'Flames', 483250283,
'Noob', 18);

INSERT INTO Coaches VALUES ('Vancouver', 'Canucks', 123456789);
```

```
INSERT INTO Coaches VALUES ('Toronto', 'Maple Leafs', 121212121);
INSERT INTO Coaches VALUES ('Montreal', 'Canadians', 884974349);
INSERT INTO Coaches VALUES ('Edmonton', 'Oilers', 000000001);
INSERT INTO Coaches VALUES ('Calgary', 'Flames', 339483239);

INSERT INTO Players VALUES ('Vancouver', 'Canucks', 547932345, 8,
'Forward');
INSERT INTO Players VALUES ('Toronto', 'Maple Leafs', 987654321, 7,
'Defence');
INSERT INTO Players VALUES ('Montreal', 'Canadians', 007008009, 1,
'Goalie');
INSERT INTO Players VALUES ('Edmonton', 'Oilers', 400400400, 4,
'Forward');
INSERT INTO Players VALUES ('Calgary', 'Flames', 483250283, 10,
'Defence');

INSERT INTO Train VALUES ('Vancouver', 'Canucks', 123456789,
'Vancouver', 'Canucks', 547932345);
INSERT INTO Train VALUES ('Toronto', 'Maple Leafs', 121212121,
'Toronto', 'Maple Leafs', 987654321);
INSERT INTO Train VALUES ('Montreal', 'Canadians', 884974349,
'Montreal', 'Canadians', 007008009);
INSERT INTO Train VALUES ('Edmonton', 'Oilers', 000000001,
'Edmonton', 'Oilers', 400400400);
INSERT INTO Train VALUES ('Calgary', 'Flames', 339483239, 'Calgary',
'Flames', 483250283);

INSERT INTO Referees VALUES (1, 'Broski');
INSERT INTO Referees VALUES (2, 'Buddy');
INSERT INTO Referees VALUES (3, 'Pal');
INSERT INTO Referees VALUES (4, 'Brotha');
INSERT INTO Referees VALUES (5, 'My Man');

INSERT INTO Spectators VALUES (196596859, 'Simp');
INSERT INTO Spectators VALUES (295060560, '#1 Fan');
INSERT INTO Spectators VALUES (309450503, 'Rager');
INSERT INTO Spectators VALUES (980850440, 'Mr. Watcher');
INSERT INTO Spectators VALUES (294454095, 'John');

INSERT INTO Tournaments VALUES ('Piston Cup', 2001);
INSERT INTO Tournaments VALUES ('NHL League', 2022);
INSERT INTO Tournaments VALUES ('Little League Hockey', 2024);
INSERT INTO Tournaments VALUES ('Stanley Cup', 1998);
INSERT INTO Tournaments VALUES ('Cyberpunk', 2077);
```

```
INSERT INTO Stadiums VALUES ('Rogers Arena', 'Vancouver');
INSERT INTO Stadiums VALUES ('Some Place', 'Some City');
INSERT INTO Stadiums VALUES ('Pokemon League Building', 'Sinnoh');
INSERT INTO Stadiums VALUES ('Death Star', 'Space');
INSERT INTO Stadiums VALUES ('Arasaka Tower', 'Night City');

INSERT INTO Tickets_date_of_purchase VALUES (123, '2022-04-20');
INSERT INTO Tickets_date_of_purchase VALUES (456, '2010-01-19');
INSERT INTO Tickets_date_of_purchase VALUES (789, '1988-12-31');
INSERT INTO Tickets_date_of_purchase VALUES (007, '2044-03-03');
INSERT INTO Tickets_date_of_purchase VALUES (420, '1999-11-14');

INSERT INTO Tickets_seat_no VALUES (196596859, '2022-04-31', 1);
INSERT INTO Tickets_seat_no VALUES (295060560, '2010-02-14', 2);
INSERT INTO Tickets_seat_no VALUES (309450503, '1989-01-24', 3);
INSERT INTO Tickets_seat_no VALUES (980850440, '2044-03-04', 4);
INSERT INTO Tickets_seat_no VALUES (294454095, '1999-11-22', 5);

INSERT INTO Tickets_price VALUES (123, 19.99);
INSERT INTO Tickets_price VALUES (456, 19.99);
INSERT INTO Tickets_price VALUES (789, 31.99);
INSERT INTO Tickets_price VALUES (007, 31.99);
INSERT INTO Tickets_price VALUES (420, 49.99);

INSERT INTO Tickets_sin VALUES (123, 196596859);
INSERT INTO Tickets_sin VALUES (456, 295060560);
INSERT INTO Tickets_sin VALUES (789, 309450503);
INSERT INTO Tickets_sin VALUES (007, 980850440);
INSERT INTO Tickets_sin VALUES (420, 294454095);

INSERT INTO Tickets_date_of_game VALUES (123, '2022-04-31');
INSERT INTO Tickets_date_of_game VALUES (456, '2010-02-14');
INSERT INTO Tickets_date_of_game VALUES (789, '1989-01-24');
INSERT INTO Tickets_date_of_game VALUES (007, '2044-03-04');
INSERT INTO Tickets_date_of_game VALUES (420, '1999-11-22');

INSERT INTO Tickets_seat_no_price VALUES (1, 19.99);
INSERT INTO Tickets_seat_no_price VALUES (2, 19.99);
INSERT INTO Tickets_seat_no_price VALUES (3, 31.99);
INSERT INTO Tickets_seat_no_price VALUES (4, 31.99);
INSERT INTO Tickets_seat_no_price VALUES (5, 49.99);

INSERT INTO Matches VALUES (1, 'Piston Cup', 2001, 'Rogers Arena',
'Vancouver', '2022-04-31 16:00');
```

```
INSERT INTO Matches VALUES (2, 'NHL League', 2022, 'Some Place',
'Some City', '2010-02-14 15:00');
INSERT INTO Matches VALUES (3, 'Little League Hockey', 2024, 'Pokemon
League Building', 'Sinnoh', '1989-01-24 08:00');
INSERT INTO Matches VALUES (4, 'Stanley Cup', 1998, 'Death Star',
'Space', '2044-03-04 18:00');
INSERT INTO Matches VALUES (5, 'Cyberpunk', 2077, 'Arasaka Tower',
'Night City', '1999-11-22 21:00');

INSERT INTO Oversee VALUES (1, 1);
INSERT INTO Oversee VALUES (2, 2);
INSERT INTO Oversee VALUES (3, 3);
INSERT INTO Oversee VALUES (4, 4);
INSERT INTO Oversee VALUES (5, 5);

INSERT INTO Watch VALUES (1, 196596859);
INSERT INTO Watch VALUES (2, 295060560);
INSERT INTO Watch VALUES (3, 309450503);
INSERT INTO Watch VALUES (4, 980850440);
INSERT INTO Watch VALUES (5, 294454095);

INSERT INTO Play VALUES ('Vancouver', 'Canucks', 1);
INSERT INTO PLAY VALUES ('Toronto', 'Maple Leafs', 1);
INSERT INTO Play VALUES ('Toronto', 'Maple Leafs', 2);
INSERT INTO Play VALUES ('Edmonton', 'Oilers', 2);
INSERT INTO Play VALUES ('Montreal', 'Canadians', 3);
INSERT INTO Play VALUES ('Calgary', 'Flames', 3);
INSERT INTO Play VALUES ('Edmonton', 'Oilers', 4);
INSERT INTO Play VALUES ('Montreal', 'Canadians', 4);
INSERT INTO Play VALUES ('Vancouver', 'Canucks', 5);
INSERT INTO Play VALUES ('Calgary', 'Flames', 5);
```