Trinity College Dublin
Coláiste na Tríonóide, Baile Átha Cliath
The University of Dublin

CSU34041 Information Management 2
Assignment: MySQL Database Project

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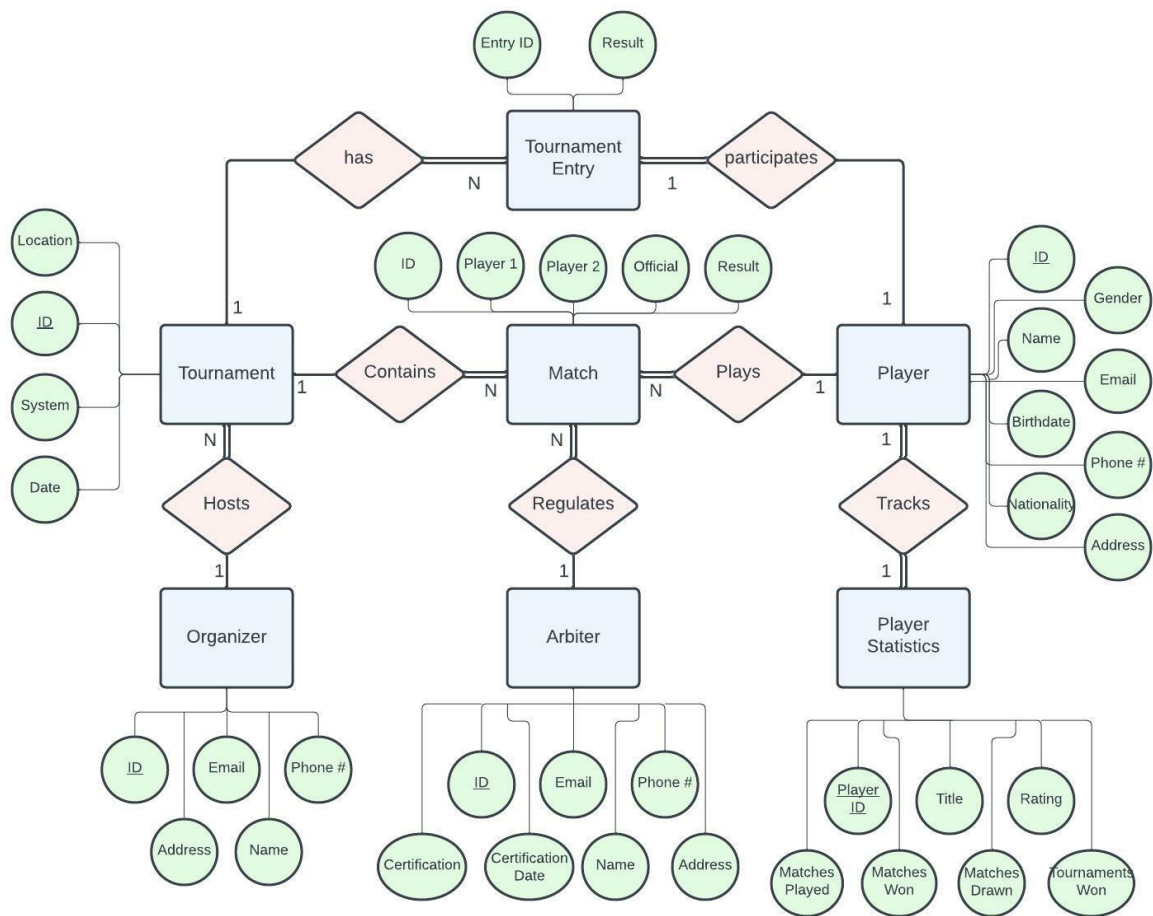
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Application Overview

This database is designed to model Chess Tournaments organized by FIDE(International Chess Federation), its many member organizations and many clubs and websites around the world. Every year there are thousands of tournaments taking place, from low stakes daily or weekly tournaments in local clubs and popular websites, all the way up to the FIDE World Chess Championship. Tournaments at all levels that operate under FIDE regulations, have the same basic formula, and all can be modeled with a limited number of tables and relations. Organizers host tournaments, which have a set number of matches, each match involves two players, and in official settings, an arbiter who ensures compliance with regulations. Because all official tournaments follow the same rules, player performances can be derived from statistics captured from matches over time.
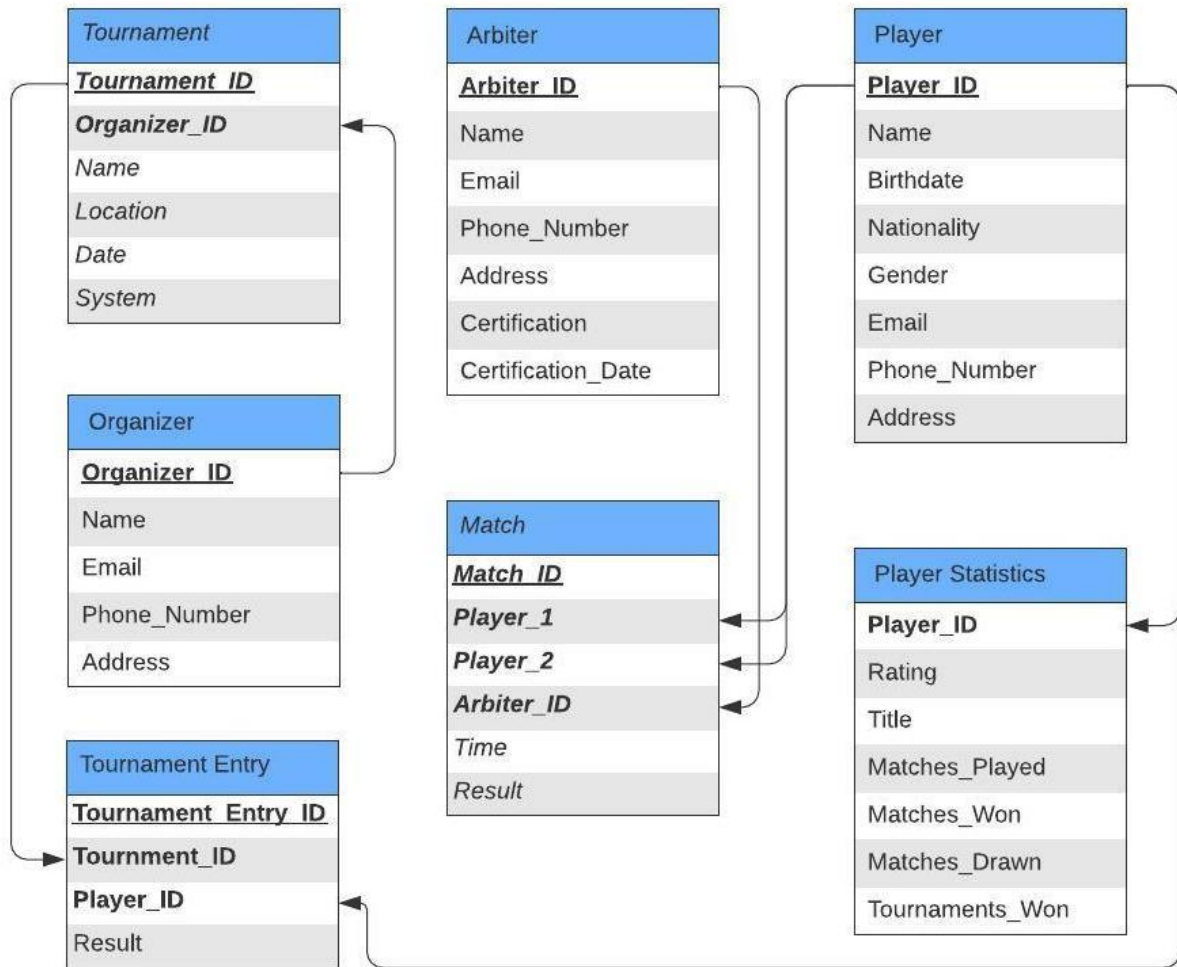
Tournaments can be described using entity tables as follows.

- **Tournaments** themselves have a given id, a name or title, an organizer, a location which could be a physical address or online, a system for matching players and deciding how many games are to be played, and a date.
- An **Organizer** is the individual, club, federation, or other organization that is putting on a specific tournament or tournaments. Organizers have an id, name or title, email, phone number, and address.
- **Players** have an id and name, their birthdate, nationality, gender, and nationality so they can be placed in tournaments with their peers. They also have email, phone, and address to be contacted.
- Chess **Arbiters** are officials who are certified to preside over matches and confirm that all rules and regulations are followed. They have an id, name, email, phone number, address, and certification, and certification date.
- **Matches** occur between two players, they may have an arbiter at higher levels, and a final result, either one player wins, or a draw.
- **Tournament Entry** tracks a player if a player is in a tournament and their result. It contains the player id, tournament id, and the player result.
- **Player Statistics** tracks a particular player's performance across officially sanctioned tournaments, it contains the player id, their elo rating(a value that tracks relative skill), their FIDE title if applicable(such as International Master or Grand Master), total matches played, matches won, matches drawn, and tournaments won.

Entity Relation Diagram

Relational Schema

Tournament
- _Tournament_ID_
- _Organizer_ID_
- Name
- Location
- Date
- System

Arbiter
- Arbiter_ID
- Name
- Email
- Phone_Number
- Address
- Certification
- Certification_Date

Player
- Player_ID
- Name
- Birthdate
- Nationality
- Gender
- Email
- Phone_Number
- Address

Organizer
- Organizer_ID
- Name
- Email
- Phone_Number
- Address

Match
- _Match_ID_
- _Player_1_
- _Player_2_
- _Arbiter_ID_
- Time
- Result

Player Statistics
- Player_ID
- Rating
- Title
- Matches_Played
- Matches_Won
- Matches_Drawn
- Tournaments_Won

Tournament Entry
- Tournament_Entry_ID
- Tournment_ID
- Player_ID
- Result
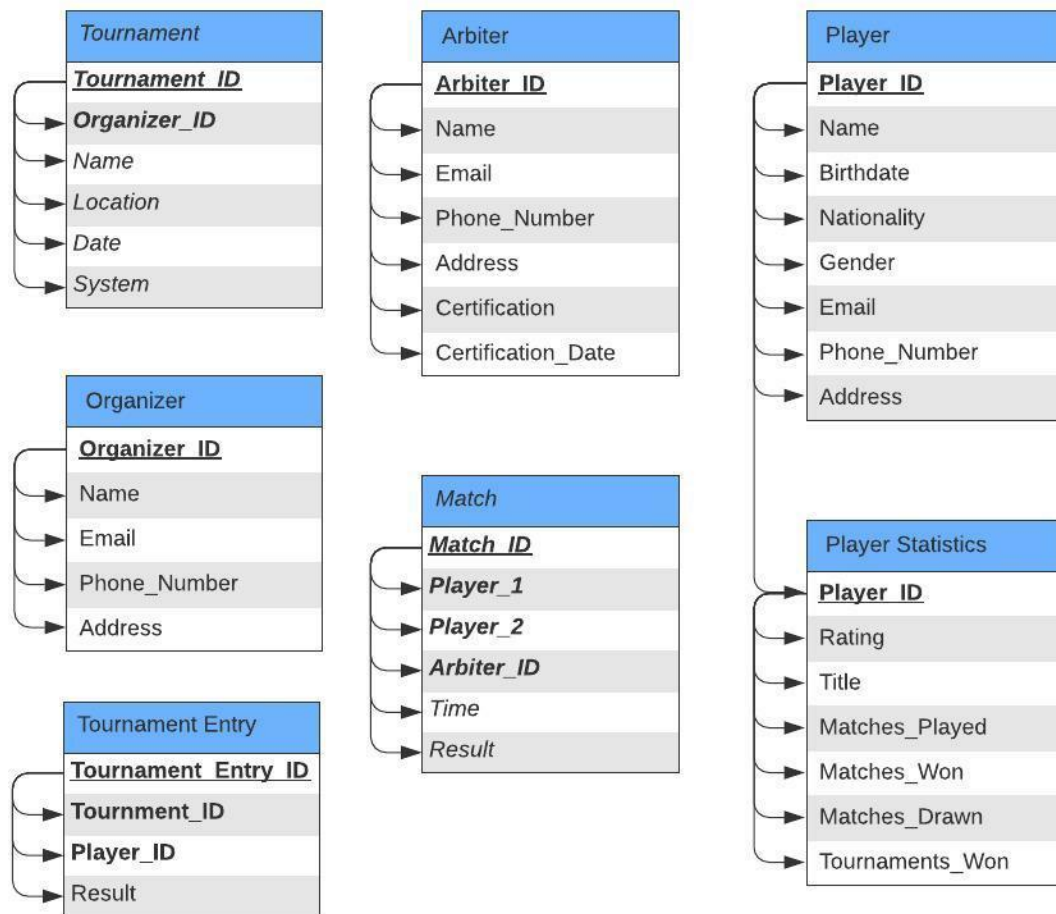
Functional Dependency Diagram

Table Creation and Constraints

Each table was constructed with constraints to ensure Values are valid. All values for all attributes must be NOT NULL. IDs for each table are automatically incremented starting from 1000, they must be unique and not NULL.

```
ALTER TABLE Tournament AUTO_INCREMENT=1000;
ALTER TABLE Organizer AUTO_INCREMENT=1000;
ALTER TABLE Player AUTO_INCREMENT=1000;
ALTER TABLE Arbiter AUTO_INCREMENT=1000;
ALTER TABLE Match AUTO_INCREMENT=1000;
ALTER TABLE Tournament_Entry AUTO_INCREMENT=1000;
```

All text values are set to a character length of 50 for a compromise between space for unique names and values, which will not get out of hand. Date and Int values use the

corresponding types to make them easy to use. Various constraints are used to verify data integrity, in the Tournament Table, a check is in place to ensure the Tournament system is a valid option. Primary and Foreign keys are defined at the end of each CREATE TABLE function.

```sql
CREATE TABLE Tournament(
    Tournament_ID INT NOT NULL AUTO_INCREMENT UNIQUE,
    Tournament_Organizer VARCHAR(50) NOT NULL,
    Tournament_Name VARCHAR(50) NOT NULL,
    Tournament_Location VARCHAR(50) NOT NULL,
    Tournament_Date DATE NOT NULL,
    Tournament_System VARCHAR(50) NOT NULL,
    CONSTRAINT chk_System
    CHECK (
        Tournament_System in ('Round Robin','Single Elimination','Swiss System')
    ),
    PRIMARY KEY (Tournament_ID)
    FOREIGN KEY (Tournament_Organizer) REFERENCES Organizer(Organizer_ID)
);
```

In the Arbiter table a check is done to ensure that an Arbiters certification is less than ten years old, to ensure that it is being kept up to date.

```sql
CREATE TABLE Arbiter(
    Arbiter_ID INT NOT NULL AUTO_INCREMENT UNIQUE,
    Arbiter_Name VARCHAR(50) NOT NULL,
    Arbiter_Email VARCHAR(50) NOT NULL,
    Arbiter_Phone VARCHAR(50) NOT NULL,
    Arbiter_Address VARCHAR(50) NOT NULL,
    Arbiter_Certification VARCHAR(50) NOT NULL,
    Arbiter_Certification_Date DATE NOT NULL,
    CONSTRAINT Arbiter_Certification_Date_Check
    CHECK (
        Arbiter_Certification_Date >= DATEADD(YEAR,-10,GETDATE())
        ),
    PRIMARY KEY (Arbiter_ID)
);
```

Player Statistics is the only table that does not have its own unique ID, as it has a 1 to 1 relationship with the Player Table, and can use the foreign key, Player_ID, as its primary key.

```sql
CREATE TABLE Player_Statistics(
    Player_ID INT NOT NULL,
```

```
   Player_Rating INT NOT NULL,
   Player_Title VARCHAR(50) NOT NULL,
   Player_Matches_Played INT NOT NULL,
   Player_Matches_Won INT NOT NULL,
   Player_Matches_Drawn INT NOT NULL,
   PRIMARY KEY (Player_ID),
   FOREIGN KEY (Player_ID) REFERENCES Player(Player_ID)
);
```

Security

Security is handled through creating roles with various permissions, and assigning each role to trusted individuals. An administrator role has been created with access to all tables and the grant option to give permissions to other/new users. The organizer role allows a tournament organizer to add, delete and alter data on all tables, but no administrator options. The Arbiter role can add, and update data to tables relevant to the matches they oversee, and not to tournaments as a whole. Example users for each type have been added.

```
-- Role Creation
CREATE ROLE 'administrator','organizer','arbiter';
GRANT ALL ON ChessTournament.* TO 'administrator' WITH GRANT OPTION;
GRANT INSERT,UPDATE,SELECT,DELETE ON ChessTournament.* TO 'organizer';
GRANT INSERT,UPDATE,SELECT ON
ChessTournament.Match,ChessTournament.Player,ChessTournament.Player_Statistics
TO 'arbiter';
-- User Creation
CREATE USER 'admin'@'localhost' IDENTIFIED BY 'admin';
CREATE USER 'irish_chess_union'@'localhost' IDENTIFIED BY 'irish_chess_union';
CREATE USER 's_gaffney'@'localhost' IDENTIFIED BY 's_gaffney';

GRANT 'administrator' TO 'admin'@'localhost';
GRANT 'organizer' TO 'irish_chess_union'@'localhost';
GRANT 'arbiter' TO 's_gaffney'@'localhost';
```

Views

There are two view options, one that shows all the players in each tournament, and one that shows all the matches an individual player has played in a tournament. These simplify the process of retrieving data to be displayed externally.

```
CREATE VIEW Players_In_Tournament AS
   SELECT Player_Name, Tournament_Name
```

```
    FROM Player, Tournament, Tournament_Entry
    WHERE Player.Player_ID = Tournament_Entry.Tournament_Entry_Player_ID
    AND Tournament.Tournament_ID =
Tournament_Entry.Tournament_Entry_Tournament_ID;


CREATE VIEW Player_Matches AS
    SELECT Player_Name, Match_Time, Match_Tournament_ID, Match_Result
    FROM Player, Match, Tournament_Entry
    WHERE Player.Player_ID = Tournament_Entry.Tournament_Entry_Player_ID
    AND Match.Match_Tournament_ID =
Tournament_Entry.Tournament_Entry_Tournament_ID;
```

Populating the Database

All tables were populated with valid, but fictitious data to demonstrate the database.

```
-- Table Population
INSERT INTO Tournament VALUES ('FIDE', 'World Championship 2021', 'New York,
USA', '2021-04-16', 'Round Robin');
INSERT INTO Tournament VALUES ('Trinity Chess Club', 'Trinity Championship 2021',
'Dublin, IE', '2021-11-11', 'Swiss System');
INSERT INTO Tournament VALUES ('Lichess.org', 'Daily Blitz Tournament 12/04/20',
'lichess.org/tournament/BxYkrTtj', '2020-04-12', 'Single Elimination');
INSERT INTO Tournament VALUES ('Irish Chess Union', 'European Individual
Championship 2021', 'Dublin, IE', '2021-05-09', 'Swiss System');
INSERT INTO Tournament VALUES ('US Chess Federation', 'Junior Festival 2021',
'Los Angles, USA', '2021-06-31', 'Round Robin');


INSERT INTO Organizer VALUES('FIDE', 'admin@fide.org', 0871234567, 'Lausanne,
Switzerland');
INSERT INTO Organizer VALUES('Trinity Chess Club', 'chess@tcd.ie', 0209153529,
'Dublin, IE');
INSERT INTO Organizer VALUES('Lichess.org', 'jd742@tcd.ie', 0209140461, 'San
Francisco, CA');
INSERT INTO Organizer VALUES('Irish Chess Union', 'david@icu.org', 02091404617,
'Dublin, IE');
INSERT INTO Organizer VALUES('US Chess Federation', 'admin@ucf.org', 0209119916,
'New York, USA');


INSERT INTO Player VALUES('John Doe', '2089-05-21', 'USA', 'Male',
'johnx492@gmail.com', 0209177806, 'New York, USA')
INSERT INTO Player VALUES('Magnus Carlsene', '2091-03-12', 'Norwegian', 'Male',
'mc90@gmail.com', 0209124872, 'Tonsberg, NR')
```

```
INSERT INTO Player VALUES('Ding Liren', '1975-09-01', 'USA', 'Male',
'dingl4592@gmail.com', 0209137064, 'Tokyo, JP')
INSERT INTO Player VALUES('Levon Aronian', '1999-06-21', 'USA', 'Male',
'laronian2@gmail.com', 0209157042, 'San Francisco, USA')
INSERT INTO Player VALUES('Eli Millar', '2000-02-08', 'USA', 'Male',
'elimillar@gmail.com', 0209115503, 'Dublin, IE')


INSERT INTO Player_Statistics VALUES (1001, 1005, 'None', 100, 40, 2);
INSERT INTO Player_Statistics VALUES (1002, 2587, 'GM', 1450, 1202, 200);
INSERT INTO Player_Statistics VALUES (1003, 2499, 'GM', 356, 254, 53);
INSERT INTO Player_Statistics VALUES (1004, 2551, 'GM', 459, 372, 24);
INSERT INTO Player_Statistics VALUES (1005, 2341, 'IM', 281, 154, 29);

INSERT INTO Aribiter VALUES('Jack Dorsey', 'jd87@gmail.com', 0771234567, 'London,
UK', 'FA-D', '2016-06-21');
INSERT INTO Aribiter VALUES('Clark Kent', 'ckent@gmail.com', 0209147799,
'Metropolis, USA', 'IA-D', '1013-02-19');
INSERT INTO Aribiter VALUES('Kerciku, Suzana', 'suzana1235@gmail.com',
0209115503, 'New Dehli, India', 'FA-D', '2019-04-31');
INSERT INTO Aribiter VALUES('Lazaj, Shkelqim', 'lazajS56@gmail.com', 0209125789,
'jakarta, Indenosia', 'FA-D', '2021-12-01');
INSERT INTO Aribiter VALUES('Shehu, Olsi', 'osli127Shehu@gmail.com', 0209184217,
'London, UK', 'FA-D', '2015-04-05');

INSERT INTO Match VALUES(1001, '12:12:12', 1003, 1002);
INSERT INTO Match VALUES(1001, '07:14:16', 1004, 1002);
INSERT INTO Match VALUES(1003, '11:23:45', 1001, 1004);
INSERT INTO Match VALUES(1003, '09:07:18', 1002, 1005);
INSERT INTO Match VALUES(1003, '06:31:24', 1005, 1003);

INSERT INTO Tournament_Entry VALUES(1001, 1003, 'Lost');
INSERT INTO Tournament_Entry VALUES(1002, 1001, 'Won');
INSERT INTO Tournament_Entry VALUES(1003, 1001, 'Lost');
INSERT INTO Tournament_Entry VALUES(1004, 1001, 'Lost');
INSERT INTO Tournament_Entry VALUES(1005, 1003, 'Won');
```