Formula 1 Season 2023 Database Application

DESCRIPTION

The aim for this project is to create a database system for Fomula 1 Season 2023 data. The entities of this project was determined as the following:
1) Driver: The primary key of the Driver entity is **did** (abbreviation of driver id). The other attributes are the name of the driver (**dname**) and the **nationality** of the driver.

2) Team: The primary key of the Team entity is **tid**. The other attributes are the name of the team **(tname)** and the **principal** of the team.

3) Engine_Supplier: The primary key of the Engine_Supplier entity is **esid**. The other attributes are the name of the engine supplier **(ename)** and the **country** of origin.

4) Race: The primary key of the Race entity is **rid**(abbreviation of race id). The other attributes are the **circuit** of the race and the number of laps to be completed (**LapCount**).

5) Race_Result: The primary key of the Race_Result entity is **rrid** (abbreviation of race result id). The other attributes are the final **position** of a specific driver and the fastest lap time (**FastestLapTime**) of a specific driver.

6) Pit_Stop: The primary key of the Pit_Stop entity is **pid**(abbreviation of pit stop id). The other attributes are the **reason** for the pit stop and the **duration** it takes.

The relationships which link those entities were determined as the following:

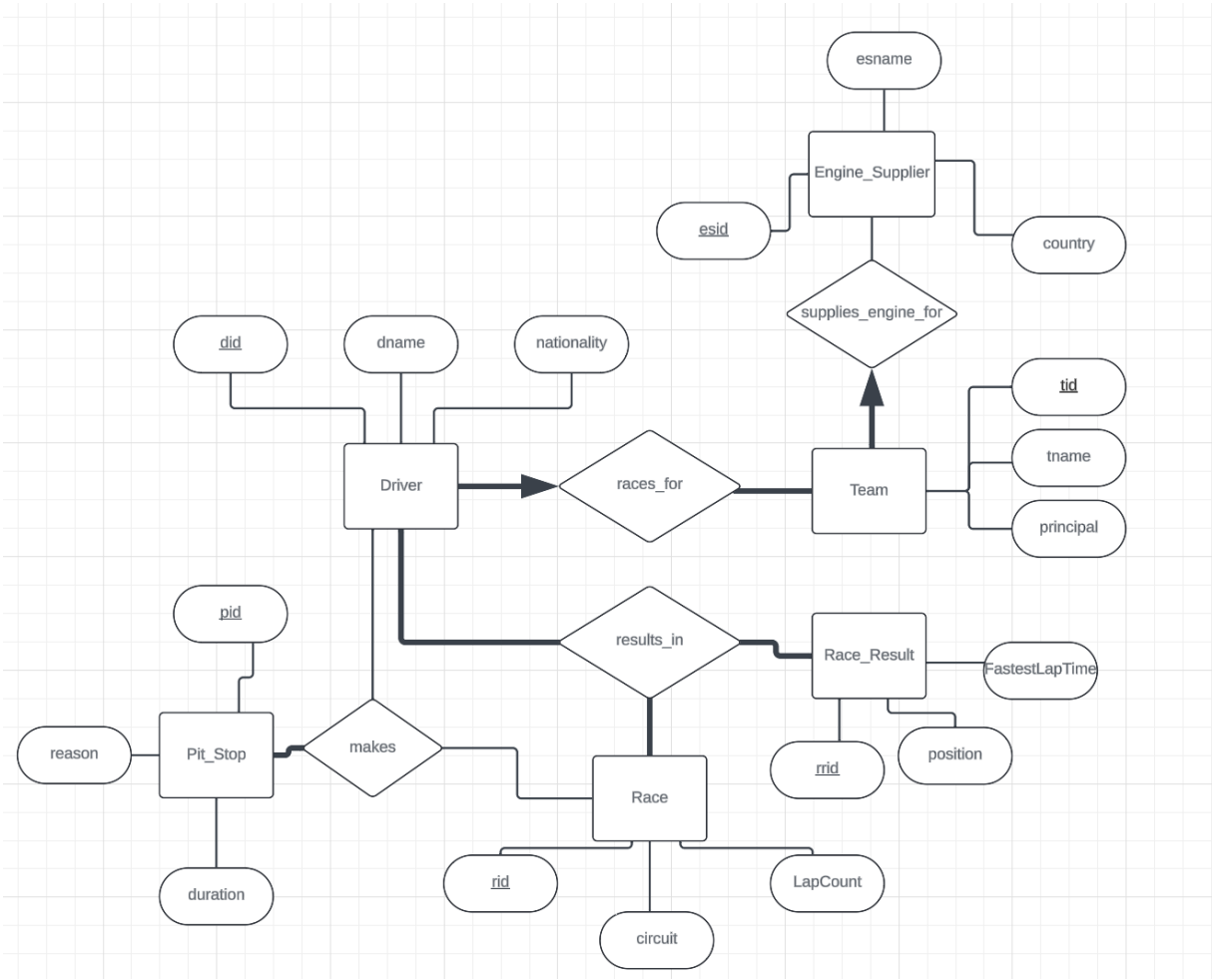
1) races_for: This relationship indicates the connection between Driver and Team entities. The relationship contains a key constraint because it is a many-to-one relationship since the driver can race for just one team but a team has two drivers. It also contains a participation constraint from both sides since each team must have a driver and each driver must have a team.

2) supplies_engine_for: This relationship indicates the connection between Team and Engine_Supplier entities. The relationship contains a key constraint because it is a many-to-one relationship since the team can have only one engine supplier but an engine supplier can work with multiple teams. It also contains a participation constraint from Team entity's side since a team must have an engine supplier but an engine supplier does not need to work with a team necessarily.

3) results_in: This is a ternary relationship which indicates the connection between Driver, Race and Race_Result entities. The relationship does not contain a key constraint. It contains a participation constraint from all sides since a race result cannot exist without a race and a driver, the same logic holds for Race and Driver entities.

4) makes: This is a ternary relationship which indicates the connection between Driver, Race and Pit_Stop entities. The relationship does not contain a key constraint. It contains a participation constraint from the Pit_Stop entity's side since every pit stop has to be made by a driver and in a race.

ER Model



Relational Model

- CREATE TABLE Engine_Supplier
  (esid INTEGER,
  ename CHAR(50),
  country CHAR(50),
  PRIMARY KEY (esid))

- CREATE TABLE Team_Supplies_Engine
  (tid INTEGER,
  tname CHAR(50),
  principal CHAR(50),
  esid INTEGER NOT NULL,

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PRIMARY KEY (tid),
FOREIGN KEY (esid) REFERENCES Engine_Supplier)
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- CREATE TABLE Driver_Races_for
(did INTEGER NOT NULL,
dname CHAR(50),
nationality CHAR(50),
tid INTEGER NOT NULL,
PRIMARY KEY (did),
FOREIGN KEY (tid) REFERENCES Team_Supplies_Engine
    ON DELETE CASCADE)
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```
- CREATE TABLE Race
(rid INTEGER,
circuit CHAR(50),
LapCount INTEGER,
PRIMARY KEY (rid))
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```
- CREATE TABLE Race_Result
(rrid INTEGER,
position INTEGER,
FastestLapTime REAL,
PRIMARY KEY (rrid))
```

```
- CREATE TABLE Results_in
(did INTEGER NOT NULL,
rid INTEGER NOT NULL,
rrid INTEGER NOT NULL,
PRIMARY KEY (rrid, did, rid),
FOREIGN KEY (did) REFERENCES Driver_Races_for
        ON DELETE CASCADE,
FOREIGN KEY (rid) REFERENCES Race
        ON DELETE CASCADE,
FOREIGN KEY (rrid) REFERENCES Race_Result
                ON DELETE SET NULL)
```

```
- CREATE TABLE Pit_Stop
(pid INTEGER,
reason CHAR(100),
duration REAL,
PRIMARY KEY (pid))
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- CREATE TABLE makes
(pid INTEGER,
rid INTEGER NOT NULL,
did INTEGER NOT NULL,
PRIMARY KEY (pid,rid,did),
FOREIGN KEY (did) REFERENCES Driver_Races_for
    ON DELETE CASCADE,
FOREIGN KEY (rid) REFERENCES Race
    ON DELETE CASCADE,
FOREIGN KEY (pid) REFERENCES Pit_Stop
     ON DELETE SET NULL)

-INSERT INTO Driver_Races_for (did,dname,nationality,tid)
 VALUES
  (1, 'Max Verstappen', 'Dutch', 2),
  (2, 'Lewis Hamilton', 'British', 1),
  (3, 'Charles Leclerc', 'Monacan', 4),
  (4, 'Nico Hülkenberg', 'German', 10),
  (5, 'Lando Norris', 'British', 5),
  (6, 'Fernando Alonso', 'Spanish', 8),
  (7, 'Valteri Bottas', 'Finnish', 3),
  (8, 'Yuki Tsunoda', 'Japanese', 7),
  (9, 'Alex Albon', 'Thai', 9),
  (10, 'Pierre Gasly', 'French', 6);

- INSERT INTO Team_Supplies_Engine(tid,tname,principal,esid)
  VALUES
  (1, 'Mercedes', 'Totto Wolf', 2),
  (2, 'Red Bull', 'Christian Horner', 3),
  (3, 'Alfa Romeo', 'Alunni Bravi', 1),
  (4, 'Ferrari', 'Frederic Vasseur', 1),
  (5, 'McLaren', 'Andrea Stella', 2),
  (6, 'Alpine', 'Otmar Szafnauer', 1),
  (7, 'Alpha Tauri', 'Franz Tost', 3),
  (8, 'Aston Martin', 'Mike Krack', 5),
  (9, 'Williams', 'James Vowles', 9),
  (10, 'Haas', 'Günther Steiner', 10);

- INSERT INTO Engine_Supplier(esid, ename, country)
  VALUES
  (1, 'Ferrari', 'Italy'),
  (2, 'Mercedes', 'Germany'),
  (3, 'Honda', 'Japan'),
  (4, 'Renault', 'France'),
  (5, 'Ford', 'France'),
  (6, 'Audi', 'German'),

(7, ‘Alpine’, ‘France’),
(8, ‘McLaren’, ‘Britain’),
(9, ‘Cosworth’, ‘Britain’),
(10, ‘BMW’, ‘Germany’);

- INSERT INTO Race(rid, circuit, LapCount)
VALUES
(1, ‘Bahrain’, 57),
(2, ‘Saudi Arabia’, 50),
(3, ‘Australia’, 58),
(4, ‘Azerbaijan’, 51),
(5, ‘Miami’, 57),
(6, ‘Emilia Romagna’, 63),
(7, ‘Monaco’, 78),
(8, ‘Spain’, 66),
(9, ‘Canada’, 70),
(10, ‘Austria’, 71);

- INSERT INTO Results_in(rrid,did, rid)
VALUES
(1,8,1),
(2, 3,2),
(3, 6,3),
(4, 1,4),
(5,10,5),
(6, 4,6),
(7,2,7),
(8, 7,8),
(9, 9,9),
(10, 5,10);

- INSERT INTO Race_Result(rrid, position, FastestLapTime)
VALUES
(1,2, 1.2),
(2, 5, 1.3),
(3, 7, 1.7),
(4, 9, 1.5),
(5,3, 1.9),
(6, 6, 2.1),
(7,11, 1.4),
(8, 18,1.7),
(9, 1, 1.1),
(10, 3,1.8);

- INSERT INTO makes(pid, rid,did)
  VALUES
  (1, 4,1),
  (2, 7,2),
  (3,2,3),
  (4,6,4),
  (5,10,5),
  (6,3,6),
  (7,8,7),
  (8,1,8),
  (9,9,9),
  (10,5,10);

- INSERT INTO Pit_Stop(pid,reason,duration)
  VALUES
  (1, ‘Tire change’, 0.18),
  (2, ‘Refueling’, 0.16),
  (3, ‘Reparing Damage’, 0.17),
  (4, ‘Adjusting car setup’, 0.11),
  (5, ‘Tire pressure adjusment’, 0.20),
  (6, ‘Brake check’, 0.26),
  (7, ‘Clearing debris’, 0.33),
  (8, ‘Penalty’, 0.10),
  (9, ‘Cooling System Error’, 0.14),
  (10, ‘Windshield Cleaning’, 0.19);