University of British Columbia, Vancouver
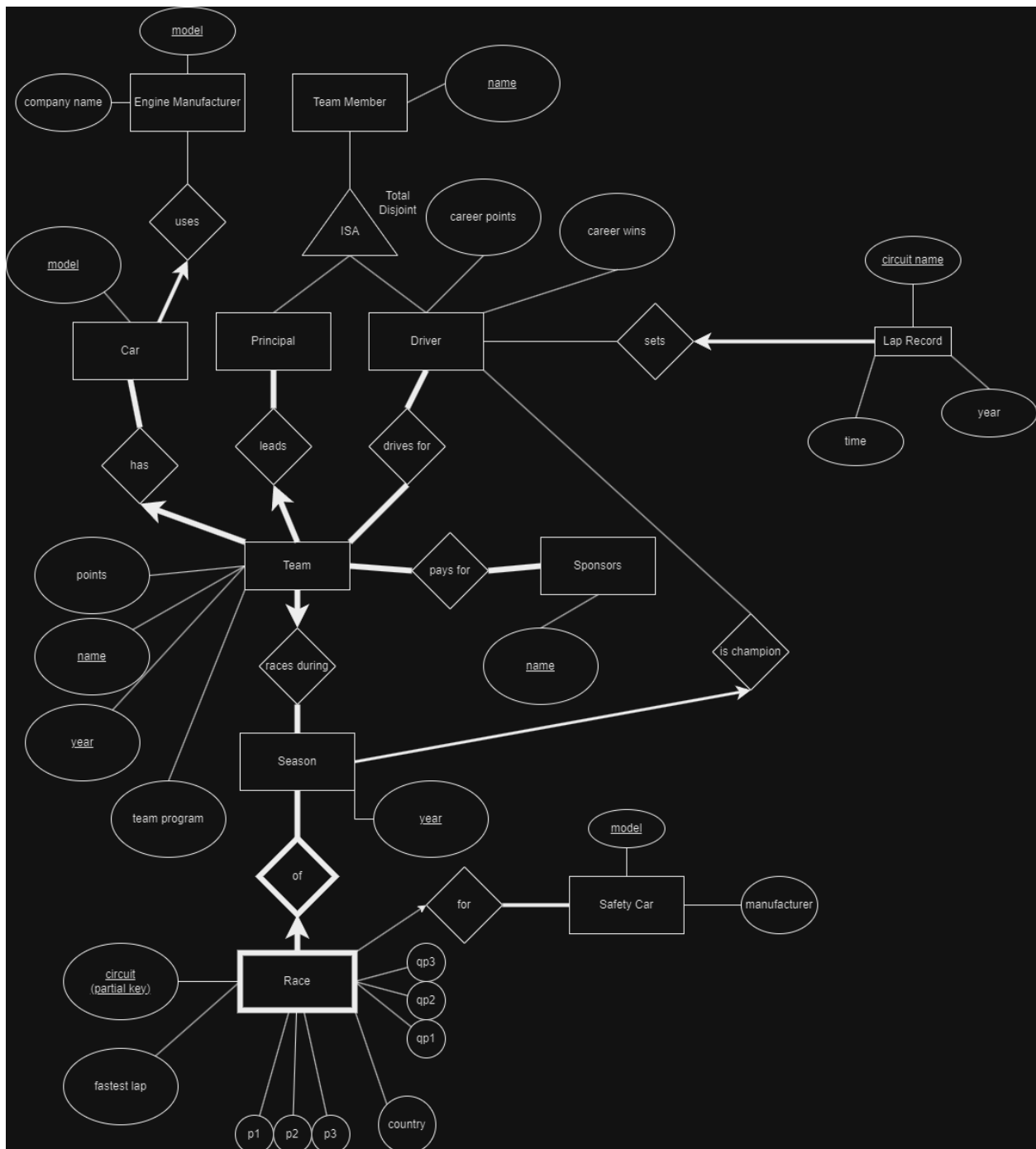Department of Computer Science

CPSC 304 Project Cover Page

Milestone #: 2

Date: 7/27/2023

Group Number: 2

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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

Changes:

Removed lap record aggregation   Race attributes

Driver attributes   Added Is Champion relation

Team attributes   Added Safety Car entity

Lap_Record_Set(circuit_name char(50), **driver_name** char(50), year int, time char(8))
Candidate Keys: circuit_name, time
Not Null: driver_name

Functional Dependencies:
Time -> circuit_name
Time -> driver_name
Time -> year

```
CREATE TABLE Lap_Record_Set (
        time CHAR(8) PRIMARY KEY,
        circuit_name CHAR(50),
        driver_name CHAR(50) NOT NULL,
        year INTEGER,
        FOREIGN KEY (driver_name) REFERENCES Driver(name) ON DELETE CASCADE ON
UPDATE CASCADE
 );
```

Lap_Record_Set

circuit_name	year	time	driver_name
Shanghai International Circuit	2004	1:32.238	Michael Schumacher
Yas Marina Circuit	2021	1:26.103	Max Verstappen
Suzuka	2019	1:30.983	Lewis Hamilton
Marina Bay Street Circuit	2018	1:41.905	Kevin Magnussen
Red Bull Ring	2020	1:05.619	Carlos Sainz

Driver(name char(50), career_points int, career_wins int)
Candidate Keys: name

CREATE TABLE Driver
        (name CHAR(50) PRIMARY KEY,
        career_points FLOAT,
        career_wins INTEGER);

Driver

name	career_points	career_wins
Michael Schumacher	1566	91
Max Verstappen	2292.5	44
Lewis Hamilton	4538.5	103
Kevin Magnussen	185	0
Carlos Sainz	869.5	1

Principal(<u>name</u> char(50))
Candidate Keys: name

CREATE TABLE Principal
      (name CHAR(50) PRIMARY KEY);

Principal

name
Jean Todt
Christian Horner
Toto Wolff
Guenther Steiner
Andreas Seidl

Drives_For(**driver_name** char(50)**, team_name** char(50)**, year** int)
Candidate Keys: year + driver_name + team_name

CREATE TABLE Drives_For (
      driver_name CHAR(50),
      team_name CHAR(50),
      year INTEGER,
      PRIMARY KEY (driver_name, team_name, year),
      FOREIGN KEY (driver_name) REFERENCES Driver(name) ON DELETE CASCADE ON
UPDATE CASCADE,
      FOREIGN KEY (team_name, year) REFERENCES Team1(name, year) ON DELETE CASCADE
ON UPDATE CASCADE
);

Drives_For

driver_name	team_name	year
Michael Schumacher	Scuderia Ferrari	2004
Max Verstappen	Oracle Red Bull Racing	2021
Lewis Hamilton	Mercedes-AMG Petronas F1 Team	2019
Kevin Magnussen	MoneyGram Haas F1 Team	2018
Carlos Sainz	McLaren F1 Team	2020

Season_Champion(<u>year</u> int, **driver_name** char(5))
Candidate Keys: year
Not Null: driver_name

CREATE TABLE Season_Champion (
        year INTEGER PRIMARY KEY,
        driver_name CHAR(50) NOT NULL,
        FOREIGN KEY (driver_name) REFERENCES Driver(name) ON DELETE CASCADE ON
UPDATE CASCADE
);

Season_Champion

year	driver_name
2004	Michael Schumacher
2021	Max Verstappen
2019	Lewis Hamilton
2018	Lewis Hamilton
2020	Lewis Hamilton

Season(<u>year</u> int)
Candidate Keys: year

CREATE TABLE Season
        (year INTEGER PRIMARY KEY);

Season

year
2004
2021
2019
2018
2020

Safety_Car(model char(50), manufacturer char(50))
Candidate Keys: model

CREATE TABLE Safety_Car (
       model CHAR(50) PRIMARY KEY,
       manufacturer CHAR(50)
);

Safety_Car

model	manufacturer
Mercedes SLK 55 AMG	Mercedes
Aston Martin Vantage	Aston Martin
Mercedes-AMG GT R	Mercedes
Mercedes-AMG GT S	Mercedes
Mercedes SLS AMG	Mercedes

Team(<u>name</u> char(50), <u>year</u> int, points int, team_program char(50), **season_year** int, **model** char(50), **principal_name** char(50))
Candidate Keys: name + year
Not Null: season_year, model, model, principal_name

Functional Dependencies:
year -> season_year
name -> team_program

<mark>BCNF</mark>:
R1(<u>name</u> char(50), <u>year</u> int, points int, team_program char(50), **model** char(50), **principal_name** char(50))
<mark>R2(<u>year</u> int, **season_year** int)</mark>
<mark>R3(<u>name</u> char(50), <u>year</u> int, points int, **model** char(50), **principal_name** char(50))</mark>
<mark>R4(<u>name</u> char(50), team_program char(50))</mark>

```
CREATE TABLE Team1 (
        name CHAR(50),
        year INTEGER,
        points INTEGER,
        car_model CHAR(50) NOT NULL,
        principal_name CHAR(50) NOT NULL,
        PRIMARY KEY (name, year),
        FOREIGN KEY (principal_name) REFERENCES Principal(name) ON DELETE CASCADE ON
UPDATE CASCADE,
        FOREIGN KEY (car_model) REFERENCES Car(model) ON DELETE CASCADE ON UPDATE
CASCADE
);
```

```
CREATE TABLE Team2 (
        year INTEGER PRIMARY KEY,
        season_year INTEGER NOT NULL,
        FOREIGN KEY (season_year) REFERENCES Season(year) ON DELETE CASCADE ON UPDATE
CASCADE
);
```

```
CREATE TABLE Team3 (
        name CHAR(50) PRIMARY KEY,
        team_program CHAR(50)
);
```

Team1

name	year	points	car_model	principal_name
Scuderia Ferrari	2004	262	F2004	Jean Todt
Oracle Red Bull Racing	2021	585.5	RB16	Christian Horner
Mercedes-AMG Petronas F1 Team	2019	739	W10	Toto Wolff
MoneyGram Haas F1 Team	2018	93	VF-18	Guenther Steiner
McLaren F1 Team	2020	202	MCL35	Andreas Seidl

Team 2

year	season_year
2004	2004
2021	2021
2019	2019
2018	2018
2020	2020

Team3

name	team_program
Scuderia Ferrari	Scuderia Ferrari
Oracle Red Bull Racing	Oracle Red Bull Racing
Mercedes-AMG Petronas F1 Team	Mercedes-AMG Petronas F1 Team

MoneyGram Haas F1 Team	Scuderia Ferrar
McLaren F1 Team	McLaren F1 Team

Race(circuit char(50), **year** int, fastest_lap char(8), p1 char(50), p2 char(50), p3 char(50), qp1 char(50), qp2 char(50), qp3 char(50), country char(50), **safety_car_model** char(50))
Candidate Keys: circuit + year

Functional Dependencies:
circuit -> country

<mark>BCNF</mark>:
<mark>R1(circuit char(50), **year** int, fastest_lap char(8), p1 char(50), p2 char(50), p3 char(50), qp1 char(50), qp2 char(50), qp3 char(50), **safety_car_model** char(50))</mark>
<mark>R2(circuit char(50), country char(50))</mark>

```
        CREATE TABLE Race1 (
                p1 CHAR(50),
                p2 CHAR(50),
                p3 CHAR(50),
                qp1 CHAR(50),
                qp2 CHAR(50),
                qp3 CHAR(50),
                fastest_lap CHAR(8),
                circuit CHAR(50),
                year INTEGER,
                safety_car_model CHAR(50),
                PRIMARY KEY (year, circuit),
                FOREIGN KEY (year) REFERENCES Season(year) ON DELETE CASCADE ON UPDATE
CASCADE,
                FOREIGN KEY (safety_car_model) REFERENCES Safety_Car(model) ON DELETE
CASCADE ON UPDATE CASCADE
        );


CREATE TABLE Race2
        (circuit CHAR(50) PRIMARY KEY,
        country CHAR(50));
```

Race1

ROW #	Year	circuit	Fastest_lap

1	2004	Sao Paulo	Juan Pablo Montoya
2	2021	Silverstone	Sergio Perez
3	2019	Circuit de Monaco	Pierre Gasly
4	2018	Spa	Valterri Bottas
5	2020	Barcelona-catalunya	Valterri Bottas

Row #	p1	p2	p3
1	Juan Pablo Montoya	Kimi Räikkönen	Rubens Barrichello
2	Lewis Hamilton	Charles Leclerc	Valterri Bottas
3	Lewis Hamilton	Sebastian Vettel	Max Verstappen
4	Sebastian Vettel	Lewis Hamilton	Max Verstappen
5	Lewis Hamilton	Max Verstappen	Valterri Bottas

Row #	qp1	qp2	qp3	country	saftey_car_model
1	Rubens Barrichello	Juan Pablo Montoya	Kimi Räikkönen	Brazil	Mercedes SLK 55 AMG
2	Max Verstappen	Lewis Hamilton	Valtteri Bottas	Great Britain	Aston Martin Vantage
3	Lewis Hamilton	Valtteri Bottas	Max Verstappen	Monaco	Mercedes-AMG GT R
4	Lewis Hamilton	Sebastian Vettel	Esteban Ocon	Belgium	Mercedes-AMG GT S
5	Lewis Hamilton	Valtteri Bottas	Max Verstappen	Spain	Mercedes SLS AMG

Race2

circuit	country

Sao Paulo	Brazil
Silverstone	Great Britain
Circuit de Monaco	Monaco
Spa	Belgium
Barcelona-catalunya	Spain

Car(model char(50))
Candidate Keys: model

CREATE TABLE Car
      (model CHAR(50) PRIMARY KEY);

Car

model
F2004
RB16
W10
VF-18
MCL35

Engine_Manufacturer(model char(50), company_name char(50))
Candidate Keys: model

CREATE TABLE Engine_Manufacturer (
        model CHAR(50) PRIMARY KEY,
        company_name CHAR(100)
);

engine_model	company_name
Ferrari V10	Ferrari
Honda RA620H	Honda
Mercedes AMG F1 M10 EQ Power+	Mercedes
Ferrari 062 EVO	Ferrari
Renault E-Tech 20 1.6 V6 t	Renault

Car_Engine(**engine_model** char(50), **car_model** char(50))
Candidate Keys: engine_model + car_model

CREATE TABLE Car_Engine (
      engine_model CHAR(50),
      car_model CHAR(50),
      PRIMARY KEY (engine_model, car_model),
      FOREIGN KEY (engine_model) REFERENCES Engine_Manufacturer(model) ON DELETE CASCADE ON UPDATE CASCADE,
      FOREIGN KEY (car_model) REFERENCES Car(model) ON DELETE CASCADE ON UPDATE CASCADE
);

car_model	engine_model
F2004	Ferrari V10
RB16	Honda RA620H
W10	Mercedes AMG F1 M10 EQ Power+
VF-18	Ferrari 062 EVO
MCL35	Renault E-Tech 20 1.6 V6 t

Sponsor(<u>name</u> char(50))
Candidate Keys: name

CREATE TABLE Sponsor(
        name CHAR(50) PRIMARY KEY);

Sponsor

name
Vodafone Group
Mobil 1
Tommy Hilfiger
Richard Mille
Velo

Pays_For(**team_name** char(50), **team_year** int, **sponsor_name** char(50))
Candidate Keys: team_name + team_year + sponsor_name

```
CREATE TABLE Pays_For (
        team_name CHAR(50),
        team_year INTEGER,
        sponsor_name CHAR(50),
        PRIMARY KEY (team_name, team_year, sponsor_name),
        FOREIGN KEY (team_name, team_year) REFERENCES Team1(name, year) ON DELETE
CASCADE ON UPDATE CASCADE,
        FOREIGN KEY (sponsor_name) REFERENCES Sponsor(name) ON DELETE CASCADE ON
UPDATE CASCADE
);
```

Pays_For

team_name	team_year	sponsor_name
Scuderia Ferrari	2004	Vodafone Group
Oracle Red Bull Racing	2021	Mobil 1
Mercedes-AMG Petronas F1 Team	2019	Tommy Hilfiger
MoneyGram Haas F1 Team	2018	Richard Mille
McLaren F1 Team	2020	Velo