



# Formula 1 Database

P. KARTHIK

22CSB0C06

[pk22csb0c06@student.nitw.ac.in](mailto:pk22csb0c06@student.nitw.ac.in)

R. ROHAN VARMA

22CSB0C25

[rr22csb0c25@student.nitw.ac.in](mailto:rr22csb0c25@student.nitw.ac.in)



# Problem Statement

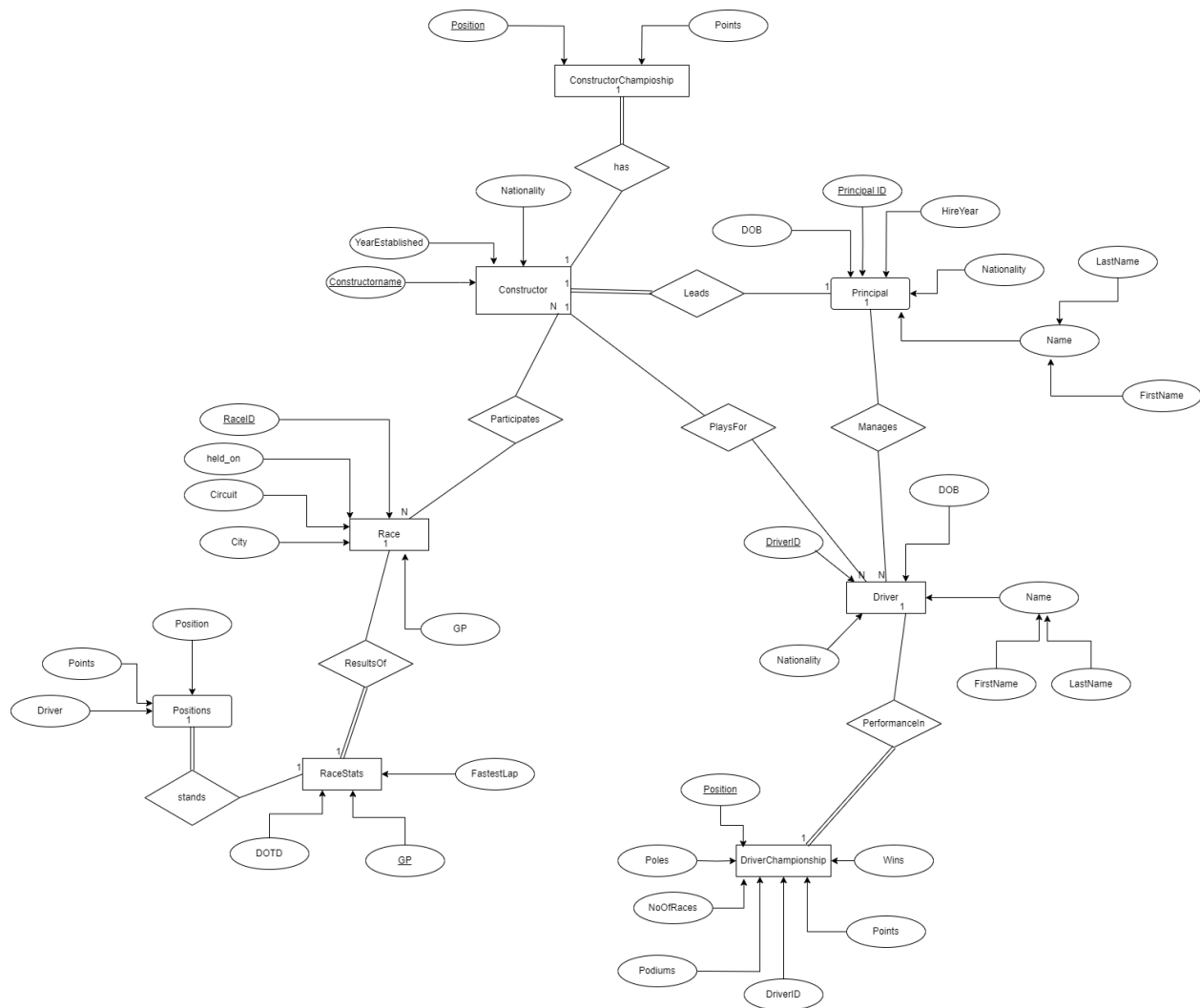
*Welcome to our DBMS project, where we aim to design and create a robust Formula 1 database that efficiently organizes data.*

*In the world of F1, the volume and complexity of data generated in each race season are immense. One can use this database to fetch, insert, update, delete data regarding the 2024 F1 championship.*

## Contents

- ER Diagram
- Tables
- Functional Dependencies
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## ER Diagram



## Assumptions

- Canceled Race don't have any stats, not even NULL values.
- A principal stays with a team throughout the season.
- There is a chance that a constructor got banned from the season because of FIA rule violation.

## TABLES, FUNCTIONAL DEPENDENCIES AND NORMALIZATION

### Constructor

(This relation is combination of 'Constructor' and 'leads')

Attribute	Datatype	Constraints
constructor_name	varchar	Primary key
nationality	varchar	
principal_id	varchar	
year_established	year	

### Functional Dependencies

- **Constructor\_name -> (nationality, principal\_id, year\_established)**
- **Principal\_id -> (constructor\_name, nationality, year\_established)**

Both constructor\_name and principal\_id are candidate keys. Hence, the relation is in BCNF.

### ConstructorChampionship

(This relation is combination of 'ConstructorChampionship' and 'has')

Attribute	Datatype	Constraints
position	int	Primary key
points	int	
team	varchar	

### Functional Dependencies

- **Position -> (points, team)**

Here, position attribute is candidate key. Hence, the relation is in BCNF.

## Driver

Attribute	Datatype	Constraints
driver_id	varchar	Primary key
first_name	varchar	
last_name	varchar	
DOB	date	
nationality	varchar	

### Functional Dependencies

- **Driver\_id -> (first\_name, last\_name, DOB, nationality)**

Here, driver\_id is the candidate key. Hence, the relation is in BCNF.

## DriverChampionship\_stats

(This relation is combination of 'DriverChampionship' and 'PerformanceIn')

Attribute	Datatype	Constraints
driver_id	varchar	Foreign key
no_of_races	int	
podiums	int	
points	int	
poles	int	
position	int	Primary Key
wins	int	

### Functional Dependencies

- **Driver\_id -> (no\_of\_races, podiums, points, poles, position, wins)**

Here, driver\_id is the candidate key. Hence, the relation is in BCNF.

### Manages

Attribute	Datatype	Constraints
driver_id	varchar	Foreign key
principal_id	varchar	Foreign key

There are no non-trivial Functional Dependencies here. Hence, the relation is in BCNF.

### Participates

Attribute	Datatype	Constraints
constructor_name	varchar	Foreign key
racelD	varchar	Foreign key

There are no non-trivial Functional Dependencies here. Hence, the relation is in BCNF.

### Plays For

Attribute	Datatype	Constraints
constructor_name	varchar	Foreign key
driverID	varchar	Foreign key

There are no non-trivial Functional Dependencies here. Hence, the relation is in BCNF.

## Positions

(This relation is combination of 'Positions' and 'stands')

Attribute	Datatype	Constraints
driver_id	varchar	Foreign Key
GP	varchar	Foreign Key
points	int	
position	int	

## Functional Dependencies

- **(Position, GP) -> (driver\_id, points)**

(Position, GP) is the candidate key. Hence the relation is in BCNF.

## Principal

Attribute	Datatype	Constraints
DOB	date	
first_name	varchar	
last_name	varchar	
HireYear	year	
nationality	varchar	
principal_id	varchar	Primary Key

## Functional Dependencies

- **Principal\_id -> (DOB, first\_name, last\_name, HireYear, nationality)**

Here, principal\_id is the candidate key. Hence, the relation is in BCNF.

## Race

Attribute	Datatype	Constraints
circuit	varchar	
city	varchar	
GP	varchar	
held_on	date	
racelD	varchar	Primary Key

### Functional Dependencies

- **Circuit -> (city, GP, held\_on, racelD)**
- **GP -> (circuit, city, held\_on, racelD)**
- **Held\_on -> (circuit, city, GP, racelD)**
- **racelD -> (circuit, city, GP, help\_on)**

Here, circuit, GP, held\_on, racelD are four candidate keys. Hence, this relation is in Race.

## RaceStats

(This relation is combination of 'RaceStats' and 'ResultsOf')

Attribute	Datatype	Constraints
DOTD	varchar	
fastest_lap_driver	varchar	
GP	varchar	Primary key

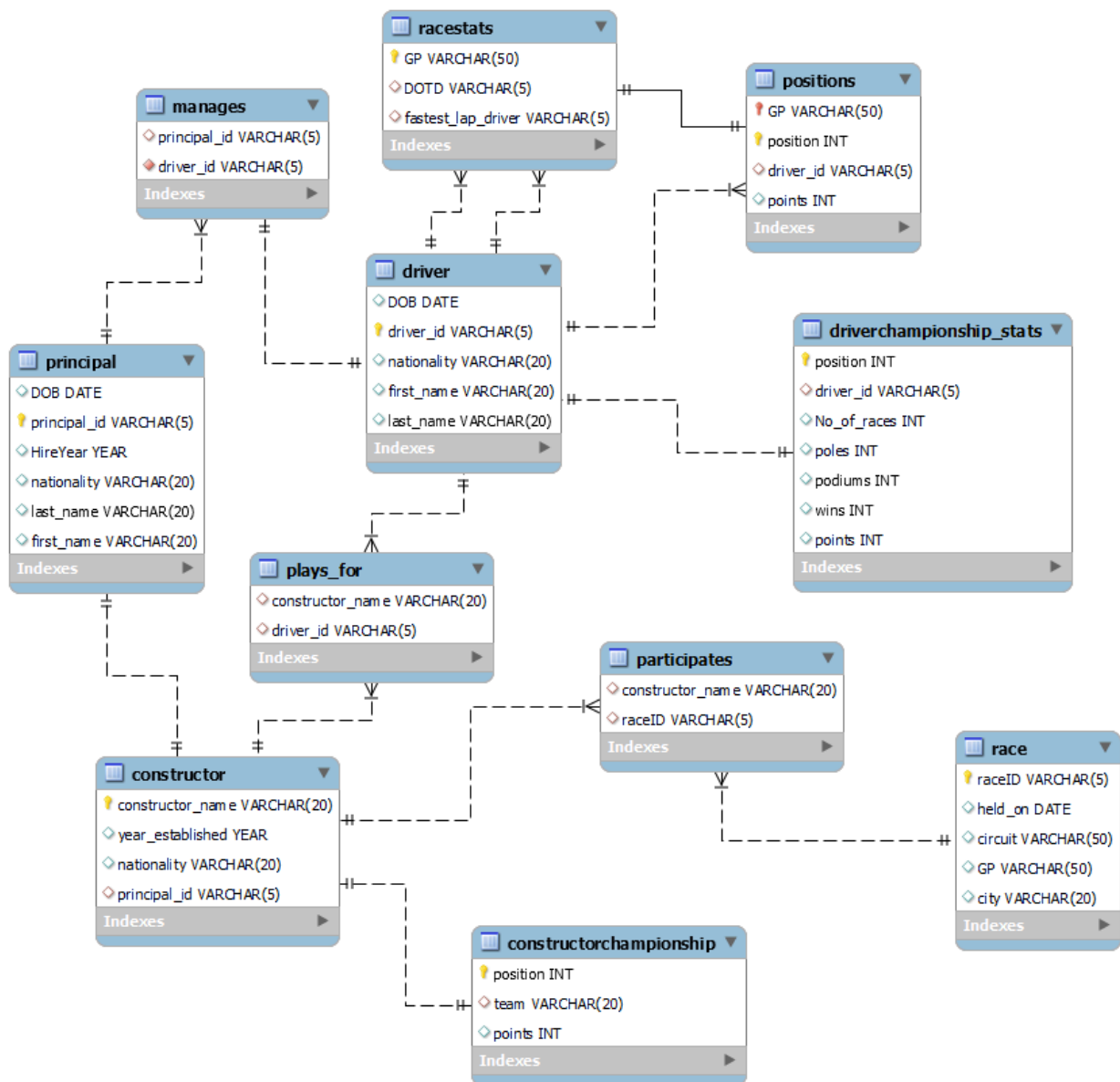
### Functional Dependencies

- **GP-> (DOTD, fastest\_lap\_driver)**

Here, GP attribute is candidate key. Hence, the relation is in BCNF.



## RELATIONAL SCHEMA





## SQL SCRIPT

```
create database FORMULA1;
```

```
use formula1;
```

```
create table Principal(  
    DOB date,  
    principal_id varchar(5) primary key,  
    HireYear year,  
    nationality varchar(20),  
    last_name varchar(20),  
    first_name varchar(20)  
);
```

```
create table driver(  
    DOB date,  
    driver_id varchar(5) primary key,  
    nationality varchar(20),  
    first_name varchar(20),  
    last_name varchar(20)  
);
```

```
create table manages(  
    principal_id varchar(5),  
    driver_id varchar(5),  
    foreign key (principal_id) references Principal(principal_id),  
    foreign key (driver_id) references Driver(driver_id)
```




);

```
create table driverchampionship_stats(  
position int primary key,  
driver_id varchar(5),  
foreign key (driver_id) references driver(driver_id),  
No_of_races int,  
poles int,  
podiums int,  
wins int,  
points int  
);
```

```
create table constructor(  
constructor_name varchar(20) primary key,  
year_established year,  
nationality varchar(20),  
principal_id varchar(5),  
foreign key (principal_id) references principal(principal_id)  
);
```


```
create table constructorchampionship(  
position int primary key,  
team varchar(20),  
foreign key (team) references constructor(constructor_name),  
points int  
);
```



```
create table plays_for(  
  constructor_name varchar(20),  
  foreign key (constructor_name) references constructor(constructor_name),  
  driver_id varchar(5),  
  foreign key (driver_id) references driver(driver_id)  
);
```

```
create table race(  
  raceID varchar(5) primary key,  
  held_on date,  
  circuit varchar(50),  
  GP varchar(50),  
  city varchar(20)  
);
```

```
create table racestats(  
  GP varchar(50) primary key,  
  DOTD varchar(5),  
  foreign key (DOTD) references driver(driver_id),  
  fastest_lap_driver varchar(5),  
  foreign key (fastest_lap_driver) references driver(driver_id)  
);
```



```
create table Positions(  
    GP varchar(50),  
    foreign key (GP) references racestats(GP),  
    position int,  
    driver_id varchar(5),  
    foreign key (driver_id) references driver(driver_id),  
    points int,  
    primary key (Position,GP)  
);
```

```
create table participates(  
    constructor_name varchar(20),  
    foreign key (constructor_name) references constructor(constructor_name),  
    raceID varchar(5),  
    foreign key (raceID) references race(raceID)  
);
```



insert into principal values

('1973-11-16','p1','2005','GBR','Horner','Christian'),  
('1972-01-12','p2','2013','GER','Wolff','Toto'),  
('1968-05-28','p3','2017','FRA','Vasseur','Frederic'),  
('1976-01-28','p4','2024','JAP','Komatsu','Ayao'),  
('1962-01-12','p5','2023','FRA','Famin','Bruno'),  
('1971-02-22','p6','2023','ITA','Stella','Andrea'),  
('1972-03-18','p7','2022','LUX','Krack','Mike'),  
('1979-06-20','p8','2023','GBR','Vowles','James'),  
('1977-04-28','p9','2024','FRA','Mekies','Laurent'),  
('1974-11-23','p10','2022','ITA','Bravi','Alessandro');

insert into driver values


('1997-09-30','D1','NED','Max','Verstappen'),  
('1985-01-07','D2','GBR','Lewis','Hamilton'),  
('1994-09-01','D3','ESP','Carlos','Sainz'),  
('1981-07-29','D4','ESP','Fernando','Alonso'),  
('1997-10-16','D5','MON','charles','leclerc'),  
('1999-11-13','D6','GBR','lando','norris'),  
('2001-04-06','D7','AUS','oscar','piastri'),  
('1990-01-26','D8','MEX','sergio','perez'),  
('1998-10-19','D9','CAN','lance','stroll'),  
('1989-01-26','D10','FIN','valterri','bottas'),  
('1998-02-15','D11','GBR','george','russell'),  
('1987-08-19','D12','GER','nico','Hulkenberg'),



('1996-03-23','D13','THA','alex','albon'),  
('1999-05-30','D14','CHI','zhou','guanyu'),  
('1992-10-05','D15','DEN','kevin','magnussen'),  
('1989-07-01','D16','AUS','daniel','ricciardo'),  
('1996-09-17','D17','FRA','ocon','esteban'),  
('2001-05-11','D18','JAP','yuki','tsunoda'),  
('1996-02-07','D19','FRA','gasly','pierre'),  
('2000-12-31','D20','USA','logan','sargeant'),  
('2005-05-08','D21','GBR','ollie','bearman'),  
('2002-02-11','D22','NZ','liam','lawson'),  
('1999-03-22','D23','GER','mick','schumacher'),  
('1996-06-25','D24','BRA','pietro','fittipaldi'),  
('2002-01-13','D25','DEN','frederik','vesti');

insert into manages values

('p1','D1'),  
('p2','D2'),  
('p3','D3'),  
('p7','D4'),  
('p3','D5'),  
('p6','D6'),  
('p6','D7'),  
('p1','D8'),  
('p7','D9'),  
('p10','D10'),  
('p2','D11'),  
('p4','D12'),  
('p8','D13'),




('p10','D14'),  
( 'p4','D15'),  
( 'p9','D16'),  
( 'p5','D17'),  
( 'p9','D18'),  
( 'p5','D19'),  
( 'p8','D20'),  
( 'p3','D21'),  
( 'p1','D22'),  
( 'p2','D23'),  
( 'p4','D24'),  
( 'p8','D25'),  
( 'p4','D21'),  
( 'p9','D22'),  
( 'p8','D23'),  
( 'p3','D24'),  
( 'p2','D25');

**insert into driverchampionship\_stats values**

(1,'D1',2,2,2,2,51),  
(2,'D8',2,0,2,0,36),  
(3,'D5',2,0,1,0,28),  
(4,'D11',2,0,0,0,18),  
(5,'D7',2,0,0,0,16),  
(6,'D3',1,0,1,0,15),  
(7,'D4',2,0,0,0,12),  
(8,'D6',2,0,0,0,12),  
(9,'D2',2,0,0,0,8),





```
(10,'D21',2,0,0,0,6),  
(11,'D12',2,0,0,0,1),  
(12,'D9',2,0,0,0,1),  
(13,'D13',2,0,0,0,0),  
(14,'D14',2,0,0,0,0),  
(15,'D15',2,0,0,0,0),  
(16,'D16',2,0,0,0,0),  
(17,'D17',2,0,0,0,0),  
(18,'D18',2,0,0,0,0),  
(19,'D20',2,0,0,0,0),  
(20,'D10',2,0,0,0,0),  
(21,'D19',2,0,0,0,0);
```

**insert into constructor values**

```
('RedBull','2005','AST','p1'),  
( 'Mercedes','1954','GER','p2'),  
( 'Ferrari','1950','ITA','p3'),  
( 'McLaren','1966','GBR','p6'),  
( 'Aston Martin','1959','GBR','p7'),  
( 'Sauber','2024','SWI','p10'),  
( 'RB','2024','ITA','p9'),  
( 'Alpine','2021','FRA','p5'),  
( 'HAAS','2016','USA','p4'),  
( 'Williams','1975','GBR','p8');
```

**insert into constructorchampionship values**


```
(1,'RedBull',87),  
(2,'Ferrari',49),
```



```
(3,'McLaren',28),  
(4,'Mercedes',26),  
(5,'Aston Martin',13),  
(6,'HAAS',1),  
(7,'Williams',0),  
(8,'Sauber',0),  
(9,'RB',0),  
(10,'Alpine',0);
```

insert into plays\_for values

```
('RedBull','D1'),  
( 'Mercedes','D2'),  
( 'Ferrari','D3'),  
( 'Aston Martin','D4'),  
( 'Ferrari','D5'),  
( 'McLaren','D6'),  
( 'McLaren','D7'),  
( 'RedBull','D8'),  
( 'Aston Martin','D9'),  
( 'Sauber','D10'),  
( 'Mercedes','D11'),  
( 'HAAS','D12'),  
( 'Williams','D13'),  
( 'Sauber','D14'),  
( 'HAAS','D15'),  
( 'RB','D16'),  
( 'Alpine','D17'),  
( 'RB','D18'),
```



```
('Alpine','D19'),  
( 'Williams','D20'),  
( 'Ferrari','D21'),  
( 'RedBull','D22'),  
( 'Mercedes','D23'),  
( 'HAAS','D24'),  
( 'Williams','D25'),  
( 'HAAS','D21'),  
( 'RB','D22'),  
( 'Williams','D23'),  
( 'Ferrari','D24'),  
( 'Mercedes','D25');
```

**insert into race values**


```
('R1','2024-03-02','bahrain International circuit','bahrain gp','bahrain'),  
( 'R2','2024-03-10','jeddah corniche circuit','saudi arabia gp','jeddah');
```

**insert into racestats values**


```
('bahrain gp','D3','D1'),  
( 'saudi arabia gp','D21','D5');
```

**insert into Positions values**

```
('bahrain gp',1,'D1',26),  
( 'bahrain gp',2,'D8',18),  
( 'bahrain gp',3,'D3',15),  
( 'bahrain gp',4,'D5',12),  
( 'bahrain gp',5,'D11',10),  
( 'bahrain gp',6,'D6',8),
```



('bahrain gp',7,'D2',6),  
('bahrain gp',8,'D7',4),  
('bahrain gp',9,'D4',2),  
('bahrain gp',10,'D9',1),  
('bahrain gp',11,'D14',0),  
('bahrain gp',12,'D15',0),  
('bahrain gp',13,'D16',0),  
('bahrain gp',14,'D18',0),  
('bahrain gp',15,'D13',0),  
('bahrain gp',16,'D12',0),  
('bahrain gp',17,'D17',0),  
('bahrain gp',18,'D19',0),  
('bahrain gp',19,'D10',0),  
('bahrain gp',20,'D20',0),  
('saudi arabia gp',1,'D1',25),  
('saudi arabia gp',2,'D8',18),  
('saudi arabia gp',3,'D5',16),  
('saudi arabia gp',4,'D7',12),  
('saudi arabia gp',5,'D4',10),  
('saudi arabia gp',6,'D11',8),  
('saudi arabia gp',7,'D21',6),  
('saudi arabia gp',8,'D6',4),  
('saudi arabia gp',9,'D2',2),  
('saudi arabia gp',10,'D12',1),  
('saudi arabia gp',11,'D13',0),  
('saudi arabia gp',12,'D15',0),  
('saudi arabia gp',13,'D17',0),  
('saudi arabia gp',14,'D18',0),



('saudi arabia gp',15,'D20',0),  
('saudi arabia gp',16,'D16',0),  
('saudi arabia gp',17,'D10',0),  
('saudi arabia gp',18,'D14',0),  
('saudi arabia gp',19,'D9',0),  
('saudi arabia gp',20,'D19',0);

insert into participates values

('RedBull','R1'),  
('Ferrari','R1'),  
('McLaren','R1'),  
('Mercedes','R1'),  
('Aston Martin','R1'),  
('HAAS','R1'),  
('Williams','R1'),  
('Sauber','R1'),  
('RB','R1'),  
('Alpine','R1'),  
('RedBull','R2'),  
('Ferrari','R2'),  
('McLaren','R2'),  
('Mercedes','R2'),  
('Aston Martin','R2'),  
('HAAS','R2'),  
('Williams','R2'),  
('Sauber','R2'),  
('RB','R2'),  
('Alpine','R2');