Assignment #2: Mini-Project - Cars Database

1. Countries and their continents. Order the results by continent names.
Ans:
```
SELECT C.CountryName, Co.Continent
FROM Countries C
INNER JOIN Continents Co ON C.Continent = Co.ContID
ORDER BY Co.Continent;
```

2. Number of countries within each continent
Ans:
```
SELECT Co.Continent, COUNT(C.CountryID) AS NumCountries
FROM Continents Co
LEFT JOIN Countries C ON Co.ContID = C.Continent
GROUP BY Co.Continent;
```

3. countries with no car makers?
Ans:
```
SELECT Co.CountryName, Co.Continent
FROM Countries Co
LEFT JOIN Car_Makers CM ON Co.CountryID = CM.Country
WHERE CM.ID IS NULL;
```

4. List of Car makers from Japan
Ans:
```
SELECT cn.continent, con.countryname, CM.maker, CM.fullname
FROM  continents cn
INNER JOIN countries con ON cn.contid=con.continent
INNER JOIN Car_Makers CM ON con.countryid=CM.country
WHERE con.countryname ='japan'
ORDER BY 1,2,3;
```

5. List of Car makers from France and USA
Ans:
```
SELECT cn.continent, con.countryname, CM.Maker, CM.fullname
FROM continents cn
INNER JOIN countries con ON cn.contid=con.continent
INNER JOIN Car_Makers CM ON con.countryid=CM.country
WHERE con.countryname ='france' OR con.countryname ='usa'
ORDER BY 1,2,3;
```

6. Country and continent of Volvo car maker
Ans:

```
SELECT C.CountryName, Co.Continent
FROM Car_Makers CM
INNER JOIN Countries C ON CM.Country = C.CountryID
INNER JOIN Continents Co ON C.Continent = Co.ContID
WHERE CM.FullName LIKE '%Volvo%';
```

7. Car models from 'Ford Motor Company'
Ans:

```
SELECT cn.continent, con.countryname, CM.Maker, CM.fullname ,md.model
FROM continents cn
INNER JOIN countries con on cn.contid=con.continent
INNER JOIN Car_Makers CM on con.countryid=CM.country
INNER JOIN model_details md on cm.id=md.maker
WHERE CM.Maker ='ford';
```

8. How many car models are made by Germany?
Ans:

```
SELECT COUNT(MD.Model) AS NumModels
FROM Model_Details MD
INNER JOIN Car_Makers CM ON MD.Maker = CM.ID
INNER JOIN Countries C ON CM.Country = C.CountryID
WHERE C.CountryName = 'Germany';
```

9. Car models made by Japan along with maker details.
Ans:

```
SELECT cn.continent, con.countryname, CM.Maker, CM.fullname ,md.model
from continents cn
INNER JOIN countries con ON cn.contid=con.continent
INNER JOIN Car_Makers cm ON con.countryid=cm.country
INNER JOIN model_details md ON cm.id=md.maker
WHERE con.countryname ='japan';
```

10. Which car models have highest and lowest values of below attributes. Extract the car maker and geography (country and continent) information also:

a. Mpg
Ans:

```
SELECT cn.continent,con.countryName,cm.maker,md.model,cd.mpg
FROM continents cn
INNER JOIN countries con ON cn.contid=con.continent
INNER JOIN car_makers cm ON con.countryid=cm.country
INNER JOIN model_details md ON cm.id=md.maker
INNER JOIN car_names cna ON md.model=cna.model
INNER JOIN car_details cd ON cna.id=cd.id
```

WHERE cd.mpg = (SELECT min(mpg) FROM car_details) OR cd.mpg = (SELECT max(mpg) FROM car_details)

b. Cylinders
Ans:
SELECT cn.continent,con.countryName,cm.maker,md.model,cd.cylinders
FROM continents cn
INNER JOIN countries con ON cn.contid=con.continent
INNER JOIN car_makers cm ON con.countryid=cm.country
INNER JOIN model_details md ON cm.id=md.maker
INNER JOIN car_names cna ON md.model=cna.model
INNER JOIN car_details cd ON cna.id=cd.id
WHERE cd.cylinders = (SELECT min(cylinders) FROM car_details) OR cd.cylinders = (SELECT max(cylinders) FROM car_details)

c. Edispl
Ans:
SELECT cn.continent,con.countryName,cm.maker,md.model,cd.Edispl
FROM continents cn
INNER JOIN countries con ON cn.contid=con.continent
INNER JOIN car_makers cm ON con.countryid=cm.country
INNER JOIN model_details md ON cm.id=md.maker
INNER JOIN car_names cna ON md.model=cna.model
INNER JOIN car_details cd ON cna.id=cd.id
WHERE cd.Edispl = (SELECT min(Edispl) FROM car_details) OR cd.Edispl = (SELECT max(Edispl) FROM car_details)

d. Horsepower
Ans:
SELECT cn.continent,con.countryName,cm.maker,md.model,cd.Horsepower
FROM continents cn
INNER JOIN countries con ON cn.contid=con.continent
INNER JOIN car_makers cm ON con.countryid=cm.country
INNER JOIN model_details md ON cm.id=md.maker
INNER JOIN car_names cna ON md.model=cna.model
INNER JOIN car_details cd ON cna.id=cd.id
WHERE cd.Horsepower = (SELECT min(Horsepower) FROM car_details) OR cd.Horsepower = (SELECT max(Horsepower) FROM car_details)

e. Weight
Ans:
SELECT cn.continent,con.countryName,cm.maker,md.model,cd.Weight
FROM continents cn
INNER JOIN countries con ON cn.contid=con.continent
INNER JOIN car_makers cm ON con.countryid=cm.country

```
INNER JOIN model_details md ON cm.id=md.maker
INNER JOIN car_names cna ON md.model=cna.model
INNER JOIN car_details cd ON cna.id=cd.id
WHERE cd.Weight = (SELECT min(Weight) FROM car_details) OR cd.Weight = (SELECT
max(Weight) FROM car_details)
```

f. Accel

Ans:

```
SELECT cn.continent,con.countryName,cm.maker,md.model,cd.Accel
FROM continents cn
INNER JOIN countries con ON cn.contid=con.continent
INNER JOIN car_makers cm ON con.countryid=cm.country
INNER JOIN model_details md ON cm.id=md.maker
INNER JOIN car_names cna ON md.model=cna.model
INNER JOIN car_details cd ON cna.id=cd.id
WHERE cd.Accel = (SELECT min(Accel) FROM car_details) OR cd.Accel = (SELECT
max(Accel) FROM car_details)
```

11. In which year most cars were made?

Ans:

```
SELECT year, COUNT(*) AS NumCars
FROM Car_Details
GROUP BY year
ORDER BY NumCars DESC
FETCH FIRST 1 ROW ONLY;
```

12. Which year had less cars made?

Ans:

```
SELECT year, COUNT(*) AS NumCars
FROM Car_Details
GROUP BY year
ORDER BY NumCars
FETCH FIRST 1 ROW ONLY;
```

13. Min, Max and Average of below attributes around the year(s):

a. Mpg

Ans:

```
SELECT YEAR, MIN(Mpg) AS MinValue, MAX(Mpg) AS MaxValue, AVG(Mpg) AS AvgValue
FROM Car_Details
GROUP BY YEAR;
```

b. Cylinders

Ans:
SELECT YEAR, MIN(Cylinders) AS MinValue, MAX(Cylinders) AS MaxValue,
AVG(Cylinders) AS AvgValue
FROM Car_Details
GROUP BY YEAR;

c. Edispl
Ans:
SELECT YEAR, MIN(Edispl) AS MinValue, MAX(Edispl) AS MaxValue, AVG(Edispl) AS AvgValue
FROM Car_Details
GROUP BY YEAR;

d. Horsepower
Ans:
SELECT YEAR, MIN(Horsepower) AS MinValue, MAX(Horsepower) AS MaxValue,
AVG(Horsepower) AS AvgValue
FROM Car_Details
GROUP BY YEAR;

e. Weight
Ans:
SELECT YEAR, MIN(Weight) AS MinValue, MAX(Weight) AS MaxValue, AVG(Weight) AS AvgValue
FROM Car_Details
GROUP BY YEAR;

f. Accel
Ans:
SELECT YEAR, MIN(Accel) AS MinValue, MAX(Accel) AS MaxValue, AVG(Accel) AS AvgValue
FROM Car_Details
GROUP BY YEAR;

14. Please carry out a small statistical analysis around (1) Horsepower (2) Weight (3) Accel. Try calculating the mean, median and standard deviation. Use SQL queries to extract these measures. What do these measures convey about horsepower and weight of the cars data? Share SQLS and few bullets on your understanding on the values captured for mean, median and standard deviation.

(1).Ans:
SELECT MIN(Horsepower) AS Min_Value,MAX(Horsepower) AS Max_Value,
AVG(Horsepower) AS Mean_Horsepower,MEDIAN(Horsepower),STDDEV(Horsepower) AS StdDev_Horsepower
FROM Car_Details;

(2).Ans:

```
SELECT MIN(Weight) AS Min_Value,MAX(Weight) AS Max_Value,
AVG(Weight) AS Mean_Weight,MEDIAN(Weight),STDDEV(Weight) AS StdDev_Weight
FROM Car_Details;
```

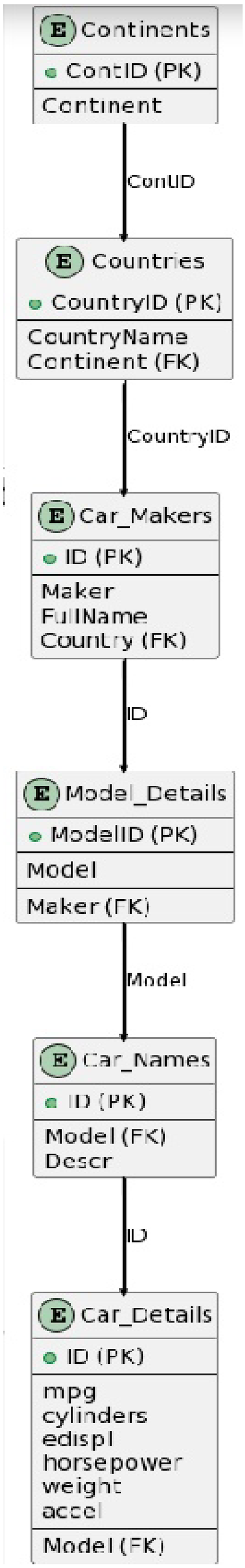
(3).Ans:

```
SELECT MIN(Accel) AS Min_Value,MAX(Accel) AS Max_Value,
AVG(Accel) AS Mean_Accel,MEDIAN(Accel),STDDEV(Accel) AS StdDev_Accel
FROM Car_Details;
```

The data reveals essential information about cars. Horsepower, a measure of engine power, varies from 46 to 230, with an average of 105.08. Weight ranges from 1613 to 5140, averaging 2979.41. Acceleration, indicating speed increase, ranges from 8 to 24.8, with a mean of 15.52. These numbers show the diverse power, weight, and speed characteristics among the cars in the dataset.

15. Draw the entity-relationship (ER) model depicting car database tables, PK and FK (i.e, relationships between them) on a plain paper using pen/pencil. Share the screenshot (ensure picture is clearly visible) and share.

Ans:


Continents
ContID (PK)
Continent
ContID
Countries
CountryID (PK)
CountryName
Continent (FK)
CountryID
Car_Makers
ID (PK)
Maker
FullName
Country (FK)
ID
Model_Details
ModelID (PK)
Model
Maker (FK)
Model
Car_Names
ID (PK)
Model (FK)
Descr
ID
Car_Details
ID (PK)
mpg
cylinders
edispl
horsepower
weight
accel
Model (FK)