Group Assignment

Group 3
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FALL_2020
ALY6030
In class exercise
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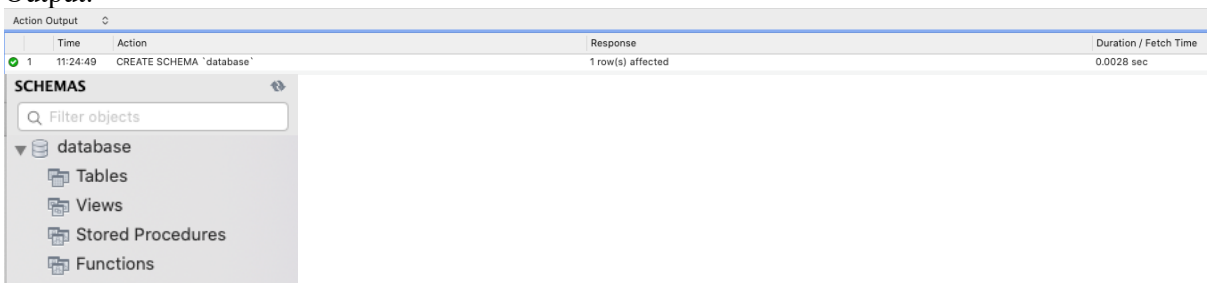
AIM: To normaize the given table into 1NF, 2NF and 3NF

Create Schema name database:

```
/* 1NF (First Normal Form) */
/* Create the schema */
CREATE SCHEMA `database`;
```

Output:

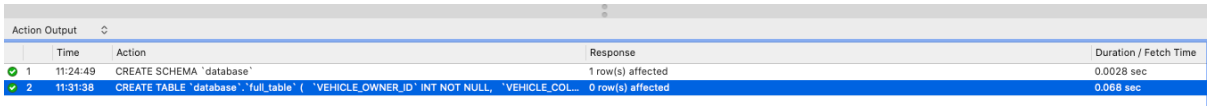



```
DROP TABLE IF EXISTS `database`.`full_table`;
DROP TABLE IF EXISTS `database`.`owner_info`;
DROP TABLE IF EXISTS `database`.`vehicle_info`;
DROP TABLE IF EXISTS  `database`.`maintenance_info`;
```

Implementing 1NF

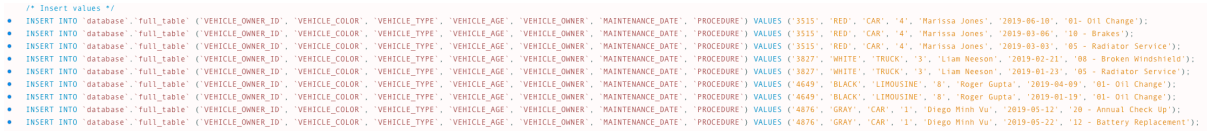
Creating table full_table:

```
/* Notice that we assume that each customer may has more than 1 car to normalize the data and to answer all four questions. */
/* 1NF */
/* Create table */
CREATE TABLE `database`.`full_table` (
  `VEHICLE_OWNER_ID` INT NOT NULL,
  `VEHICLE_COLOR` VARCHAR(45) NOT NULL,
  `VEHICLE_TYPE` VARCHAR(45) NOT NULL,
  `VEHICLE_AGE` INT NOT NULL,
  `VEHICLE_OWNER` VARCHAR(45) NOT NULL,
  `MAINTENANCE_DATE` DATE NOT NULL,
  `PROCEDURE` VARCHAR(45) NOT NULL);
```



Inserting data into full_table

- Full Screenshot



- Split screenshot for clear view

```
/* Insert values */
INSERT INTO `database`.`full_table` (`VEHICLE_OWNER_ID`, `VEHICLE_COLOR`, `VEHICLE_TYPE`, `VEHICLE_AGE`, `VEHICLE_OWNER`, `MAINTENANCE_DATE`, `PROCEDURE`)
INSERT INTO `database`.`full_table` (`VEHICLE_OWNER_ID`, `VEHICLE_COLOR`, `VEHICLE_TYPE`, `VEHICLE_AGE`, `VEHICLE_OWNER`, `MAINTENANCE_DATE`, `PROCEDURE`)
INSERT INTO `database`.`full_table` (`VEHICLE_OWNER_ID`, `VEHICLE_COLOR`, `VEHICLE_TYPE`, `VEHICLE_AGE`, `VEHICLE_OWNER`, `MAINTENANCE_DATE`, `PROCEDURE`)
INSERT INTO `database`.`full_table` (`VEHICLE_OWNER_ID`, `VEHICLE_COLOR`, `VEHICLE_TYPE`, `VEHICLE_AGE`, `VEHICLE_OWNER`, `MAINTENANCE_DATE`, `PROCEDURE`)
INSERT INTO `database`.`full_table` (`VEHICLE_OWNER_ID`, `VEHICLE_COLOR`, `VEHICLE_TYPE`, `VEHICLE_AGE`, `VEHICLE_OWNER`, `MAINTENANCE_DATE`, `PROCEDURE`)
INSERT INTO `database`.`full_table` (`VEHICLE_OWNER_ID`, `VEHICLE_COLOR`, `VEHICLE_TYPE`, `VEHICLE_AGE`, `VEHICLE_OWNER`, `MAINTENANCE_DATE`, `PROCEDURE`)
INSERT INTO `database`.`full_table` (`VEHICLE_OWNER_ID`, `VEHICLE_COLOR`, `VEHICLE_TYPE`, `VEHICLE_AGE`, `VEHICLE_OWNER`, `MAINTENANCE_DATE`, `PROCEDURE`)
INSERT INTO `database`.`full_table` (`VEHICLE_OWNER_ID`, `VEHICLE_COLOR`, `VEHICLE_TYPE`, `VEHICLE_AGE`, `VEHICLE_OWNER`, `MAINTENANCE_DATE`, `PROCEDURE`)
INSERT INTO `database`.`full_table` (`VEHICLE_OWNER_ID`, `VEHICLE_COLOR`, `VEHICLE_TYPE`, `VEHICLE_AGE`, `VEHICLE_OWNER`, `MAINTENANCE_DATE`, `PROCEDURE`)
```

```
VALUES ('3515', 'RED', 'CAR', '4', 'Marissa Jones', '2019-06-10', '01- Oil Change');
VALUES ('3515', 'RED', 'CAR', '4', 'Marissa Jones', '2019-03-06', '10 - Brakes');
VALUES ('3515', 'RED', 'CAR', '4', 'Marissa Jones', '2019-03-03', '05 - Radiator Service');
VALUES ('3827', 'WHITE', 'TRUCK', '3', 'Liam Neeson', '2019-02-21', '08 - Broken Windshield');
VALUES ('3827', 'WHITE', 'TRUCK', '3', 'Liam Neeson', '2019-01-23', '05 - Radiator Service');
VALUES ('4649', 'BLACK', 'LIMOUSINE', '8', 'Roger Gupta', '2019-04-09', '01- Oil Change');
VALUES ('4649', 'BLACK', 'LIMOUSINE', '8', 'Roger Gupta', '2019-01-19', '01- Oil Change');
VALUES ('4876', 'GRAY', 'CAR', '1', 'Diego Minh Vu', '2019-05-12', '20 - Annual Check Up');
VALUES ('4876', 'GRAY', 'CAR', '1', 'Diego Minh Vu', '2019-05-22', '12 - Battery Replacement');
```

Output:

Action Output

	Time	Action	Response
1	11:24:49	CREATE SCHEMA `database`	1 row(s) affected
2	11:31:38	CREATE TABLE `database`.`full_table` (`VEHICLE_OWNER_ID` INT NOT NULL, `VEHICLE_COLOR` VARCHAR(45) NOT NULL, `VEHICLE_TYPE` VARCHAR(45) NOT NULL, `VEHICLE_AGE` INT NOT NULL, `VEHICLE_OWNER`...	0 row(s) affected
3	11:34:25	INSERT INTO `database`.`full_table` (`VEHICLE_OWNER_ID`, `VEHICLE_COLOR`, `VEHICLE_TYPE`, `VEHICLE_AGE`, `VEHICLE_OWNER`, `MAINTENANCE_DATE`, `PROCEDURE`) VALUES ('3515', 'RED', 'CAR', '4', 'Marissa Jones',...	1 row(s) affected
4	11:34:25	INSERT INTO `database`.`full_table` (`VEHICLE_OWNER_ID`, `VEHICLE_COLOR`, `VEHICLE_TYPE`, `VEHICLE_AGE`, `VEHICLE_OWNER`, `MAINTENANCE_DATE`, `PROCEDURE`) VALUES ('3515', 'RED', 'CAR', '4', 'Marissa Jones',...	1 row(s) affected
5	11:34:25	INSERT INTO `database`.`full_table` (`VEHICLE_OWNER_ID`, `VEHICLE_COLOR`, `VEHICLE_TYPE`, `VEHICLE_AGE`, `VEHICLE_OWNER`, `MAINTENANCE_DATE`, `PROCEDURE`) VALUES ('3515', 'RED', 'CAR', '4', 'Marissa Jones',...	1 row(s) affected
6	11:34:25	INSERT INTO `database`.`full_table` (`VEHICLE_OWNER_ID`, `VEHICLE_COLOR`, `VEHICLE_TYPE`, `VEHICLE_AGE`, `VEHICLE_OWNER`, `MAINTENANCE_DATE`, `PROCEDURE`) VALUES ('3827', 'WHITE', 'TRUCK', '3', 'Liam Nee...	1 row(s) affected
7	11:34:25	INSERT INTO `database`.`full_table` (`VEHICLE_OWNER_ID`, `VEHICLE_COLOR`, `VEHICLE_TYPE`, `VEHICLE_AGE`, `VEHICLE_OWNER`, `MAINTENANCE_DATE`, `PROCEDURE`) VALUES ('3827', 'WHITE', 'TRUCK', '3', 'Liam Nee...	1 row(s) affected
8	11:34:25	INSERT INTO `database`.`full_table` (`VEHICLE_OWNER_ID`, `VEHICLE_COLOR`, `VEHICLE_TYPE`, `VEHICLE_AGE`, `VEHICLE_OWNER`, `MAINTENANCE_DATE`, `PROCEDURE`) VALUES ('4649', 'BLACK', 'LIMOUSINE', '8', 'Roge...	1 row(s) affected
9	11:34:25	INSERT INTO `database`.`full_table` (`VEHICLE_OWNER_ID`, `VEHICLE_COLOR`, `VEHICLE_TYPE`, `VEHICLE_AGE`, `VEHICLE_OWNER`, `MAINTENANCE_DATE`, `PROCEDURE`) VALUES ('4649', 'BLACK', 'LIMOUSINE', '8', 'Roge...	1 row(s) affected
10	11:34:25	INSERT INTO `database`.`full_table` (`VEHICLE_OWNER_ID`, `VEHICLE_COLOR`, `VEHICLE_TYPE`, `VEHICLE_AGE`, `VEHICLE_OWNER`, `MAINTENANCE_DATE`, `PROCEDURE`) VALUES ('4876', 'GRAY', 'CAR', '1', 'Diego Minh V...	1 row(s) affected
11	11:34:25	INSERT INTO `database`.`full_table` (`VEHICLE_OWNER_ID`, `VEHICLE_COLOR`, `VEHICLE_TYPE`, `VEHICLE_AGE`, `VEHICLE_OWNER`, `MAINTENANCE_DATE`, `PROCEDURE`) VALUES ('4876', 'GRAY', 'CAR', '1', 'Diego Minh V...	1 row(s) affected

Implementing 2NF and 3NF

Creating table owner_info:

```
/* 2NF and 3NF (Second and Third Normal Form) */
/* Create table */
CREATE TABLE `database`.`owner_info` (
  `VEHICLE_OWNER_ID` INT NOT NULL,
  `VEHICLE_OWNER` VARCHAR(45) NOT NULL,
  PRIMARY KEY (`VEHICLE_OWNER_ID`));
```

Output:

7	11:34:25	INSERT INTO `database`.`full_table` (`VEHICLE_OWNER_ID`, `VEHICLE_COLOR`, `VEHICLE_TYPE`, `VEHICLE_AGE`, `VEHICLE_OWNER`, `MAINTENANCE_DATE`, `PROCEDURE`) VALUES ('3827', 'WHITE', 'TRUCK', '3', 'Liam Nee...	1 row(s) affected
8	11:34:25	INSERT INTO `database`.`full_table` (`VEHICLE_OWNER_ID`, `VEHICLE_COLOR`, `VEHICLE_TYPE`, `VEHICLE_AGE`, `VEHICLE_OWNER`, `MAINTENANCE_DATE`, `PROCEDURE`) VALUES ('4649', 'BLACK', 'LIMOUSINE', '8', 'Roge...	1 row(s) affected
9	11:34:25	INSERT INTO `database`.`full_table` (`VEHICLE_OWNER_ID`, `VEHICLE_COLOR`, `VEHICLE_TYPE`, `VEHICLE_AGE`, `VEHICLE_OWNER`, `MAINTENANCE_DATE`, `PROCEDURE`) VALUES ('4649', 'BLACK', 'LIMOUSINE', '8', 'Roge...	1 row(s) affected
10	11:34:25	INSERT INTO `database`.`full_table` (`VEHICLE_OWNER_ID`, `VEHICLE_COLOR`, `VEHICLE_TYPE`, `VEHICLE_AGE`, `VEHICLE_OWNER`, `MAINTENANCE_DATE`, `PROCEDURE`) VALUES ('4876', 'GRAY', 'CAR', '1', 'Diego Minh V...	1 row(s) affected
11	11:34:25	INSERT INTO `database`.`full_table` (`VEHICLE_OWNER_ID`, `VEHICLE_COLOR`, `VEHICLE_TYPE`, `VEHICLE_AGE`, `VEHICLE_OWNER`, `MAINTENANCE_DATE`, `PROCEDURE`) VALUES ('4876', 'GRAY', 'CAR', '1', 'Diego Minh V...	1 row(s) affected
12	11:40:30	CREATE TABLE `database`.`owner_info` (`VEHICLE_OWNER_ID` INT NOT NULL, `VEHICLE_OWNER` VARCHAR(45) NOT NULL, PRIMARY KEY (`VEHICLE_OWNER_ID`))	0 row(s) affected

Insuring data into table owner_info

```
/* Insert values */
INSERT INTO `database`.`owner_info` (`VEHICLE_OWNER_ID`, `VEHICLE_OWNER`) VALUES ('3515', 'Marissa Jones');
INSERT INTO `database`.`owner_info` (`VEHICLE_OWNER_ID`, `VEHICLE_OWNER`) VALUES ('3827', 'Liam Neeson');
INSERT INTO `database`.`owner_info` (`VEHICLE_OWNER_ID`, `VEHICLE_OWNER`) VALUES ('4649', 'Roger Gupta');
INSERT INTO `database`.`owner_info` (`VEHICLE_OWNER_ID`, `VEHICLE_OWNER`) VALUES ('4876', 'Diego Minh Vu');
```

Output:

11	11:34:25	INSERT INTO `database`.`full_table` (`VEHICLE_OWNER_ID`, `VEHICLE_COLOR`, `VEHICLE_TYPE`, `VEHICLE_AGE`, `VEHICLE_OWNER`, `MAINTENANCE_DATE`, `PROCEDURE`) VALUES ('4876', 'GRAY', 'CAR', '1', 'Diego Minh V...	1 row(s) affected
12	11:40:30	CREATE TABLE `database`.`owner_info` (`VEHICLE_OWNER_ID` INT NOT NULL, `VEHICLE_OWNER` VARCHAR(45) NOT NULL, PRIMARY KEY (`VEHICLE_OWNER_ID`))	0 row(s) affected
13	11:42:33	INSERT INTO `database`.`owner_info` (`VEHICLE_OWNER_ID`, `VEHICLE_OWNER`) VALUES ('3515', 'Marissa Jones')	1 row(s) affected
14	11:42:33	INSERT INTO `database`.`owner_info` (`VEHICLE_OWNER_ID`, `VEHICLE_OWNER`) VALUES ('3827', 'Liam Neeson')	1 row(s) affected
15	11:42:33	INSERT INTO `database`.`owner_info` (`VEHICLE_OWNER_ID`, `VEHICLE_OWNER`) VALUES ('4649', 'Roger Gupta')	1 row(s) affected
16	11:42:33	INSERT INTO `database`.`owner_info` (`VEHICLE_OWNER_ID`, `VEHICLE_OWNER`) VALUES ('4876', 'Diego Minh Vu')	1 row(s) affected

Creating table vehicle_info:

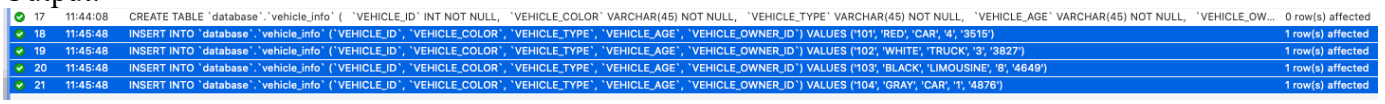
```
/* Create table */
CREATE TABLE `database`.`vehicle_info` (
  `VEHICLE_ID` INT NOT NULL,
  `VEHICLE_COLOR` VARCHAR(45) NOT NULL,
  `VEHICLE_TYPE` VARCHAR(45) NOT NULL,
  `VEHICLE_AGE` VARCHAR(45) NOT NULL,
  `VEHICLE_OWNER_ID` INT NOT NULL,
  PRIMARY KEY (`VEHICLE_ID`),
  FOREIGN KEY (`VEHICLE_OWNER_ID`) REFERENCES `database`.`owner_info`(`VEHICLE_OWNER_ID`));
```

Output:

Inserting data to table

```
/* Insert values */
INSERT INTO `database`.`vehicle_info` (`VEHICLE_ID`, `VEHICLE_COLOR`, `VEHICLE_TYPE`, `VEHICLE_AGE`, `VEHICLE_OWNER_ID`) VALUES ('101', 'RED', 'CAR', '4', '3515');
INSERT INTO `database`.`vehicle_info` (`VEHICLE_ID`, `VEHICLE_COLOR`, `VEHICLE_TYPE`, `VEHICLE_AGE`, `VEHICLE_OWNER_ID`) VALUES ('102', 'WHITE', 'TRUCK', '3', '3827');
INSERT INTO `database`.`vehicle_info` (`VEHICLE_ID`, `VEHICLE_COLOR`, `VEHICLE_TYPE`, `VEHICLE_AGE`, `VEHICLE_OWNER_ID`) VALUES ('103', 'BLACK', 'LIMOUSINE', '8', '4649');
INSERT INTO `database`.`vehicle_info` (`VEHICLE_ID`, `VEHICLE_COLOR`, `VEHICLE_TYPE`, `VEHICLE_AGE`, `VEHICLE_OWNER_ID`) VALUES ('104', 'GRAY', 'CAR', '1', '4876');
```

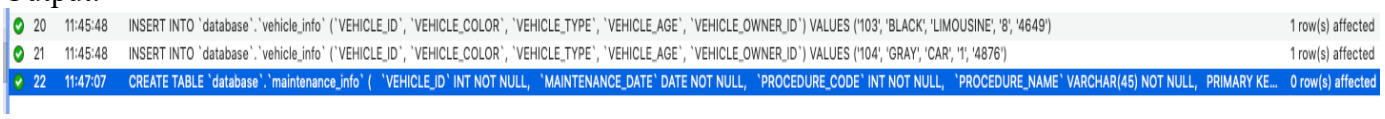
Output:



Creating table maintenance_info:

```
/* Create table */
CREATE TABLE `database`.`maintenance_info` (
  `VEHICLE_ID` INT NOT NULL,
  `MAINTENANCE_DATE` DATE NOT NULL,
  `PROCEDURE_CODE` INT NOT NULL,
  `PROCEDURE_NAME` VARCHAR(45) NOT NULL,
  PRIMARY KEY (`VEHICLE_ID`, `MAINTENANCE_DATE`, `PROCEDURE_CODE`),
  FOREIGN KEY (`VEHICLE_ID`) REFERENCES `database`.`vehicle_info`(`VEHICLE_ID`));
```

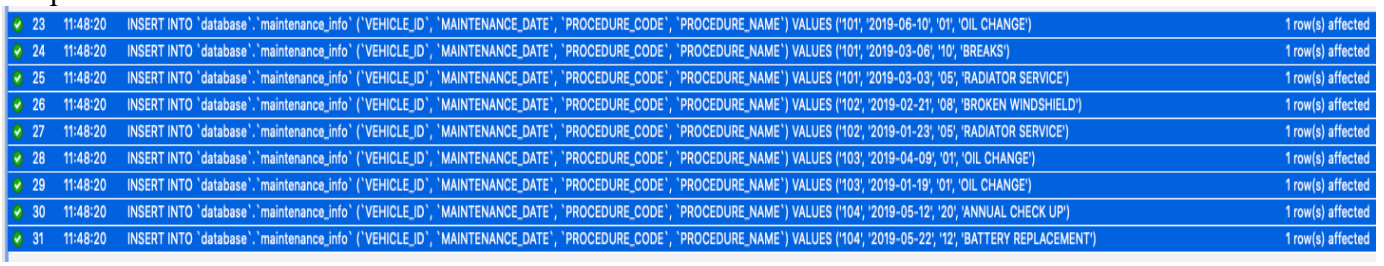
Output:



Inserting data into table

```
/* Insert values */
INSERT INTO `database`.`maintenance_info` (`VEHICLE_ID`, `MAINTENANCE_DATE`, `PROCEDURE_CODE`, `PROCEDURE_NAME`) VALUES ('101', '2019-06-10', '01', 'OIL CHANGE');
INSERT INTO `database`.`maintenance_info` (`VEHICLE_ID`, `MAINTENANCE_DATE`, `PROCEDURE_CODE`, `PROCEDURE_NAME`) VALUES ('101', '2019-03-06', '10', 'BREAKS');
INSERT INTO `database`.`maintenance_info` (`VEHICLE_ID`, `MAINTENANCE_DATE`, `PROCEDURE_CODE`, `PROCEDURE_NAME`) VALUES ('101', '2019-03-03', '05', 'RADIATOR SERVICE');
INSERT INTO `database`.`maintenance_info` (`VEHICLE_ID`, `MAINTENANCE_DATE`, `PROCEDURE_CODE`, `PROCEDURE_NAME`) VALUES ('102', '2019-02-21', '08', 'BROKEN WINDSHIELD');
INSERT INTO `database`.`maintenance_info` (`VEHICLE_ID`, `MAINTENANCE_DATE`, `PROCEDURE_CODE`, `PROCEDURE_NAME`) VALUES ('102', '2019-01-23', '05', 'RADIATOR SERVICE');
INSERT INTO `database`.`maintenance_info` (`VEHICLE_ID`, `MAINTENANCE_DATE`, `PROCEDURE_CODE`, `PROCEDURE_NAME`) VALUES ('103', '2019-04-09', '01', 'OIL CHANGE');
INSERT INTO `database`.`maintenance_info` (`VEHICLE_ID`, `MAINTENANCE_DATE`, `PROCEDURE_CODE`, `PROCEDURE_NAME`) VALUES ('103', '2019-01-19', '01', 'OIL CHANGE');
INSERT INTO `database`.`maintenance_info` (`VEHICLE_ID`, `MAINTENANCE_DATE`, `PROCEDURE_CODE`, `PROCEDURE_NAME`) VALUES ('104', '2019-05-12', '20', 'ANNUAL CHECK UP');
INSERT INTO `database`.`maintenance_info` (`VEHICLE_ID`, `MAINTENANCE_DATE`, `PROCEDURE_CODE`, `PROCEDURE_NAME`) VALUES ('104', '2019-05-22', '12', 'BATTERY REPLACEMENT');
```

Output:



Based on the table that we created, querying the following

Q1: Most common vehicle type amongst the customers

```
/* Q1: Most common vehicle type amongest the customers */
SELECT * FROM
(SELECT VEHICLE_TYPE, COUNT(DISTINCT VEHICLE_OWNER_ID) AS NUM_OWNERS
FROM vehicle_info
GROUP BY VEHICLE_TYPE) AS A
ORDER BY A.NUM_OWNERS DESC;
/* Most common vehicle type amongest the customers is Car. Two people own this vehicle type (car). */
```

Output:

```
36  11:51:35  SELECT * FROM (SELECT v.VEHICLE_TYPE, COUNT(DISTINCT o.VEHICLE_OWNER) AS NUM_OWNERS FROM owner_info as o LEFT JOIN vehicle_info as v ON o.VEHICLE_OWNER_ID = v.VEHICLE_OWNER_ID GROUP BY v.VEHICLE...  3 row(s) returned
```

Table:

Result Grid Filter Rows: Search Export:

VEHICLE_TYPE	NUM_OWNERS
CAR	2
LIMOUSINE	1
TRUCK	1

Q2: The least popular vehicle color

```
/* Q2: The least popular vehicle color */
SELECT * FROM
(SELECT VEHICLE_COLOR, COUNT(DISTINCT VEHICLE_OWNER_ID) AS NUM_OWNERS
FROM vehicle_info
GROUP BY VEHICLE_COLOR) AS A
ORDER BY A.NUM_OWNERS ASC;
/* There is no least popular vehicle color. There is only 1 car of each color. */
```

Output:

```
36  11:51:35  SELECT * FROM (SELECT v.VEHICLE_TYPE, COUNT(DISTINCT o.VEHICLE_OWNER) AS NUM_OWNERS FROM owner_info as o LEFT JOIN vehicle_info as v ON o.VEHICLE_OWNER_ID = v.VEHICLE_OWNER_ID GROUP BY v.VEHICLE...  3 row(s) returned
37  11:54:01  SELECT * FROM (SELECT v.VEHICLE_COLOR, COUNT(DISTINCT o.VEHICLE_OWNER) AS NUM_OWNERS FROM owner_info as o LEFT JOIN vehicle_info as v ON o.VEHICLE_OWNER_ID = v.VEHICLE_OWNER_ID GROUP BY v.V...  4 row(s) returned
```

Table:

Result Grid Filter Rows: Search Export:

VEHICLE_COLOR	NUM_OWNERS
BLACK	1
GRAY	1
RED	1
WHITE	1

Q3: The average vehicle age

```
/* Q3: The average vehicle age */
SELECT AVG (VEHICLE_AGE)
FROM vehicle_info;
/*The average vehicle age is 4 years.*/
```

Output:

```
38  11:55:15  SELECT AVG (VEHICLE_AGE) FROM vehicle_info LIMIT 0, 1000  1 row(s) returned
```

Table:

Result Grid Filter Rows: Search Export:

AVG (VEHICLE_AGE)
4

Q4: A frequency report for the count of cars by age group

```
/* Q4: A frequency report for the count of cars by age group */
SELECT AGE_BUCKET, COUNT(DISTINCT VEHICLE_ID) AS NUM_CARS
FROM
(SELECT VEHICLE_ID,
CASE
  WHEN VEHICLE_AGE >= 0 AND VEHICLE_AGE<2 THEN '0-2'
  WHEN VEHICLE_AGE >= 2 AND VEHICLE_AGE<4 THEN '2-4'
  WHEN VEHICLE_AGE >= 4 AND VEHICLE_AGE<6 THEN '4-6'
  WHEN VEHICLE_AGE >= 6 AND VEHICLE_AGE<8 THEN '6-8'
  ELSE '>=8'
END AS AGE_BUCKET
FROM vehicle_info) AS B
GROUP BY B.AGE_BUCKET;
/* This is a requency report for the count of cars by age group. We devided all ages into four age groups (buckets). */
/* Each age group has one car. */
```

Output:

```
36  11:51:35  SELECT * FROM (SELECT v.VEHICLE_TYPE, COUNT(DISTINCT o.VEHICLE_OWNER) AS NUM_OWNERS FROM owner_info as o LEFT JOIN vehicle_info as v ON o.VEHICLE_OWNER_ID = v.VEHICLE_OWNER_ID GROUP BY v.VEHICLE...  3 row(s) returned
37  11:54:01  SELECT * FROM (SELECT v.VEHICLE_COLOR, COUNT(DISTINCT o.VEHICLE_OWNER) AS NUM_OWNERS FROM owner_info as o LEFT JOIN vehicle_info as v ON o.VEHICLE_OWNER_ID = v.VEHICLE_OWNER_ID GROUP BY v.V...  4 row(s) returned
38  11:55:15  SELECT AVG (VEHICLE_AGE) FROM vehicle_info LIMIT 0, 1000  1 row(s) returned
39  11:56:18  SELECT AGE_BUCKET, COUNT(DISTINCT VEHICLE_ID) AS NUM_CARS FROM (SELECT VEHICLE_ID, CASE WHEN VEHICLE_AGE >= 0 AND VEHICLE_AGE<2 THEN '0-2' WHEN VEHICLE_AGE >= 2 AND VEHICLE_AGE<5 THEN '2-...  3 row(s) returned
```

Table:

Result Grid Filter Rows: Search Export:

AGE_BUCKET	NUM_CARS
>=8	1
0-2	1
2-5	2

Schema "database" after creating all tables