VEHICLE INSURANCE POLICY DATA MANAGEMENT SYSTEM

GROUP –14:

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INTRODUCTION

A car insurance claim is a request for financial compensation that a driver files with an insurance company after their vehicle is damaged or they are injured in a car accident.

More than $170 billion in auto insurance claims payments are made by U.S. insurance companies each year.

With over 284 million vehicles operating on roads in 2022 throughout the United States, there is a need for a robust vehicle's insurance database management system to be developed to retrieve information regarding the accident, vehicles involved and help customers with their policy and claim their deserved compensation from their opted insurance companies.

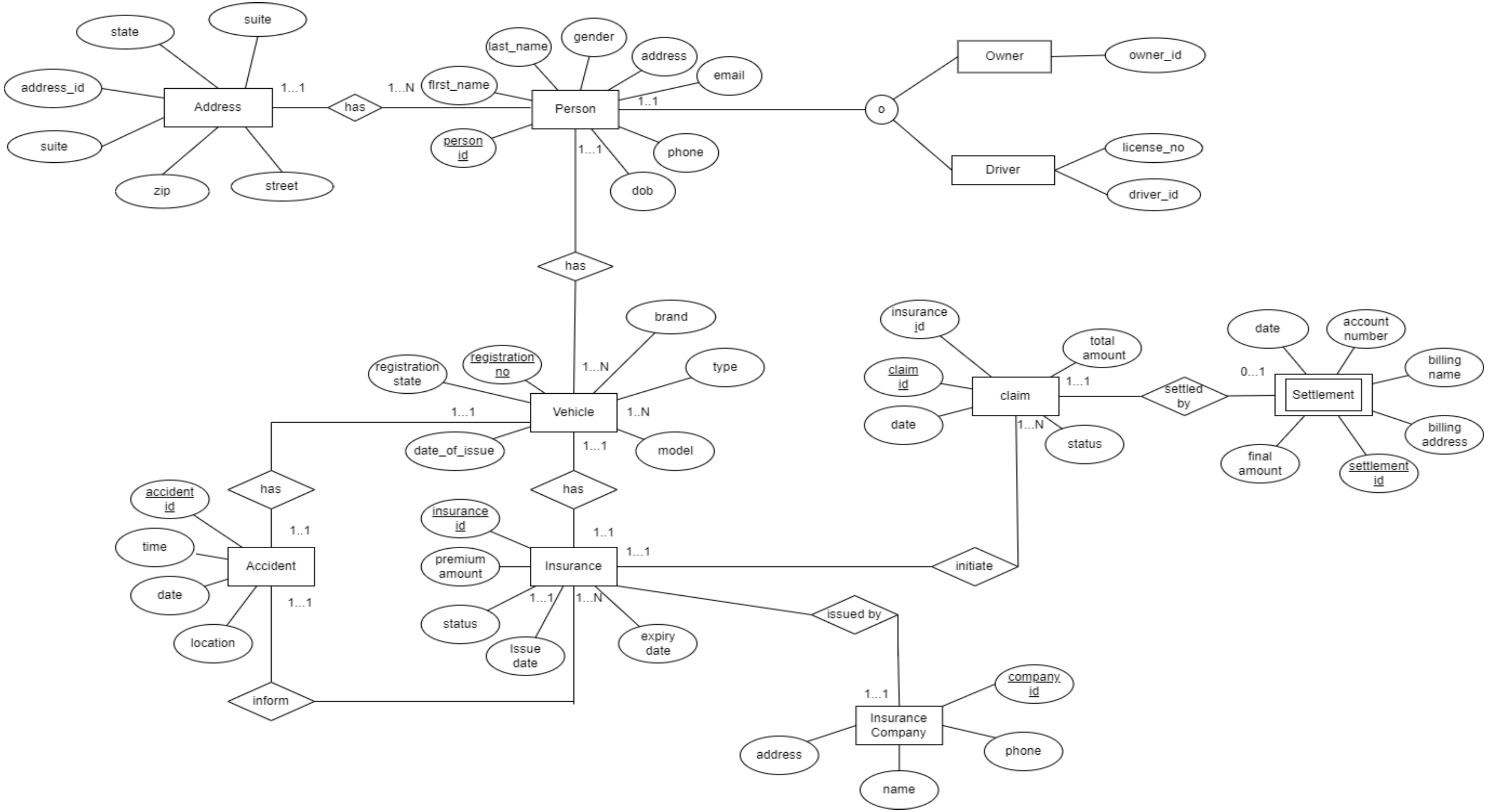
BUSINESS PROBLEM DEFINITION

We plan to develop a vehicle insurance policy management system. The platform will connect the Owner details, vehicle’s details, Driver attributes, damage, Policy details, claim amount and settlement.

The platform will be a one-stop solution for customers making the insurance claiming and tracking process a hassle-free one.

We can keep track of accident history, claim amount awarded, number of claims honored helping in creating a reputation for the company and attracting prospective customers

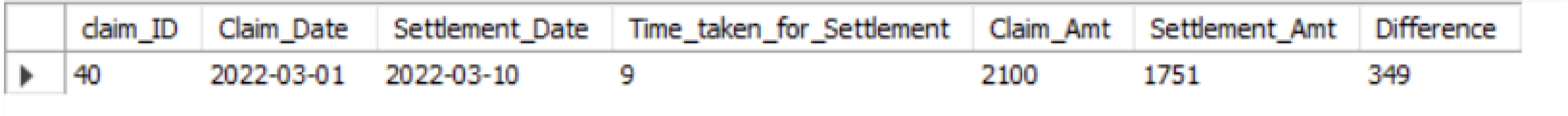
EER DIAGRAM:


state
suite
address_id
Address
suite
zip
street
1...1
has
1...N
last_name
gender
address
email
first_name
Person
1..1
person id
phone
1...1
dob
o
Owner
owner_id
Driver
license_no
driver_id
has
brand
registration state
registration no
1...N
type
Vehicle
1..N
1...1
date_of_issue
1...1
model
insurance id
total amount
claim id
claim
1...1
settled by
0...1
date
account number
billing name
Settlement
date
1...N
status
billing address
final amount
settlement id
has
has
accident id
1..1
1..1
insurance id
time
Accident
premium amount
Insurance
1...1
initiate
date
1...1
location
status
1...1
1...N
Issue date
expiry date
issued by
inform
1...1
company id
Insurance Company
address
phone
name

SQL Implementation

View for claim and settlements with the amount of time taken for settlement and the difference in settlement amount.

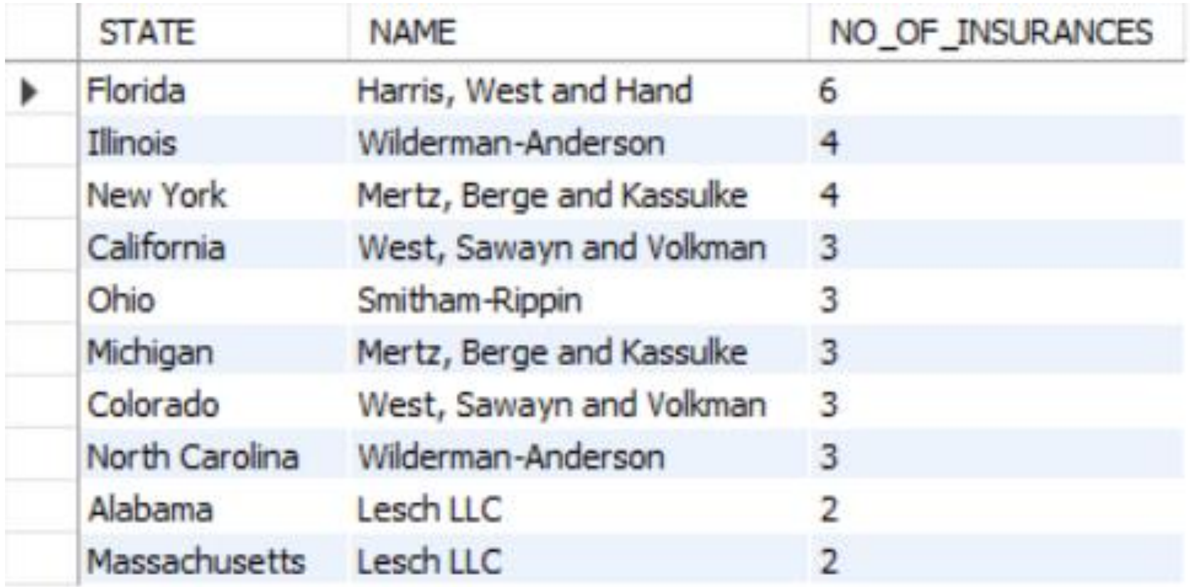
```
select c.claim_ID, c.date as Claim_Date, s.date as Settlement_Date, DATEDIFF(s.date, c.date) as
Time_taken_for_Settlement, c.total_amount as Claim_Amt, s.final_amount as Settlement_Amt,
c.total_amount-s.final_amount as Difference
from claim c, settlement s
where c.settlement_id = s.settlement_id
and c.claim_ID = 40;
```



	claim_ID	Claim_Date	Settlement_Date	Time_taken_for_Settlement	Claim_Amt	Settlement_Amt	Difference
▶	40	2022-03-01	2022-03-10	9	2100	1751	349

View for Popular Insurance companies state wise with maximum number of registered insurance vehicles.

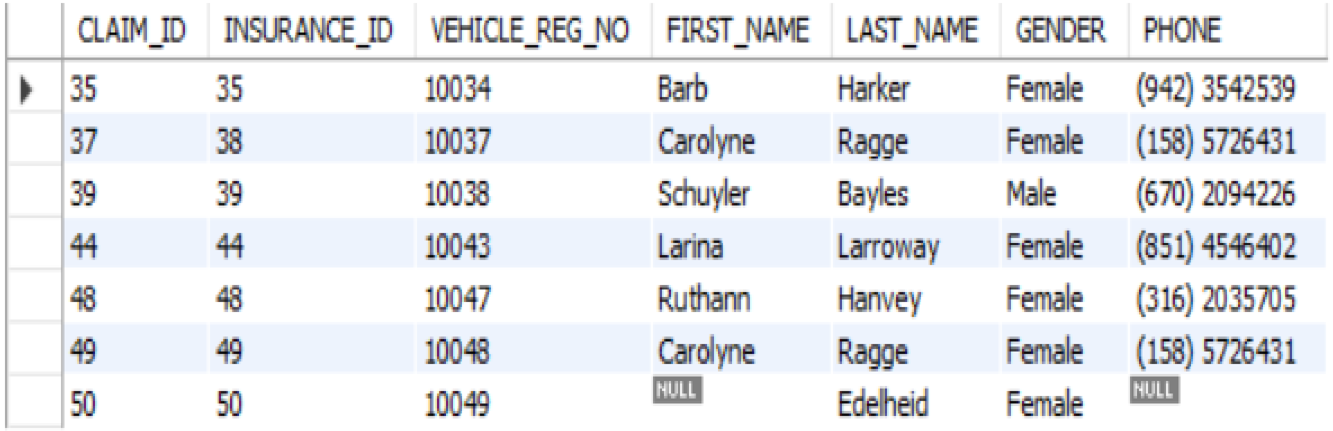
```
SELECT V.STATE, IC.NAME, COUNT(I.INSURANCE_ID) AS NO_OF_INSURANCES
FROM INSURANCE I, INSURANCE_COMPANY IC, VEHICLE V
WHERE I.VEHICLE_REG_NO = V.REGISTRATION_NO
AND I.INSURANCE_COMP_ID = IC.COMPANY_ID
GROUP BY V.STATE
ORDER BY COUNT(I.INSURANCE_ID) DESC
LIMIT 10;
```



STATE	NAME	NO_OF_INSURANCES
Florida	Harris, West and Hand	6
Illinois	Wilderman-Anderson	4
New York	Mertz, Berge and Kassulke	4
California	West, Sawayn and Volkman	3
Ohio	Smitham-Rippin	3
Michigan	Mertz, Berge and Kassulke	3
Colorado	West, Sawayn and Volkman	3
North Carolina	Wilderman-Anderson	3
Alabama	Lesch LLC	2
Massachusetts	Lesch LLC	2

View of details of people and vehicle which do not have a settlement yet

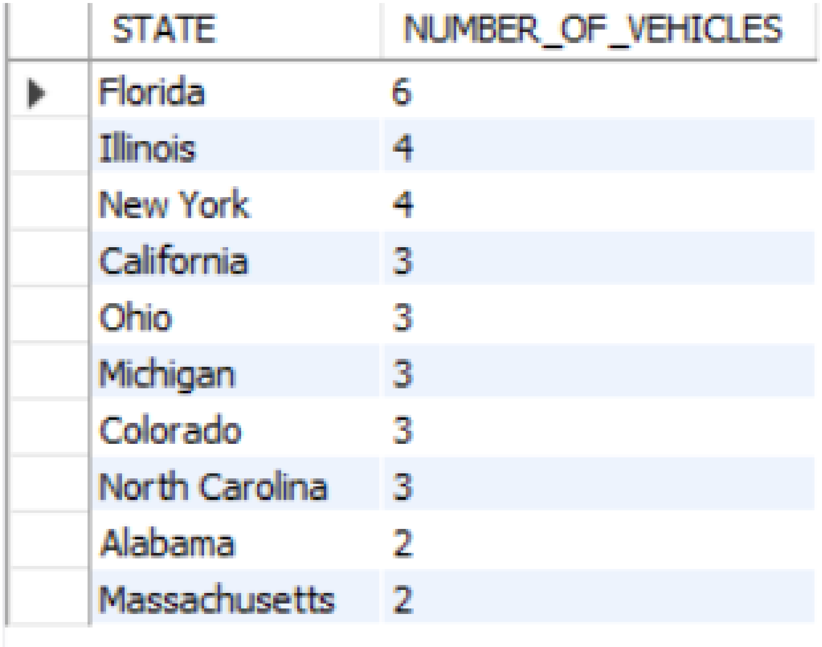
```
SELECT C.CLAIM_ID, C.INSURANCE_ID, I.VEHICLE_REG_NO, P.FIRST_NAME, P.LAST_NAME,
P.GENDER, P.PHONE

FROM CLAIM C, INSURANCE I, PERSON P, VEHICLE V

WHERE C.INSURANCE_ID = I.INSURANCE_ID

AND I.VEHICLE_REG_NO = V.REGISTRATION_NO

AND V.PERSON_ID = P.PERSON_ID

AND C.CLAIM_ID IN (

SELECT CLAIM_ID

FROM CLAIM

WHERE CLAIM_ID NOT IN(

SELECT CLAIM_ID

FROM CLAIM C, SETTLEMENT S

WHERE  C.SETTLEMENT_ID = S.SETTLEMENT_ID

));
```



CLAIM_ID	INSURANCE_ID	VEHICLE_REG_NO	FIRST_NAME	LAST_NAME	GENDER	PHONE
35	35	10034	Barb	Harker	Female	(942) 3542539
37	38	10037	Carolyne	Ragge	Female	(158) 5726431
39	39	10038	Schuyler	Bayles	Male	(670) 2094226
44	44	10043	Larina	Larroway	Female	(851) 4546402
48	48	10047	Ruthann	Hanvey	Female	(316) 2035705
49	49	10048	Carolyne	Ragge	Female	(158) 5726431
50	50	10049	NULL	Edelheid	Female	NULL

View for top 10 states with highest no. of registered car

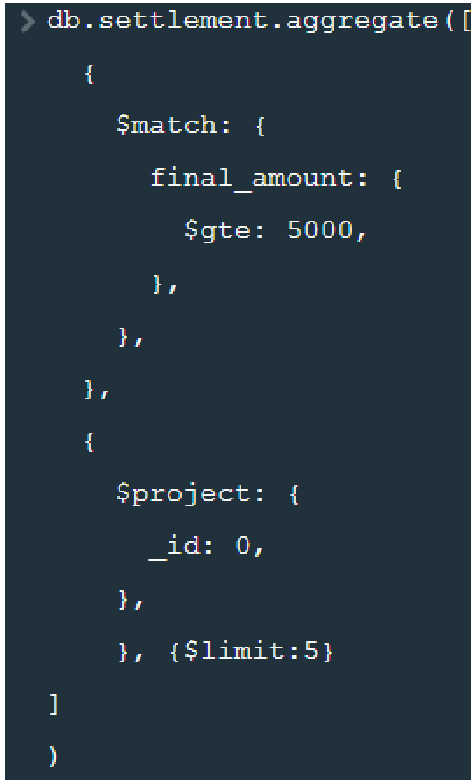
```
SELECT STATE, COUNT(REGISTRATION_NO) AS NUMBER_OF_VEHICLES FROM VEHICLE
 GROUP BY STATE
 ORDER BY COUNT(REGISTRATION_NO) DESC

LIMIT 10;
```



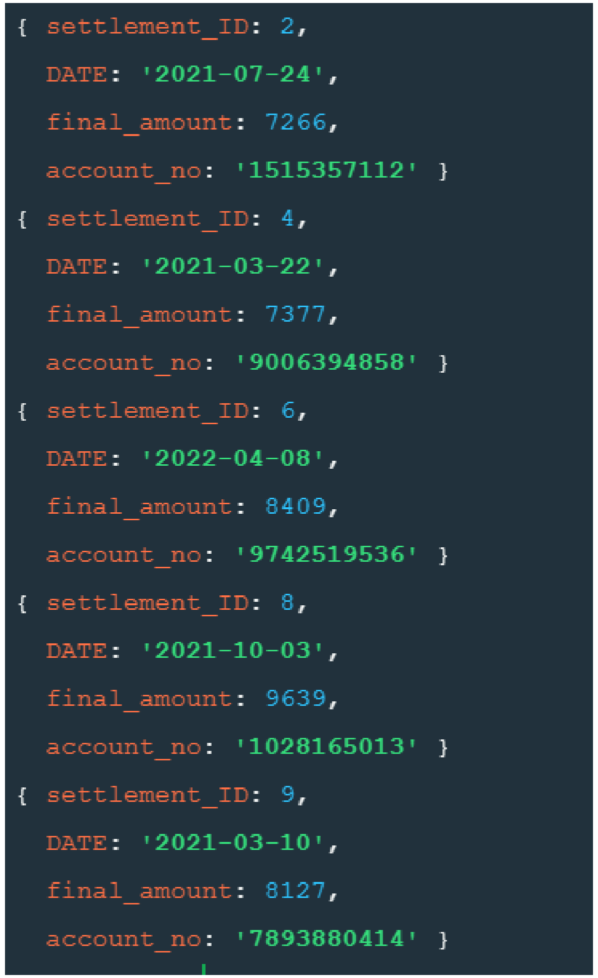
STATE	NUMBER_OF_VEHICLES
Florida	6
Illinois	4
New York	4
California	3
Ohio	3
Michigan	3
Colorado	3
North Carolina	3
Alabama	2
Massachusetts	2

NoSQL Implementation
MongoDB Query using MongoDB Compass

- **Details of settlement greater than 5000 USD**

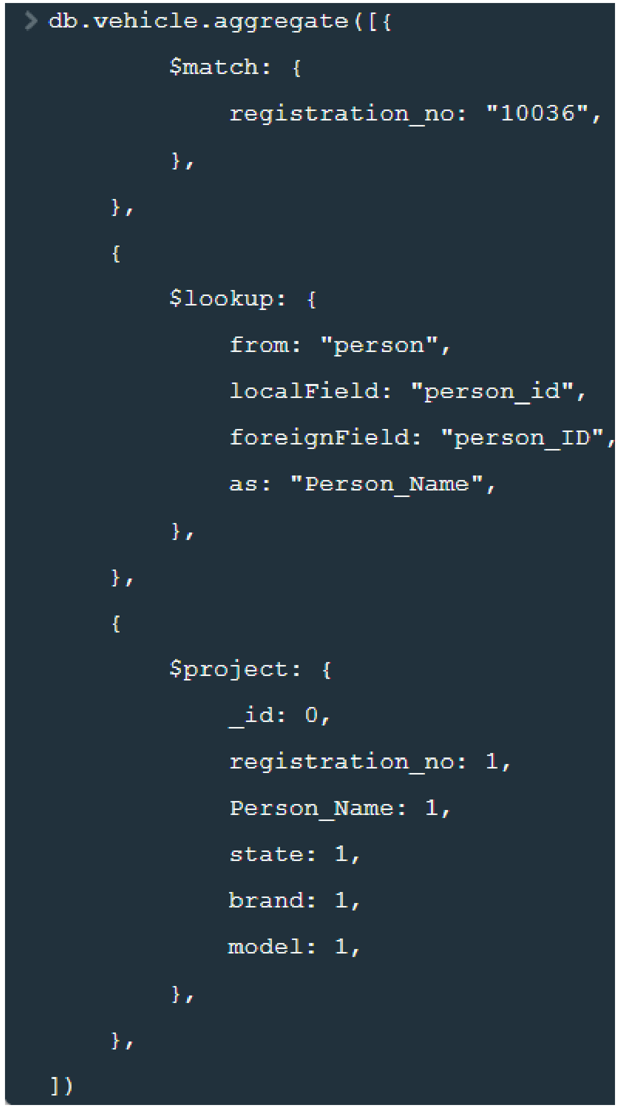


```
> db.settlement.aggregate([
    {
      $match: {
        final_amount: {
          $gte: 5000,
        },
      },
    },
    {
      $project: {
        _id: 0,
      },
      }, {$limit:5}
  ]
  )
```

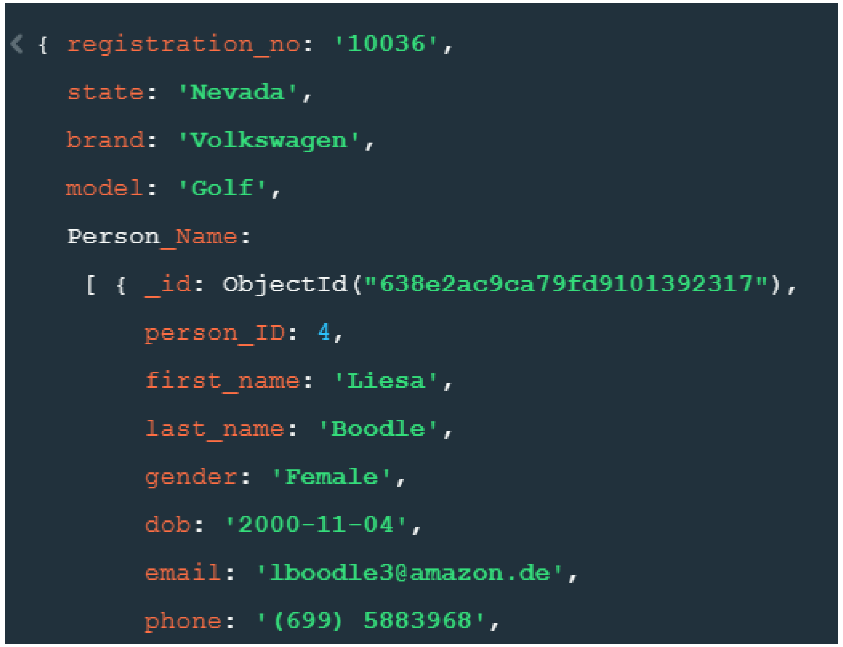


```
{ settlement_ID: 2,
  DATE: '2021-07-24',
  final_amount: 7266,
  account_no: '1515357112' }
{ settlement_ID: 4,
  DATE: '2021-03-22',
  final_amount: 7377,
  account_no: '9006394858' }
{ settlement_ID: 6,
  DATE: '2022-04-08',
  final_amount: 8409,
  account_no: '9742519536' }
{ settlement_ID: 8,
  DATE: '2021-10-03',
  final_amount: 9639,
  account_no: '1028165013' }
{ settlement_ID: 9,
  DATE: '2021-03-10',
  final_amount: 8127,
  account_no: '7893880414' }
```

- **Details of people from vehicle registration no 10036**



```
> db.vehicle.aggregate([{
        $match: {
            registration_no: "10036",
        },
    },
    {
        $lookup: {
            from: "person",
            localField: "person_id",
            foreignField: "person_ID",
            as: "Person_Name",
        },
    },
    {
        $project: {
            _id: 0,
            registration_no: 1,
            Person_Name: 1,
            state: 1,
            brand: 1,
            model: 1,
        },
    },
 ])
```



```
< { registration_no: '10036',
    state: 'Nevada',
    brand: 'Volkswagen',
    model: 'Golf',
    Person_Name:
     [ { _id: ObjectId("638e2ac9ca79fd9101392317"),
         person_ID: 4,
         first_name: 'Liesa',
         last_name: 'Boodle',
         gender: 'Female',
         dob: '2000-11-04',
         email: 'lboodle3@amazon.de',
         phone: '(699) 5883968',
```

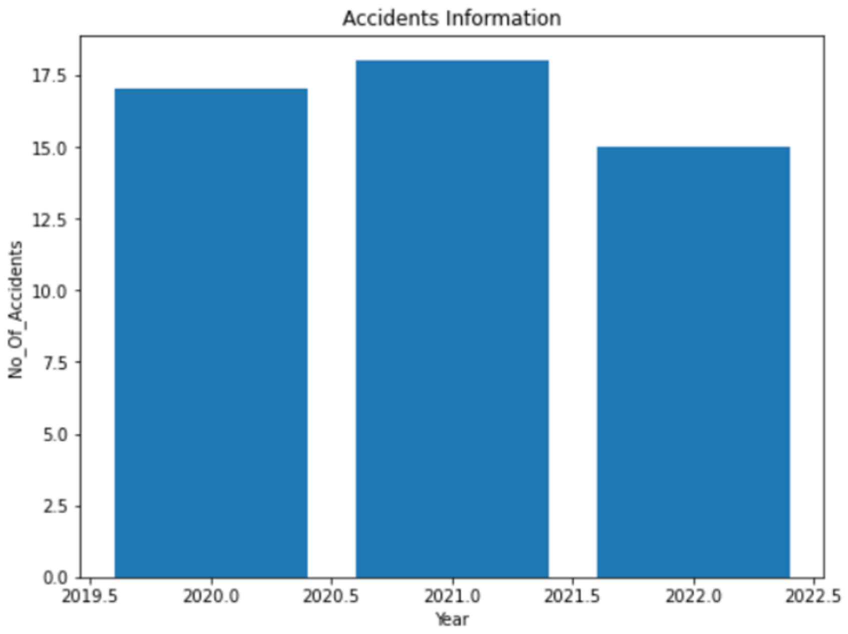
Visualizations using
Python-MySQL Connection

Code for connecting MySQL to Python

```
pip install mysql-connector-python
import mysql.connector as connection
import pandas as pd
import mysql.connector
import matplotlib.pyplot as plt

mydb = connection.connect(host="localhost", database = 'db_insurance',user="root",
passwd="root",use_pure=True)
```

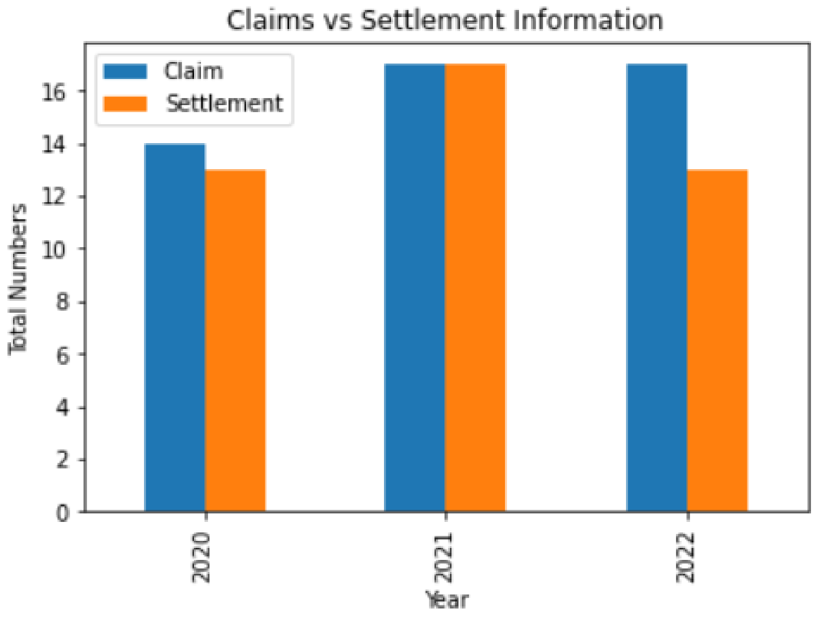
Code for creating bar plot

```
query = "select year(date),count(accident_id) from
accident group by year(date);"
result_df = pd.read_sql(query,mydb)
result_df.set_index("year(date)", inplace = True)
plt.figure(figsize=(8, 6))
result_df.plot(kind="bar")
plt.xlabel("Year")
plt.ylabel("No_Of_Accidents")
plt.title("Accidents Information")
plt.show()
```



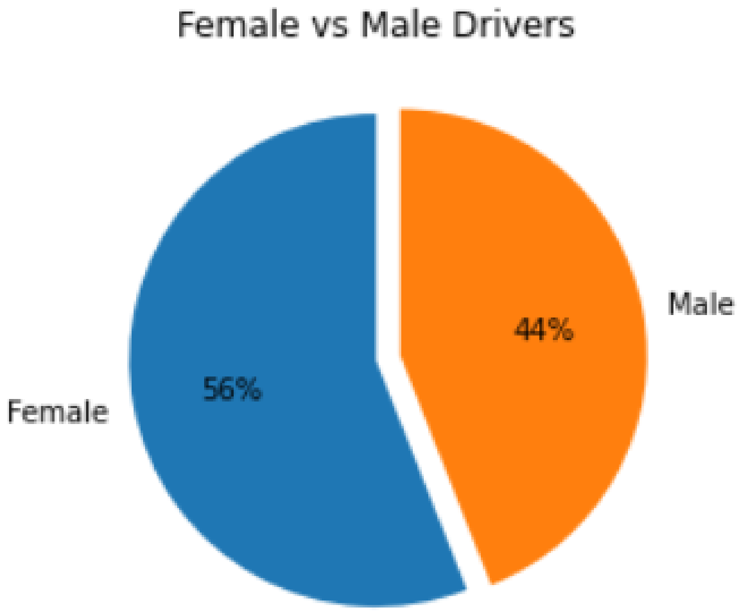
Code for creating grouped bar plot

```
query = "select year(c.date) as Year, count(c.claim_id)
as Claim, count(s.settlement_id) as Settlement from
claim c left join settlement s on  c.settlement_id =
s.settlement_id group by year(c.date) order by
year(c.date);"
result_df = pd.read_sql(query,mydb)
result_df.set_index("Year", inplace = True)
result_df.plot(kind="bar")
plt.xlabel("Year")
plt.ylabel("Total Numbers")
plt.title("Claims vs Settlement Information")
plt.show()
```



Code for creating pie-chart

```
query = "select p.gender, count(person_id) as count
from person p, driver d where p.person_id = d.driver_id
group by p.gender;"
result_df = pd.read_sql(query,mydb)
myexplode = (0, 0.1)
sizes = plt.pie(result_df['count'], labels =
result_df['gender'], startangle = 90, explode =
myexplode)
plt.title("Female vs Male Drivers")
plt.show()
```



FUTURE SCOPE

❑ Accident data can be used to implement safety alerting systems on roads and support the advancement in road transportation infrastructure.

❑ At high level this model can be improved to send alerts about when the Insurance policy is about to expire

Thank You!!