THE NATIONAL INSTITUTE OF ENGINEERING,MYSURU

DEPARTMENT OF INFORMATION SCIENCE AND ENGINEERING

DATABASE SYSTEMS LAB

PROJECT REPORT

EVOLVE

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4TH SEMESTER '**B**' SECTION **'B2'** BATCH

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INTRODUCTION

The database application **EVOLVE** revolves around **E**lectric **V**ehicles. It contains details about some prominent **EV** companies, the vehicles they produce, their cost, service and charging stations.The database contains information about the same. There are 6 tables and there exists many relationships between them. The Software used is **MySQL.**

DATABASE APPLICATION

The database application stores information about the details of a company,the vehicles they produce and their specifications, the detailed cost of vehicles, the various services the company provides, the revenue model of the company, the details about the charging stations.

OBJECTIVES

- To retrieve the information about any EV.
- To know the information about any company.
- Provides detailed information about the Revenue Model of the company.
- To compare and contrast the features of any two vehicles.
- To find the location of the charging station.
- Very useful for the people who are looking to buy an EV.

Key benefits of EVOLVE:

- Users will be able to choose their best electric vehicle with ease.
- With evolve , customers can compare the specifications of various electric vehicles.
- Customers can find their company's charging stations near them.
- Customers will be able to view service ratings of various companies.
- The customer will be able to view the unit economics of the product.
- Additionally, customers will be able to see the financial conditions of the companies.
- When all these factors are taken into account, users can easily choose the right vehicle.

System requirements:

Minimum Hardware requirements:

Processor : Any single / dual core processor.

Ram : Minimum 512 MB is required.

Display resolution : 1024*768 is recommended.

Any other device : Storage device capable of storing small data.

Software Requirements :

Operating System : Windows XP or an equivalent version of any other OS.

Programming language : Nil (-)

Drivers : ODBC (Open database connectivity).

Backend tool : MySQL

ENTITIES

The following section outlines all the Entities that the database tracks and lists its Primary key,Foreign Keys if any ,and all its attributes.

COMPANY

- **Primary Key**:-comp_id.
- **Foreign Key:**-None.
- **Attributes:**-comp_name,comp_hq,comp_head,no_of_emp,models.

VEHICLES

- **Primary Key**:-V_id.
- **Foreign Key**:-Comp_id references COMPANY(comp_id),
  Station_id references STATION(station_id).
- **Attributes** :- V_name,max_range,cost,max_speed,hours,voltage,station_id.

STATION

- **Primary Key**:-Station_id.
- **Foreign Key**:-Comp_id references COMPANY(comp_id).
- **Attributes** :- Location,no_of_units,cost,max_limit.

FINANCE

- **Primary Key**:-None.
- **Foreign Key**:-Comp_id references COMPANY(comp_id).
- **Attributes** :- Total_sales,Vehicles_sold,Profit,Total_spent.

COST

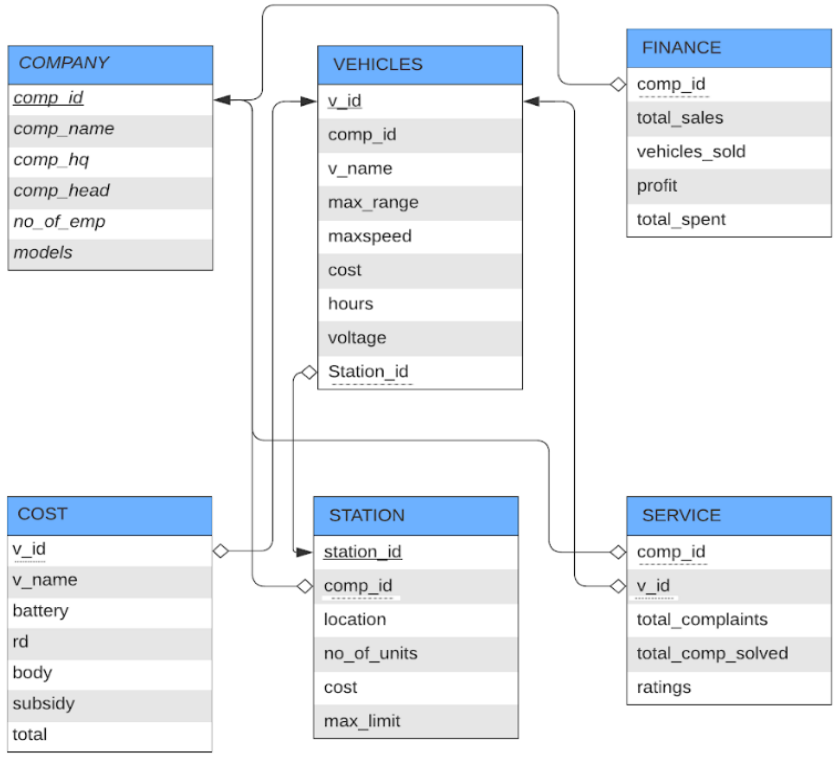
- **Primary Key:**-V_id
- **Foreign Key:**-Cost
- **Attributes** :- V_namebattery,rd,body,subsidy,total.

SERVICE

- **Primary Key:**-V_id
- **Foreign Key:**-Comp_id references COMPANY(comp_id),
  V_id references Vehicles(v_id)
- **Attributes** :- V_name,max_range,cost,max_speed,hours,voltage,station_id

DATABASE SCHEMA

RELATIONAL SCHEMA DIAGRAM



TABLES CREATION

COMPANY TABLE

```
CREATE table COMPANY(
   comp_id int PRIMARY KEY NOT NULL,
   comp_name varchar(20)  NOT NULL,
   comp_hq varchar(20),
   comp_head varchar(30),
   no_of_emp bigint,
   models int
   );
```

VEHICLES TABLE

```
 CREATE table VEHICLES(
    v_id int PRIMARY KEY NOT NULL,
    comp_id int NOT NULL,
    v_name varchar(20),
    max_range int,
    cost bigint,
    max_speed int,
    hours int,
    voltage int,
    station_id int
    );
```

STATION TABLE

```
create table STATION(
    station_id int PRIMARY KEY NOT NULL,
    comp_id int NOT NULL,
    location varchar(20),
    no_of_units bigint,
    cost float(9,2),
    max_limit int
    );
```

FINANCE TABLE

```
create table FINANCE(
   comp_id int,
   total_sales varchar(20),
   vehicles_sold int,
   profit float,
   total_spent float
);
```

COST TABLE

```
 create table COST (
    v_id int,
    v_name varchar(50),
    battery float(9,2),
    rd float(9,2),
    body float(9,2),
    subsidy float(9,2),
    total float(9,2)
);
```

SERVICE TABLE

```
    create table SERVICE(
    comp_id int,
    v_id int,
    total_complaints int,
    total_comp_solved int,
    ratings int
);
```

CONSTRAINTS

```
alter table vehicles add foreign key (comp_id) references company(comp_id);
alter table vehicles add foreign key (Station_id) references station(station_id);
alter table station add foreign key (comp_id) references COMPANY(comp_id);
alter table finance add foreign key (comp_id) references COMPANY(comp_id);
alter table cost add foreign key (v_id) references vehicles(v_id);
alter table service add foreign key (comp_id) references COMPANY(comp_id);
alter table service add foreign key (v_id) references vehicles(v_id);
```

TABLES DESCRIPTION

COMPANY

Field	Type	Null	Key	Default	Extra
comp_id	int	NO	PRI	NULL	
comp_name	varchar(20)	NO	UNI	NULL	
comp_hq	varchar(20)	YES		NULL	
comp_head	varchar(30)	YES		NULL	
no_of_emp	bigint	YES		NULL	
models	int	YES		NULL	

VEHICLES

Field	Type	Null	Key	Default	Extra
v_id	int	NO	PRI	NULL	
comp_id	int	NO	MUL	NULL	
v_name	varchar(20)	YES		NULL	
max_range	int	YES		NULL	
maxspeed	bigint	YES		NULL	
cost	int	YES		NULL	
hours	int	YES		NULL	
voltage	int	YES		NULL	
station_id	int	NO	MUL	NULL	

SERVICE

Field	Type	Null	Key	Default	Extra
comp_id	int	YES		NULL	
v_id	int	YES		NULL	
total_complaints	int	YES		NULL	
total_comp_solved	int	YES		NULL	
ratings	int	YES		NULL	

FINANCE

Field	Type	Null	Key	Default	Extra
comp_id	int	YES	MUL	NULL	
total_sales	varchar(20)	YES		NULL	
vehicles_sold	int	YES		NULL	
profit	varchar(20)	YES		NULL	
total_spent	varchar(20)	YES		NULL	

COST

Field	Type	Null	Key	Default	Extra
v_id	int	YES	MUL	NULL	
v_name	varchar(50)	YES		NULL	
battery	float(9,2)	YES		NULL	
rd	float(9,2)	YES		NULL	
body	float(9,2)	YES		NULL	
subsidy	float(9,2)	YES		NULL	
total	float(9,2)	YES		NULL	

STATION

Field	Type	Null	Key	Default	Extra
station_id	int	NO	PRI	NULL	
comp_id	int	NO		NULL	
location	varchar(20)	YES		NULL	
no_of_units	bigint	YES		NULL	
cost	float(9,2)	YES		NULL	
max_limit	int	YES		NULL	

INSERTING VALUES INTO TABLES

Inserting into Company Table

insert into company values (101,"TESLA","TEXAS","ELON MUSK",500,4);
insert into company values (102,"ATHER","BANGALORE","TARUN MEHTA",200,4);
insert into company values (103,"OLA","BANGALORE","BHAVISH AGGARWAL",200,2);
insert into company values (104,"HERO","LUDHIANA","SOHINDER SINGH GILL",150,4);
insert into company values (105,"ELECTROWHEELZ","TORONTO","JEFF BROWN",100,1);
insert into company values (106,"OKINAWA","BANGALORE","JEETENDER SHARMA",80,1);
insert into company values (107,"KIA","SEOUL","SONG HO-SUNG",200,2);
insert into company values (108,"TATA","MUMBAI","NATARAJAN CHANDRASEKARAN",1000,2);

```
mysql> select * from company;
+---------+---------------+-----------+-------------------------+-----------+--------+
| comp_id | comp_name     | comp_hq   | comp_head               | no_of_emp | models |
+---------+---------------+-----------+-------------------------+-----------+--------+
|     101 | TESLA         | TEXAS     | ELON MUSK               |       500 |      4 |
|     102 | ATHER         | BANGALORE | TARUN MEHTA             |       200 |      2 |
|     103 | OLA           | BANGALORE | BHAVISH AGGARWAL        |       200 |      2 |
|     104 | HERO          | LUDHIANA  | SOHINDER SINGH GILL     |       150 |      4 |
|     105 | ELECTROWHEELZ | TORONTO   | JEFF BROWN              |       100 |      1 |
|     106 | OKINAWA       | BANGALORE | JEETENDER SHARMA        |        80 |      1 |
|     107 | KIA           | SEOUL     | SONG HO-SUNG            |       200 |      2 |
|     108 | TATA          | MUMBAI    | NATARAJAN CHANDRASEKARAN |      1000 |      2 |
+---------+---------------+-----------+-------------------------+-----------+--------+
```

Inserting into Vehicles Table

insert into vehicles values(201,101,"MODEL X",480,120,6000000,6,110,301);
insert into vehicles values(202,101,"MODEL S",440,110,5000000,7,110,301);
insert into vehicles values(203,101,"MODEL 3",400,100,4500000,8,110,301);
insert into vehicles values(204,101,"MODEL Y",350,100,4000000,6,110,301);
insert into vehicles values(205,102,"ATHER 450 PLUS",100,100,130000,6,220,302);
insert into vehicles values(207,103,"S1 PRO",120,120,120000,7,220,303);
insert into vehicles values(208,103,"S1",100,110,100000,8,220,303);
insert into vehicles values(209,104,"FLASH",50,30,35000,9,220,304);
insert into vehicles values(210,104,"OPTIMA",50,40,40000,8,220,304);
insert into vehicles values(211,104,"NYX",50,50,50000,7,220,304);
insert into vehicles values(212,105,"WIND",60,50,60000,8,220,305);
insert into vehicles values(213,106,"RIDGE+",100,60,70000,7,220,306);
insert into vehicles values(214,107,"EV6",500,150,6000000,1,110,307);
insert into vehicles values(215,108,"NEXON",400,130,2000000,1,110,308);
insert into vehicles values(216,108,"TIGOR",300,110,1000000,1,110,308);

```
mysql> select * from vehicles;
+------+---------+----------------+-----------+----------+---------+-------+---------+------------+
| v_id | comp_id | v_name         | max_range | maxspeed | cost    | hours | voltage | station_id |
+------+---------+----------------+-----------+----------+---------+-------+---------+------------+
|  201 |     101 | MODEL X        |       480 |      120 | 6000000 |     6 |     110 |        301 |
|  202 |     101 | MODEL S        |       440 |      110 | 5000000 |     7 |     110 |        301 |
|  203 |     101 | MODEL 3        |       400 |      100 | 4500000 |     8 |     110 |        301 |
|  204 |     101 | MODEL Y        |       350 |      100 | 4000000 |     6 |     110 |        301 |
|  205 |     102 | ATHER 450 PLUS |       100 |      100 |  130000 |     6 |     220 |        302 |
|  206 |     102 | ATHER 450 X    |       120 |      110 |  150000 |     5 |     220 |        302 |
|  207 |     103 | S1 PRO         |       120 |      120 |  120000 |     7 |     220 |        303 |
|  208 |     103 | S1             |       100 |      110 |  100000 |     8 |     220 |        303 |
|  209 |     104 | FLASH          |        50 |       30 |   35000 |     9 |     220 |        304 |
|  210 |     104 | OPTIMA         |        50 |       40 |   40000 |     8 |     220 |        304 |
|  211 |     104 | NYX            |        50 |       50 |   50000 |     7 |     220 |        304 |
|  212 |     105 | WIND           |        60 |       50 |   60000 |     8 |     220 |        305 |
|  213 |     106 | RIDGE+         |       100 |       60 |   70000 |     7 |     220 |        306 |
|  214 |     107 | EV6            |       500 |      150 | 6000000 |     1 |     110 |        307 |
|  215 |     108 | NEXON          |       400 |      130 | 2000000 |     1 |     110 |        308 |
|  216 |     108 | TIGOR          |       300 |      110 | 1000000 |     1 |     110 |        308 |
+------+---------+----------------+-----------+----------+---------+-------+---------+------------+
16 rows in set (0.00 sec)
```

Inserting into Finance Table

insert into finance values(101,"500Mn",100000,"100Mn","400Mn");
insert into finance values(102,"10Mn",4000,"5Mn","5Mn");
insert into finance values(103,"5Mn",2000,"1Mn","4Mn");
insert into finance values(104,"15Mn",7000,"6Mn","9Mn");
insert into finance values(105,"1Mn",950,"60L","40L");
insert into finance values(106,"8Mn",2500,"2Mn","6Mn");
insert into finance values(107,"300Mn",95000,"200Mn","100Mn");
insert into finance values(108,"400Mn",105000,"100Mn","300Mn");

```
mysql> select * from finance;
+---------+-------------+---------------+--------+-------------+
| comp_id | total_sales | vehicles_sold | profit | total_spent |
+---------+-------------+---------------+--------+-------------+
|     101 | 500Mn       |        100000 | 100Mn  | 400Mn       |
|     102 | 10Mn        |          4000 | 5Mn    | 5Mn         |
|     103 | 5Mn         |          2000 | 1Mn    | 4Mn         |
|     104 | 15Mn        |          7000 | 6Mn    | 9Mn         |
|     105 | 1Mn         |           950 | 60L    | 40L         |
|     106 | 8Mn         |          2500 | 2Mn    | 6Mn         |
|     107 | 300Mn       |         95000 | 200Mn  | 100Mn       |
|     108 | 400Mn       |        105000 | 100Mn  | 300Mn       |
+---------+-------------+---------------+--------+-------------+
```

Inserting into Station Table

insert into station values(301,101,"KUVEMPUNAGAR",10,50,6);
insert into station values(302,102,"VIJAYANAGAR",15,40,5);
insert into station values(303,103,"SARASWATHIPURAM",20,45,4);
insert into station values(304,104,"VONTIKOPPAL",40,80,7);
insert into station values(305,105,"VIDYARANYAPURAM",25,60,10);

insert into station values(306,106,"HEBBAL",15,35,9);
insert into station values(307,107,"SRIRAMPURA",30,45,7);
insert into station values(308,108,"GOKULAM",40,20,5);

```
mysql> select * from station;
+------------+---------+-----------------+-------------+-------+-----------+
| station_id | comp_id | location        | no_of_units | cost  | max_limit |
+------------+---------+-----------------+-------------+-------+-----------+
|        301 |     101 | KUVEMPUNAGAR    |          10 | 50.00 |         6 |
|        302 |     102 | VIJAYANAGAR     |          15 | 40.00 |         5 |
|        303 |     103 | SARASWATHIPURAM |          20 | 45.00 |         4 |
|        304 |     104 | VONTIKOPPAL     |          40 | 80.00 |         7 |
|        305 |     105 | VIDYARANYAPURAM |          25 | 60.00 |        10 |
|        306 |     106 | HEBBAL          |          15 | 35.00 |         9 |
|        307 |     107 | SRIRAMPURA      |          30 | 45.00 |         7 |
|        308 |     108 | GOKULAM         |          40 | 20.00 |         5 |
+------------+---------+-----------------+-------------+-------+-----------+
```

Inserting into Cost Table

insert into cost values(201,"MODEL X",1500000,1500000,3200000,200000,6000000);
insert into cost values(202,"MODEL S",1300000,1300000,2650000,250000,5000000);
insert into cost values(203,"MODEL 3",1300000,1300000,2100000,200000,4500000);
insert into cost values(204,"MODEL Y",1100000,1100000,2000000,200000,4000000);
insert into cost values(205,"ATHER 450 PLUS",30000,30000,75000,5000,130000);
insert into cost values(207,"S1 PRO",25000,25000,72000,2000,120000);
insert into cost values(208,"S1",23000,23000,56000,2000,100000);
insert into cost values(209,"FLASH",7000,5000,25000,2000,35000);
insert into cost values(210,"OPTIMA",8000,8000,26000,2000,40000);
insert into cost values(211,"NYX",10000,10000,32000,2000,50000);
insert into cost values(212,"WIND",10000,12000,40000,2000,60000);
insert into cost values(213,"RIDGE+",12000,15000,46000,3000,70000);
insert into cost values(214,"EV6",1200000,1500000,3600000,300000,6000000);
insert into cost values(215,"NEXON",200000,300000,1700000,200000,2000000);
insert into cost values(216,"TIGOR",100000,200000,800000,100000,1000000);

v_id	v_name	battery	rd	body	subsidy	total
201	MODEL X	1500000.00	1500000.00	3200000.00	200000.00	6000000.00
202	MODEL S	1300000.00	1300000.00	2650000.00	250000.00	5000000.00
203	MODEL 3	1300000.00	1300000.00	2100000.00	200000.00	4500000.00
204	MODEL Y	1100000.00	1100000.00	2000000.00	200000.00	4000000.00
205	ATHER 450 PLUS	30000.00	30000.00	75000.00	5000.00	130000.00
207	S1 PRO	25000.00	25000.00	72000.00	2000.00	120000.00
208	S1	23000.00	23000.00	56000.00	2000.00	100000.00
209	FLASH	7000.00	5000.00	25000.00	2000.00	35000.00
210	OPTIMA	8000.00	8000.00	26000.00	2000.00	40000.00
211	NYX	10000.00	10000.00	32000.00	2000.00	50000.00
212	WIND	10000.00	12000.00	40000.00	2000.00	60000.00
213	RIDGE+	12000.00	15000.00	46000.00	3000.00	70000.00
214	EV6	1200000.00	1500000.00	3600000.00	300000.00	6000000.00
215	NEXON	200000.00	300000.00	1700000.00	200000.00	2000000.00
216	TIGOR	100000.00	200000.00	800000.00	100000.00	1000000.00

Inserting into Service Table

```
insert into service values(101,201,10000,9500,4.5);
insert into service values(101,202,10000,9400,4.4);
insert into service values(101,203,9000,8000,4.5);
insert into service values(101,204,5000,4500,4.6);
insert into service values(102,205,500,450,3.9);
insert into service values(103,207,1100,850,3.5);
insert into service values(103,208,900,750,3.8);
insert into service values(104,209,500,450,3.8);
insert into service values(104,210,600,550,3.9);
insert into service values(104,211,400,350,4.0);
insert into service values(105,212,900,850,4.1);
insert into service values(106,213,800,650,3.8);
insert into service values(107,214,950,850,4.1);
insert into service values(108,215,9500,8400,4.3);
insert into service values(108,216,9500,8500,4.1);
```

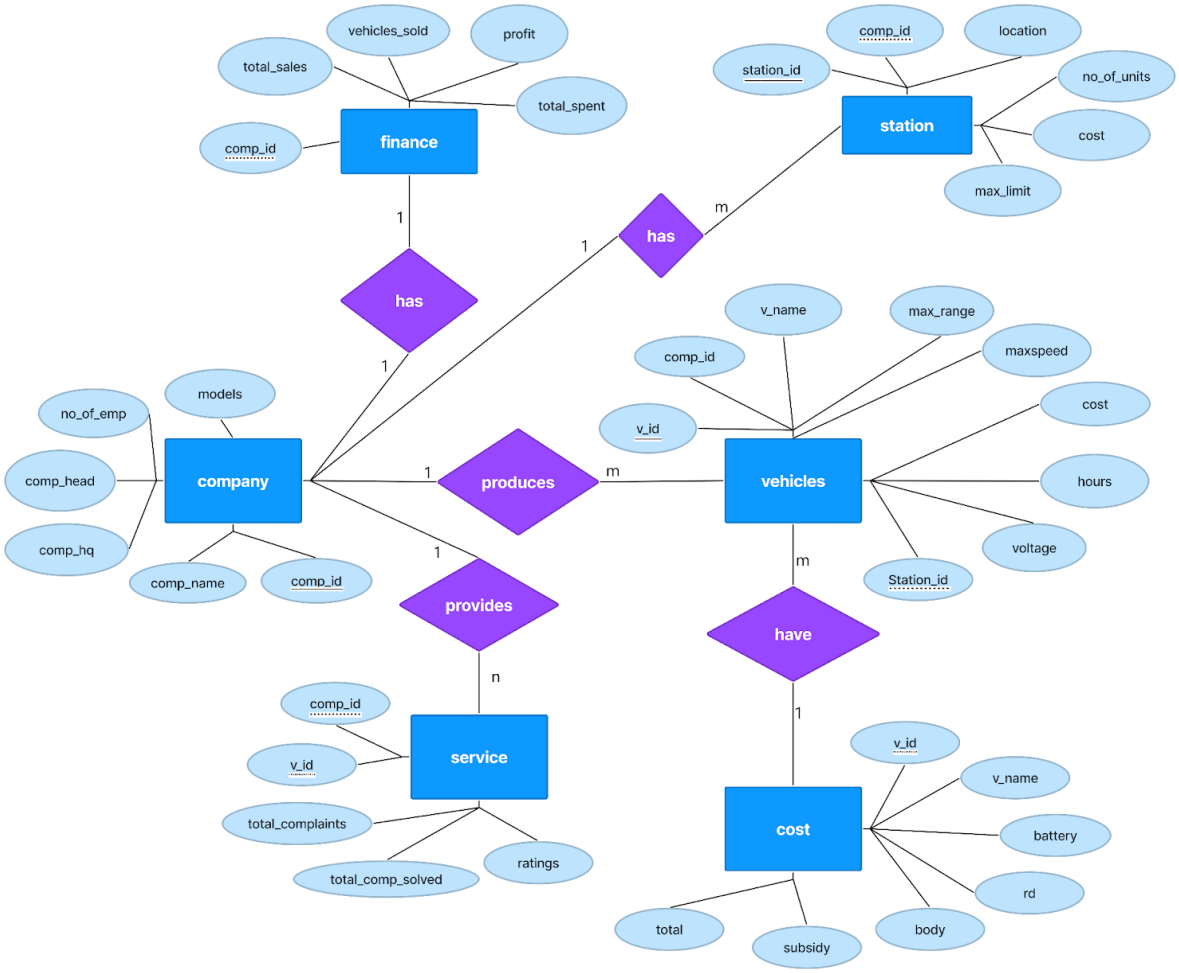
comp_id	v_id	total_complaints	total_comp_solved	ratings
101	201	10000	9500	5
101	202	10000	9400	4
101	203	9000	8000	5
101	204	5000	4500	5
102	205	500	450	4
103	207	1100	850	4
103	208	900	750	4
104	209	500	450	4
104	210	600	550	4
104	211	400	350	4
105	212	900	850	4
106	213	800	650	4
107	214	950	850	4
108	215	9500	8400	4
108	216	9500	8500	4

RELATIONSHIP

ENTITY-RELATIONSHIP:

- Each and every company (1) maintains its own (1) finance
- One company has many(m) charging stations
- One company(1) produces many (m) vehicles
- One company (1) provides service to many(m) customers.
- Many vehicles(m) have their unique(1) cost

ER Diagram:



SAMPLE SQL QUERIES

1. To find the details of the Vehicles whose cost is greater than 200000 and maximum range is greater than 450kms

> select * from vehicles where cost>200000 and max_range>450;

```
mysql> select * from vehicles where cost>200000 and max_range>450;
+------+---------+---------+-----------+----------+---------+-------+---------+------------+
| v_id | comp_id | v_name  | max_range | maxspeed | cost    | hours | voltage | station_id |
+------+---------+---------+-----------+----------+---------+-------+---------+------------+
|  201 |     101 | MODEL X |       480 |      120 | 6000000 |     6 |     110 |        301 |
|  214 |     107 | EV6     |       500 |      150 | 6000000 |     1 |     110 |        307 |
+------+---------+---------+-----------+----------+---------+-------+---------+------------+
```

2. To select the costliest model from each company

> select comp_id,v_name,max(cost) from vehicles group by comp_id;

```
mysql> select comp_id,v_name,max(cost) from vehicles group by comp_id;
+---------+----------------+-----------+
| comp_id | v_name         | max(cost) |
+---------+----------------+-----------+
|     101 | MODEL X        |   6000000 |
|     102 | ATHER 450 PLUS |    150000 |
|     103 | S1 PRO         |    120000 |
|     104 | FLASH          |     50000 |
|     105 | WIND           |     60000 |
|     106 | RIDGE+         |     70000 |
|     107 | EV6            |   6000000 |
|     108 | NEXON          |   2000000 |
+---------+----------------+-----------+
```

3. To select names of company who have sold more than 50000 units

> select comp_name from company where comp_id in (select comp_id from finance where vehicles_sold>50000);

```
+-----------+
| comp_name |
+-----------+
| TESLA     |
| KIA       |
| TATA      |
+-----------+
```

4. To select the company id and vehicle names whose charging cost is lesser than 50

```
> select vehicles.comp_id,vehicles.v_name,station.cost  from vehicles
   join station on vehicles.station_id=station.station_id
   where station.cost<50;
```

comp_id	v_name	cost
102	ATHER 450 PLUS	40.00
102	ATHER 450 X	40.00
103	S1 PRO	45.00
103	S1	45.00
106	RIDGE+	35.00
107	EV6	45.00
108	NEXON	20.00
108	TIGOR	20.00

5. To select the names of company and their heads and the average cost of the vehicles they manufacture

```
>select company.comp_id,company.comp_name,company.comp_head,
  avg (vehicles.cost) from company  join vehicles on
  company.comp_id=vehicles.comp_id group by vehicles.comp_id;
```

comp_id	comp_name	comp_head	avg(vehicles.cost)
101	TESLA	ELON MUSK	4875000.0000
102	ATHER	TARUN MEHTA	140000.0000
103	OLA	BHAVISH AGGARWAL	110000.0000
104	HERO	SOHINDER SINGH GILL	41666.6667
105	ELECTROWHEELZ	JEFF BROWN	60000.0000
106	OKINAWA	JEETENDER SHARMA	70000.0000
107	KIA	SONG HO-SUNG	6000000.0000
108	TATA	NATARAJAN CHANDRASEKARAN	1500000.0000

----------THE END----------