CASE STUDY

OF

TAXI

MANAGEMENT

SYSTEM

USING

RELATIONAL

DATABASE DESIGN

Case Study in Relational Database Design

- **Title:** Taxi Management System

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Contents

Abstract

The objective of this thesis is to get some good hands-on for creating the relational schemas and implementing the data extraction queries related to them. One case study "Taxi Management System" is presented. Input for this case study is taken from its informal specification to a relational schema using entity-relationship modeling and its translation to the relational model, to database schema, to implementation of the database, to interactive SQL querying of the installed database (Oracle).

Acknowledgement

We would like to express our gratitude to all those who made it possible to complete this thesis in particular to our supervisor Chaitanya Singla sir. We would also like to thank our family for their understanding and continuous support.
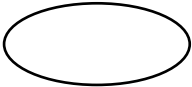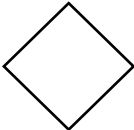
Chapter 1: Introduction
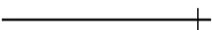
- **Database Management System:**

  Database Management Systems (DBMS) are software systems used to store, retrieve, and run queries on data. A DBMS serves as an interface between an end-user and a database, allowing users to create, read, update, and delete data in the database. DBMS manages the data, the database engine, and the database schema, allowing for data to be manipulated or extracted by users and other programs. This helps provide data security, data integrity, concurrency, and uniform data administration procedures.

- **Relational Database Management System:**

  A Relational Database Management System (RDBMS) is a program that allows you to create, update, and administer a relational database. Most relational database management systems use the SQL language to access the database.

- **ER Diagram:**

  - <u>Attribute</u>

  - <u>Entity</u>

  - <u>Relationship</u>

  - <u>One relation</u>

  - <u>One or many relation</u>

- **The objective of Case Study:**

  The objective of this case study is to get a little taste of how the designing process of the database system goes and how all the data insertions, updates, and fetching are performed. In this, we also had a hands-on practice of how to design the ER diagram of our database.

Chapter 2: Taxi Management System

2.1.   Case Study Informal Description:

We have planned a taxi management system in which we are storing the information of our taxies and all the drivers. In our system, we, are also storing the details of our customers and all about their ride information. We are also having a feedback section in which we are storing the feedback from our customers regarding their experience with the driver and his/her skills in their journey.

2.2.   Case Study Logical Model:
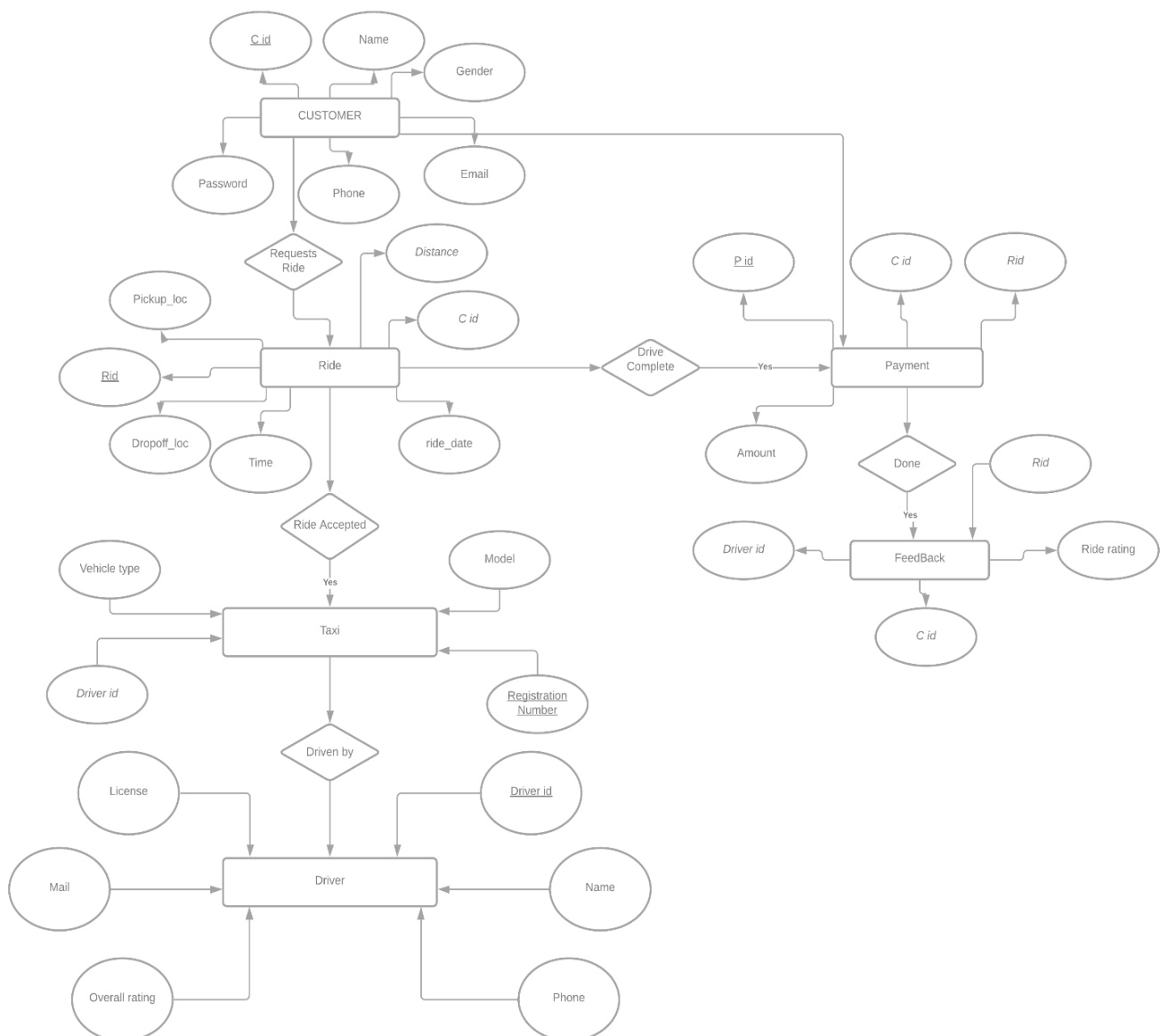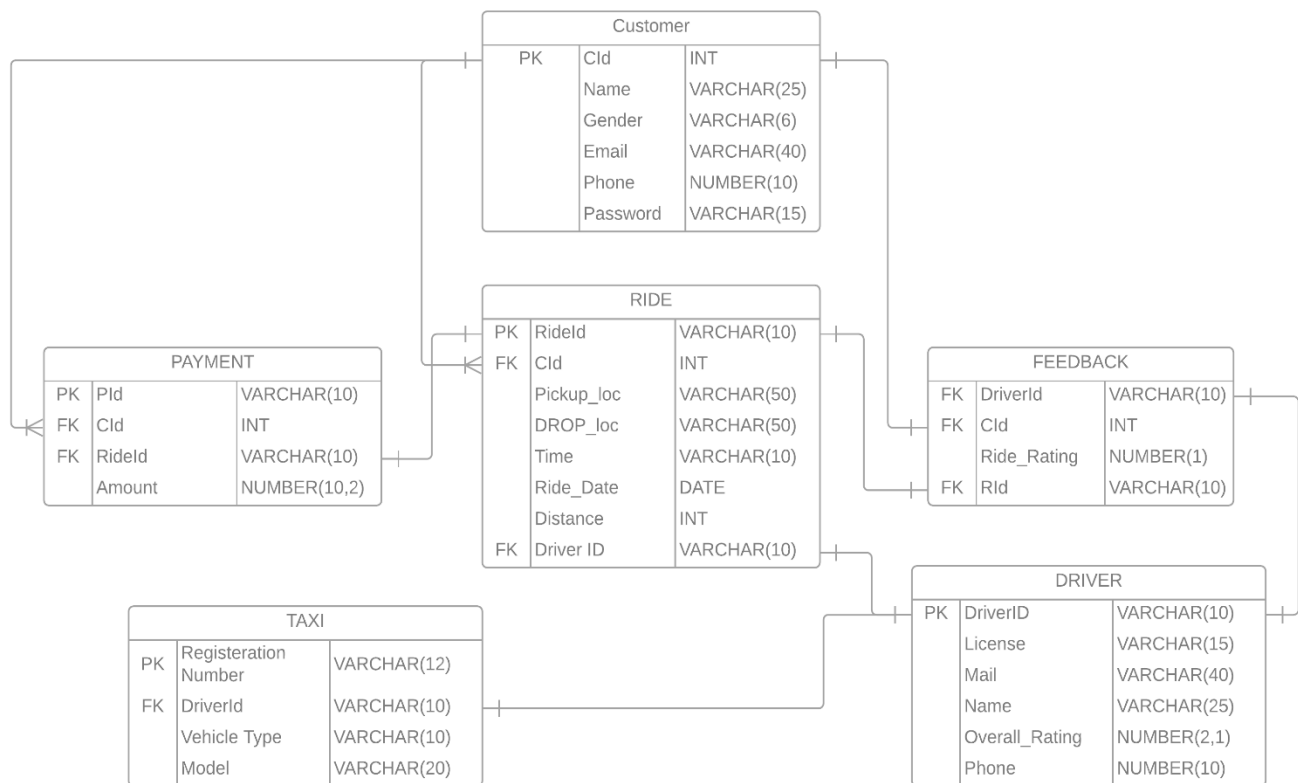
2.3. Case Study Physical Model:

- **Customer Table:**

create table customer (
cid int,
name varchar (25) not null,
gender varchar (6) not null,
email varchar (40) not null check (email like '%@%'),
phone number (10) check (length(phone)=10),
password varchar (15),
constraint cust_id primary key(cid)
);

```
SQL> CREATE TABLE customer(cid INT,name VARCHAR(25) NOT NULL,gender VARCHAR(6) NOT NULL,email VARCHAR(40) NOT N
ULL CHECK (email like '%@%'),phone NUMBER(10) CHECK (LENGTH(phone)=10),password VARCHAR(15),CONSTRAINT cust_id
PRIMARY KEY(cid));

Table created.
```

insert into customer values (

101,'Rupesh Dev Mand', 'Male', 'rupesh01@gmail.com', 6518734985,
'abc1238jb'
);

```
SQL> INSERT INTO customer VALUES(101,'Rupesh Dev Mand','Male','rupesh01@gmail.com',6518734985,'abc1238jb');

1 row created.
```

```
    CID NAME                    GENDER EMAIL                                      PHONE PASSWORD
---------- -----------------   ------ ---------------------------------- ---------- --------------
    101 Rupesh Dev Mand         Male   rupesh01@gmail.com                    6518734985 abc1238jb
    102 Jobin Radhe Rajagopal   Male   jobin02@gmail.com                     6128219987 #4@hgyr0
    103 Kajal Malhotra          Female kajal03@yahoo.com                     6411017992 *+451kui;
    104 Samir Kumar             Male   samir04@gmail.com                     6218461723 Iunm890?
    105 Upasana Pandit          Female upasana05@yahoo.com                   7979084959 @#tyh678
    106 Kirti Choudhry          Female kirti06@gmail.com                     6809670819 $%@uijm8
    107 Prabhat Sangha          Male   prabhat07@yahoo.com                   8917659281 ()874jukm
    108 Sheetal Nayar           Female sheetal08@gmail.com                   6127982334 =%^hgbt54
```

- **Driver Table:**

create table driver (
d_id varchar (10),
license varchar (15),
name varchar (25) not null,
phone number (10) check (length(phone)=10),
mail varchar (40) not null check (mail like '%@%'),
overall_rating number (2,1),
constraint driver_id primary key(d_id)
);

```
SQL> CREATE TABLE driver(d_id VARCHAR(10),license VARCHAR(15),name VARCHAR(25) NOT NULL,phone NUMBER(10) CHECK (LENGTH(pho
ne)=10),mail VARCHAR(40) NOT NULL CHECK (mail like '%@%'),overall_rating NUMBER(2,1),CONSTRAINT driver_id PRIMARY KEY(d_id
));

Table created.
```

insert into driver values (
'D101', 'PB7028718', 'Manpreet Singh', 7136768490,
'manpreet01@gmail.com', 4.7
);

```
SQL> INSERT INTO driver VALUES('D101','PB7028718','Manpreet Singh',7136768490,'manpreet01@gmail.com',4.7);

1 row created.
```

```
D_ID       LICENSE      NAME                        PHONE MAIL                                        OVERALL_RATING
---------- ------------ ------------------------- ---------- ------------------------------------------ --------------
D101       PB7028718    Manpreet Singh            7136768490 manpreet01@gmail.com                                  4.7
D102       MH4478223    Yogesh Sharma             9799900889 yogesh02@yahoo.com                                      5
D103       HR9312538    Sanjana Garg              6127993561 sanjana03@gmail.com                                   4.4
D104       HR3077002    Yash                      8917258098 yash04@gmail.com                                        4
D105       DL8542285    Vishal Gupta              7887916490 vishal05@gmail.com                                    3.9
D106       CH2967725    Bhavna Garg               7284278815 bhavna06@yahoo.com                                    4.9
```

- **Ride Table:**

create table ride (
rid varchar (10),
cid int,
pickup_loc varchar (50) not null,
dropoff_loc varchar (50) not null,
ride_date date,
time varchar (10),
distance int,
d_id varchar (10),
constraint ride_id primary key(rid),
constraint cust_id1 foreign key(cid) references customer(cid),
constraint driver_id1 foreign key(d_id) references driver(d_id)
);

```
SQL> CREATE TABLE ride(rid VARCHAR(10),cid INT,pickup_loc VARCHAR(50) NOT NULL,dropoff_loc VARCHAR(50) NOT NULL,ride_date
DATE,time VARCHAR(10),distance INT,d_id VARCHAR(10),CONSTRAINT ride_id PRIMARY KEY(rid),CONSTRAINT cust_id1 FOREIGN KEY(ci
d) REFERENCES customer(cid),CONSTRAINT driver_id1 FOREIGN KEY(d_id) REFERENCES driver(d_id));

Table created.
```

insert into ride values (
'R101', 101, 'Nabha', 'Patiala', to_date ('12-04-2021', 'dd-mm-yyyy'),
to_char (to_date ('1325', 'hh24mi'),'hh24:mi'), 30, 'D101'
);

```
SQL> INSERT INTO ride VALUES('R101',101,'Nabha','Patiala',to_date('12-04-2021','dd-mm-yyyy'),to_char(to_date('1325','hh2
4mi'),'hh24:mi'),30,'D101');

1 row created.
```

```
RID          CID PICKUP_LOC                      DROPOFF_LOC                    RIDE_DATE TIME      DISTANCE D_ID
--------- --------- ------------                 ------------                   --------- ---------  --------- ---------
R101         101 Nabha                           Patiala                        12-APR-21 13:25           30 D101
R102         105 Pune                            Navi Mumbai                    12-APR-21 19:00          126 D102
R103         103 Panchkula                       New Delhi                      09-MAY-21 18:30          260 D105
R104         102 Gurgaon                         New Delhi                      10-MAY-21 09:55           30 D104
R105         105 Patiala                         Rajpura                        11-MAY-21 19:00           34 D101
R106         104 Panchkula                       Chandigarh                     12-MAY-21 14:15           12 D103
```

- **Payment Table:**

create table payment (
pid varchar (10),
rid varchar (10),
cid int,
amount number (10,2),
constraint pay_id primary key(pid),
constraint ride_id1 foreign key(rid) references ride(rid),
constraint cust_id2 foreign key(cid) references customer(cid)
);

```
SQL> CREATE TABLE payment(pid VARCHAR(10),rid VARCHAR(10),cid INT,amount NUMBER(10,2),CONSTRAINT pay_id PRIMARY KEY(pid),C
ONSTRAINT ride_id1 FOREIGN KEY(rid) REFERENCES ride(rid),CONSTRAINT cust_id2 FOREIGN KEY(cid) REFERENCES customer(cid));

Table created.
```

insert into payment values (
'P101', 'R101', 101, 1000.0
);

```
SQL> INSERT INTO payment VALUES('P101','R101',101,1000.0);

1 row created.
```

```
PID            RID                   CID        AMOUNT
---------- ----------        ---------- ----------
P101           R101                  101          1000
P102           R102                  105       1549.23
P103           R103                  103        1863.8
P104           R104                  102        2000.5
P105           R105                  105          1250
P106           R106                  104        830.65
```

- **Taxi Table:**

```
create table taxi (
regis_number varchar (12),
model varchar (20),
vehicle_type varchar (10),
d_id varchar (10),
constraint regis_no primary key(regis_number),
constraint driver_id2 foreign key(d_id) references driver(d_id)
);
```

```
SQL> CREATE TABLE taxi(regis_number VARCHAR(12),model VARCHAR(20),vehicle_type VARCHAR(10),d_id VARCHAR(10),CONSTRAINT reg
is_no PRIMARY KEY(regis_number),CONSTRAINT driver_id2 FOREIGN KEY(d_id) REFERENCES driver(d_id));

Table created.
```

```
insert into taxi values (
'PB11CY4512','Altroz','Hatchback','D101'
);
```

```
SQL> INSERT INTO taxi VALUES('PB11CY4512','Altroz','Hatchback','D101');

1 row created.
```

```
REGIS_NUMBER MODEL                VEHICLE_TY D_ID
------------ -------------------- ---------- ----------
PB11CY4512   Altroz               Hatchback  D101
MH12TS2154   Harrier              SUV        D102
HR03Z7842    Swift Dzire          Sedan      D103
HR72C3298    Grand i10            Hatchback  D104
DL7CQ1939    Aura                 Sedan      D105
CH01CF8561   Vitara Brezza        Crossover  D106
MH01DX6427   Fortuner             SUV
```

- **Feedback Table:**

```
create table feedback (
d_id varchar (10),
cid int,
rid varchar (10),
```

```
ride_rating number (1),
constraint driver_id3 foreign key(d_id) references driver(d_id),
constraint cust_id3 foreign key(cid) references customer(cid),
constraint ride_id2 foreign key(rid) references ride(rid)
);
```

```
SQL> CREATE TABLE feedback(d_id VARCHAR(10),cid INT,rid VARCHAR(10),ride_rating NUMBER(1),CONSTRAINT driver_id3 FOREIGN KE
Y(d_id) REFERENCES driver(d_id),CONSTRAINT cust_id3 FOREIGN KEY(cid) REFERENCES customer(cid),CONSTRAINT ride_id2 FOREIGN
KEY(rid) REFERENCES ride(rid));

Table created.
```

```
insert into feedback values (
'D101',101,'R101',4
);
```

```
SQL> INSERT INTO feedback VALUES('D101',101,'R101',4);

1 row created.
```

```
D_ID                    CID RID          RIDE_RATING
----------     ----------- ----------    -----------
D101                    101 R101                    4
D102                    105 R102                    4
D105                    103 R103                    4
D104                    102 R104                    3
D101                    105 R105                    4
D103                    104 R106                    5
```

2.4.   Case Study Interactive Queries:

- **Query 1:** Find the female customers who had a ride on 09/05/2021.
  = select cid, name from customer natural join ride where gender='Female' and ride_date=to_date('09-05-2021', 'dd-mm-yyyy');

```
SQL> SELECT cid, name FROM customer NATURAL JOIN ride WHERE gender='Female' AND ride_date=to_date('09-05-2021','dd-mm-yy
yy');

       CID NAME
---------- -----------------------
       103 Kajal Malhotra
```

- **Query 2:** Find the taxi registration number and name of the driver whose overall rating is 5.
  = select regis_number, name from taxi inner join driver on taxi.d_id = driver.d_id where overall_rating=5;

```
SQL> SELECT regis_number, name FROM taxi INNER JOIN driver ON taxi.d_id=driver.d_id WHERE overall_rating=5;

REGIS_NUMBER NAME
----------- -----------------------
MH12TS2154   Yogesh Sharma
```

- **Query 3:** Find the count of all the vehicle types.
  = select vehicle_type, count(regis_number) from taxi group by vehicle_type;

```
SQL> SELECT vehicle_type, count(regis_number) FROM taxi GROUP BY vehicle_type;

VEHICLE_TY COUNT(REGIS_NUMBER)
---------- -------------------
Sedan                        2
Crossover                    1
Hatchback                    2
SUV                          2
```

- **Query 4:** Find all the pickup points with their respective number of customers.
  = select pickup_loc, count(cid) from customer natural join ride group by pickup_loc;

```
SQL> SELECT pickup_loc,count(cid) FROM customer NATURAL JOIN ride GROUP BY pickup_loc;

PICKUP_LOC                                         COUNT(CID)
-------------------------------------------------- ----------
Panchkula                                                   2
Patiala                                                     1
Gurgaon                                                     1
Nabha                                                       1
Pune                                                        1
```

- **Query 5:** Find the count of SUV's.
  = select count(regis_number) as "No. of SUV's" from taxi group by vehicle_type having vehicle_type='SUV';

```
SQL> SELECT COUNT(regis_number) AS "No. of SUV's" FROM taxi GROUP BY vehicle_type HAVING vehicle_type='SUV';

No. of SUV's
-----------
          2
```

- **Query 6:** Find the phone, email of the customer who had rated their ride with 3 or more stars.

= select phone, email from customer where cid= (select cid from feedback where ride_rating<=3);

```
SQL> select phone,email from customer where cid=(select cid from feedback where ride_rating<=3);

    PHONE EMAIL
---------- -------------------------------------
6128219987 jobin02@gmail.com
```

- **Query 7:** Find email ids of customers who paid ride amount >=1300.

= select email from customer inner join payment on customer.cid=payment.cid where amount>=1300;

```
SQL> SELECT email FROM customer INNER JOIN payment ON customer.cid=payment.cid WHERE amount>=1300;

EMAIL
-------------------------------------
jobin02@gmail.com
kajal03@yahoo.com
upasana05@yahoo.com
```

- **Query 8:** Find details of the driver and his car who drives the car with registration number = "MH12TS2154".

= select * from driver inner join taxi on driver.d_id=taxi.d_id where regis_ number = 'MH12TS2154';

```
SQL> SELECT * FROM driver INNER JOIN taxi ON driver.d_id=taxi.d_id where regis_number='MH12TS2154';

D_ID   LICENSE     NAME          PHONE MAIL                          OVERALL_RATING REGIS_NUMBER MODEL      VEHICLE_TY D_ID
------ ----------- ------------- ----------------------------------- -------------- ------------ ---------- ---------- ------
D102   MH4478223   Yogesh Sharma 9799900889 yogesh02@yahoo.com                    5 MH12TS2154   Harrier    SUV        D102
```

- **Query 9:** Find name, gender of customer who requested ride after 18:00hrs.

= select name, gender from customer inner join ride on customer.cid=ride.cid where time>'1800';

```
SQL> SELECT name,gender FROM customer INNER JOIN ride ON customer.cid=ride.cid WHERE time>'1800';

NAME                    GENDER
----------------------- ------
Upasana Pandit          Female
Kajal Malhotra          Female
Upasana Pandit          Female
```

Conclusion

While working on this project, we learned a lot about creating a database and implementing all the queries related to the creation of the database, modifying it, and fetching the data from it. We have a good hold on the concepts related to ER diagram now.

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- 'An Introduction to Database Systems', C.J. Date, O'Reilly Media, Eighth Edition.
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