

Faculty of Computers and Artificial intelligence-Cairo University (credit hours system)



Final Assessment Project

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Transportation system

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Chapter 1: Introduction

The term "transportation system" is used to refer to the equipment and logistics of transporting passengers and goods. It covers movement by all forms of transport, from cars, bikes, scooters and buses to boats, aircraft and even space travel.

The purpose of a transportation system is to coordinate the movement of people, goods, and vehicles to <u>utilize routes most efficiently</u>. When implemented, transportation systems seek to <u>reduce transport costs</u> and improve delivery times through effective timetabling and route management. Periodic re-evaluations and the development of alternative routes allow for timely changes to the transportation system to <u>maintain efficiency</u>.

3.1 <u>Description of the project idea:</u>

The idea behind our project is to let users book a vehicle to complete a ride they want to make and to let the drivers make a way of living out of it too. Users can sign up into our system and create an account by entering their personal data which they can update later. The driver should enter his full details into the system. As well as the vehicle, vehicle's type and its data must be known to the system. There are several functionalities that this system can do such as ride rating which is given to the driver by the users, ride history and different methods for payment as cash/visa/master card. Users can enter promo codes to get discounts on their rides.

3.2 <u>Technology and tools used:</u>

- ERD PLUS online software.
- SQL Server 2014 Management Studio.
- Microsoft Office Word.

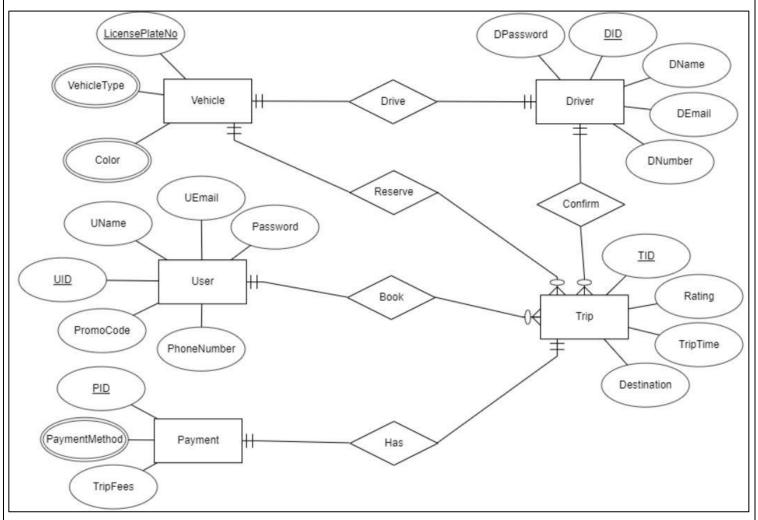
Chapter 2: Analysis

2.1 Schema:

Entity types	Strong or week	Attributes
User	Strong	<u>UID</u> , UName, UEmail,
		PhoneNumber, PromoCode,
		Password
Driver	Strong	DID, DName, DEmail, DNumber,
		DPassword
Trip	Strong	TID, Rating, TripTime, Destination
Vehicle	Strong	<u>LicensePlateNo</u> , VehicleType, Color
Payment	Strong	PID, PaymentMethod, TripFees

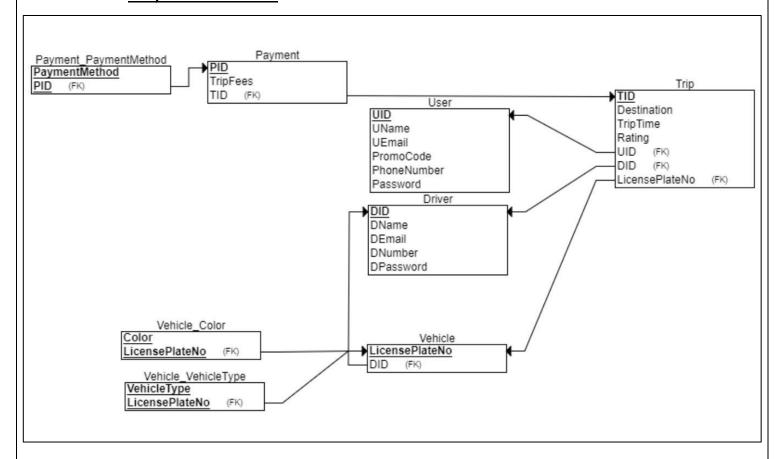
Relationship type	Between	Cardinality	Participants
Book	User-Trip	M:1	Optional-Mandatory
Has	Trip-Payment	1:1	Mandatory-Mandatory
Drive	Driver-Vehicle	1:1	Mandatory-Mandatory
Confirm	Driver-Trip	M:1	Optional-Mandatory
Reserve	Vehicle-Trip	M:1	Optional-Mandatory

2.2 Conceptual Model (ERD):



- In the above ERD, the <u>Driver</u> has **DPassword** which is the driver's password to his account, **DID** is the driver's ID, **DName** is the driver's name, **DEmail** is the driver's email and **DNumber** is the driver's number.
- The <u>Vehicle</u> has **LicensePlateNo** which is the number of the driver's license plate, **VehicleType** is the driver's vehicle type and it is a <u>multi-value attribute</u> which may be bus/car/scooter and **Color** which is the driver's vehicle color and it is a <u>multi-value attribute</u> which may be black/white/brown/red/green/blue/yellow/green.
- The <u>User</u> has **Password** which is the user's password to his account, **UID** is the user's ID, **UName** is the user's name, **DEmail** is the user's email, **DNumber** is the user's number and **PromoCode** that may be given to user.
- The <u>Payment</u> has <u>PID</u> which is the payment's ID, <u>PaymentMethod</u> is the way
 the user pay for a trip and it is a <u>multi-value attribute</u> which may be
 Cash/Visa/Mastercard and <u>TripFees</u> is the cost of a trip.
- The <u>Trip</u> has **TID** which is the trip's ID, **Rating** is given to the driver by the users ridden with him, **TripTime** is the trip's duration and **Destination** is the place the user wants to go.
- The <u>confirm</u> relationship is between the <u>driver</u> and the <u>trip</u>. For <u>one</u> trip, <u>one</u> mandatory driver can confirm it. For <u>one</u> driver, <u>many optional</u> trips can be confirmed.
- The <u>reserve</u> relationship is between the **vehicle** and the **trip**. For **one** trip, **one** mandatory vehicle can confirm it. For **one** vehicle, **many optional** trips can be
 reserved.
- The <u>book</u> relationship is between the **user** and the **trip**. For **one** trip, **one mandatory** user can book it. For **one** user, **many optional** trips can be booked.
- The <u>has</u> relationship is between **trip** and **payment**. For **one mandatory** trip, **one mandatory** payment has it and vice versa.
- The <u>drive</u> relationship is between **driver** and **vehicle**. For **one mandatory** driver, **one mandatory** vehicle can drive it and vice versa.

2.3 Physical model:



- In the above physical model, the <u>Driver</u> has **DPassword** which is the driver's password to his account, **DID** (primary key) is the driver's ID, **DName** is the driver's name, **DEmail** is the driver's email and **DNumber** is the driver's number.
- The <u>Vehicle</u> has **LicensePlateNo** (primary key) which is the number of the driver's license plate and **DID** (foreign key) is the driver's ID.
- The <u>Vehicle Color</u> has **Color** (*primary key*) which is the driver's vehicle color and **LicensePlateNo** (*foreign key*) which is the number of the driver's license plate.
- The <u>Vehicle VehicleType</u> has **VehicleType** (*primary key*) which is the driver's vehicle type and **LicensePlateNo** (*foreign key*) is the number of the driver's license plate.
- The <u>User</u> has **Password** which is the user's password to his account, **UID** is the user's ID, **UName** is the user's name, **DEmail** is the user's email, **DNumber** is the user's number and **PromoCode** which is the promocode that may be given to user.
- The <u>Payment</u> has **PID** (primary key) which is the payment's ID, **TripFees** is the cost of the trip and **TID** is the trip's ID(foreign key).
- The <u>Payment PaymentMethod</u> has **PaymentMethod** (primary key) is the way the user pay for a trip and **PID** is the payment's ID(foreign key)
- The <u>Trip</u> has **TID** (primary key) which is the trip's ID, **Rating** is given to the driver by the users ridden with him, **TripTime** is the trip's duration,
 Destination is the place the user wants to go and **UID** (foreign key) is the user's ID, **DID** (foreign key) is the driver's ID, **LicensePlateNo** (foreign key) is the number of the driver's license plate.

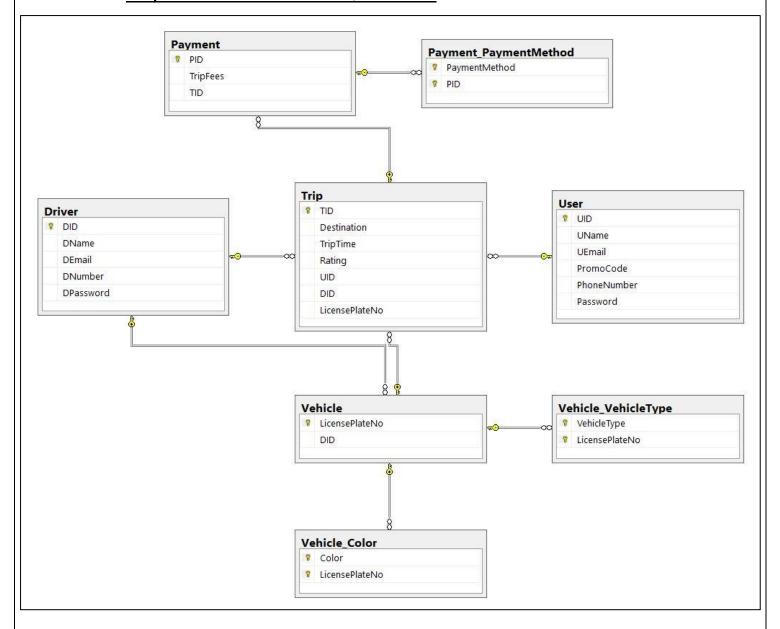
2.4 DDL:

```
CREATE DATABASE TransportationSystem
CREATE TABLE [User]
  UID INT NOT NULL,
 UName VARCHAR(20) NOT NULL,
 UEmail VARCHAR(20) NOT NULL,
  PromoCode VARCHAR(5),
  PhoneNumber NUMERIC(11) NOT NULL,
 Password VARCHAR(50) NOT NULL,
 PRIMARY KEY (UID)
);
CREATE TABLE Driver
 DID INT NOT NULL,
 DName VARCHAR(20) NOT NULL,
 DEmail VARCHAR(20) NOT NULL,
  DNumber NUMERIC(11) NOT NULL,
  DPassword VARCHAR(50) NOT NULL,
 PRIMARY KEY (DID)
CREATE TABLE Vehicle
  LicensePlateNo VARCHAR(6) NOT NULL,
 DID INT NOT NULL,
 PRIMARY KEY (LicensePlateNo),
  FOREIGN KEY (DID) REFERENCES Driver(DID)
CREATE TABLE Vehicle VehicleType
 VehicleType VARCHAR(20) NOT NULL,
  LicensePlateNo VARCHAR(6) NOT NULL,
  PRIMARY KEY (VehicleType, LicensePlateNo),
  FOREIGN KEY (LicensePlateNo) REFERENCES Vehicle(LicensePlateNo)
);
CREATE TABLE Vehicle_Color
 Color VARCHAR(10) NOT NULL,
  LicensePlateNo VARCHAR(6) NOT NULL,
  PRIMARY KEY (Color, LicensePlateNo),
  FOREIGN KEY (LicensePlateNo) REFERENCES Vehicle(LicensePlateNo)
);
```

```
CREATE TABLE Trip
  TID INT NOT NULL,
  Destination VARCHAR(50) NOT NULL,
  TripTime DATE NOT NULL,
  Rating FLOAT NOT NULL,
  UID INT NOT NULL,
  DID INT NOT NULL,
  LicensePlateNo VARCHAR(6) NOT NULL,
  PRIMARY KEY (TID),
  FOREIGN KEY (UID) REFERENCES [User](UID),
  FOREIGN KEY (DID) REFERENCES Driver(DID),
  FOREIGN KEY (LicensePlateNo) REFERENCES Vehicle(LicensePlateNo)
);
CREATE TABLE Payment
  PID INT NOT NULL,
  TripFees FLOAT NOT NULL,
  TID INT NOT NULL,
  PRIMARY KEY (PID),
  FOREIGN KEY (TID) REFERENCES Trip(TID)
);
CREATE TABLE Payment_PaymentMethod
  PaymentMethod VARCHAR(20) NOT NULL,
  PID INT NOT NULL,
  PRIMARY KEY (PaymentMethod, PID),
  FOREIGN KEY (PID) REFERENCES Payment(PID)
insert into [User] values (1, 'Ahmed Sayed', 'ahmed@gmail.com', NULL,
01234567891, 'XN856982')
insert into [User] values (2, 'Mohamed Saied', 'mohamed@gmail.com', 'PXY96',
01298765432, 'AUF535895')
insert into [User] values (3, 'Marwa Mohamed', 'marwa@gmail.com', NULL,
01106987515, 'HFS954235')
insert into [User] values (4, 'Samia Sleim', 'samia@gmail.com', 'ABR85',
01086589421, 'NJN954321')
insert into [User] values (5, 'Sarah Khaled', 'sarah@gmail.com', NULL,
01264198752, 'YFS964826')
insert into Driver values (1, 'Karim Mohamed', 'karim@gmail.com',
01264831972, 'ASA965423')
insert into Driver values (2, 'Ali Ahmed', 'ali@gmail.com', 01548259040,'EFC364985')
insert into Driver values (3, 'Osama Mohmoud', 'osama@gmail.com',
01064851221, '00G648523')
insert into Driver values (4, 'Abdallah Morsi', 'abdallah@gmail.com',
01223659804, 'FAA963275')
insert into Driver values (5, 'Zedan Ahmed', 'zedan@gmail.com', 01005660193,'DKT086242')
```

```
insert into Trip values (001, 'Nasr City', '2020-04-10', 4.5, 1, 2, '123AD')
insert into Trip values (002, '6 of October', '2020-05-10', 4.6, 2, 1, '364FV')
insert into Trip values (003, '6 of October', '2020-04-20', 4.1, 3, 5, '942CG') insert into Trip values (004, '6 of October', '2020-03-15', 3.2, 4, 3, '376MH')
insert into Trip values (005, 'Maadi', '2020-01-20', 4.8, 5, 4, '582GW')
insert into Trip values (006, 'Nasr City', '2020-02-10', 4.9, 3, 2, '123AD')
insert into Trip values (007, 'AL-Mukattam', '2020-04-30', 4.5, 1, 2, '123AD')
insert into Trip values (008, '6 of October', '2020-04-20', 4.0, 5, 4, '123AD')
insert into Vehicle values ('942CG', 5)
insert into Vehicle values ('376MH', 3)
insert into Vehicle values ('364FV', 2)
insert into Vehicle values ('123AD', 4)
insert into Vehicle values ('582GW', 1)
insert into Vehicle VehicleType values ('Car', '582GW')
insert into Vehicle_VehicleType values ('Scooter', '942CG')
insert into Vehicle_VehicleType values ('Bus','123AD')
insert into Vehicle_VehicleType values ('Car','364FV')
insert into Vehicle_VehicleType values ('Car','376MH')
insert into Vehicle_Color values ('Black','582GW')
insert into Vehicle_Color values ('Green','942CG')
insert into Vehicle_Color values ('Yellow','123AD')
insert into Vehicle Color values ('White','364FV')
insert into Vehicle_Color values ('Red','376MH')
insert into Payment values (010, 35.5, 002)
insert into Payment values (020, 50, 001)
insert into Payment values (030, 10, 005)
insert into Payment values (040, 25, 004)
insert into Payment values (050, 35.5, 003)
insert into Payment_PaymentMethod values ('Visa', 020)
insert into Payment PaymentMethod values ('Master Card', 050)
insert into Payment_PaymentMethod values ('Cash', 030)
insert into Payment_PaymentMethod values ('Cash', 010)
insert into Payment_PaymentMethod values ('Visa', 040)
```

2.5 Physical model from SQL server:



Chapter 3: SQL Queries + screenshots of the results

(a.1) What was the area that had the most ride requests last month?



Trip table:

	TID	Destination	TripTime	Rating	UID	DID	LicensePlateNo
1	1	Nasr City	2020-04-10	4.5	1	2	123AD
2	2	6 of October	2020-05-10	4.6	2	1	364FV
3	3	6 of October	2020-04-20	4.1	3	5	942CG
4	4	6 of October	2020-03-15	3.2	4	3	376MH
5	5	Maadi	2020-01-20	4.8	5	4	582GW
6	6	Nasr City	2020-02-10	4.9	3	2	123AD
7	7	AL-Mukattam	2020-04-30	4.5	1	2	123AD
8	8	6 of October	2020-04-20	4	5	4	123AD

(a.2) What was the area that had the <u>least</u> ride requests last month?

```
--(a.2) What was the area that had the least ride requests last month?

select distinct Trip.Destination

from Trip

where MONTH(Trip.TripTime) = '4' and YEAR(Trip.TripTime) = '2020'

group by Trip.Destination

having count(Trip.Destination) in

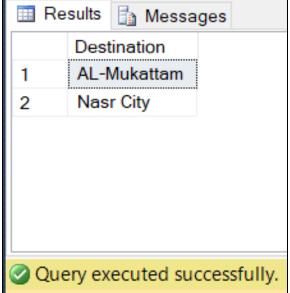
(

    select min(x) as least_total
    from
    (

        select Trip.Destination, count(Trip.Destination) as x
        from Trip
        where MONTH(Trip.TripTime) = '4' and YEAR(Trip.TripTime) = '2020'
        group by Trip.Destination

) as t

| Results | Mess
```



Trip table:

	TID	Destination	TripTime	Rating	UID	DID	LicensePlateNo
1	1	Nasr City	2020-04-10	4.5	1	2	123AD
2	2	6 of October	2020-05-10	4.6	2	1	364FV
3	3	6 of October	2020-04-20	4.1	3	5	942CG
4	4	6 of October	2020-03-15	3.2	4	3	376MH
5	5	Maadi	2020-01-20	4.8	5	4	582GW
6	6	Nasr City	2020-02-10	4.9	3	2	123AD
7	7	AL-Mukattam	2020-04-30	4.5	1	2	123AD
8	8	6 of October	2020-04-20	4	5	4	123AD

(b) Who were the drivers with the maximum number of rides last month?

```
--(b) Who were the drivers with the maximum number of rides last month?
select DID, DName
from Driver
where DID =
      select distinct Trip.DID
    from Trip
      where MONTH(Trip.TripTime) = '4' and YEAR(Trip.TripTime) = '2020'
       group by Trip.DID
      having count(Trip.DID) in
              select max(x) as highest_total
                    select Trip.DID, count(Trip.DID) as x
                    from Trip
                    where MONTH(Trip.TripTime) = '4' and YEAR(Trip.TripTime) = '2020'
                    group by Trip.DID
                                                                      Results
                                                                                Messages
              ) as t
      )
                                                                           DID
                                                                                DName
                                                                                 Ali Ahmed
                                                                     Query executed successfully.
```

Trip table:





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(c) For each driver, retrieve all his/her information and the number of rides he/she had.

```
--(c) For each driver, retrieve all his/her information and the number of rides he/she
select distinct
from Driver inner join
        select distinct Trip.DID, count(Trip.DID) as NumberOfTrips
    from Trip
     group by Trip.DID
                                                📰 Results 🔓 Messages
)as t
                                                                                                   DID NumberOfTrips
                                                     DID
                                                        DName
                                                                       DEmail
                                                                                        DNumber
        on Driver.DID=t.DID
                                                         Karim Mohamed
                                                                       karim@gmail.com
                                                                                        1264831972
                                                2
                                                         Ali Ahmed
                                                                       ali@gmail.com
                                                                                        1548259040
                                                                                                   2
                                                3
                                                     3
                                                         Osama Mohmoud
                                                                       osama@gmail.com
                                                                                        1064851221 3
                                                         Abdallah Morsi
                                                                       abdallah@gmail.com
                                                                                        1223659804 4
                                                                                                       2
                                                5
                                                         Zedan Ahmed
                                                                       zedan@gmail.com
                                                                                        1005660193 5
                                                Query executed successfully.
```

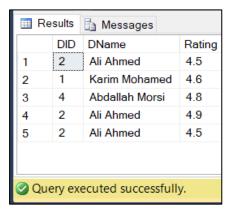
Trip table:





(d) Which driver got at least 4.5 out of 5 on every user rating he/she got?

```
--(d) Which driver got at least 4.5 out of 5 on every user rating he/she got?
select Driver.DID,DName,Rating
from Driver,Trip
where Driver.DID=Trip.DID and Rating>=4.5
```



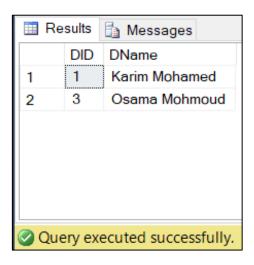
Trip table:

	TID	Destination	TripTime	Rating	UID	DID	LicensePlateNo
1	1	Nasr City	2020-04-10	4.5	1	2	123AD
2	2	6 of October	2020-05-10	4.6	2	1	364FV
3	3	6 of October	2020-04-20	4.1	3	5	942CG
4	4	6 of October	2020-03-15	3.2	4	3	376MH
5	5	Maadi	2020-01-20	4.8	5	4	582GW
6	6	Nasr City	2020-02-10	4.9	3	2	123AD
7	7	AL-Mukattam	2020-04-30	4.5	1	2	123AD
8	8	6 of October	2020-04-20	4	5	4	123AD



(e) Who were the drivers that didn't have any ride last month?

```
--(e) Who were the drivers that didn't have any ride last month?
select DID,DName
from Driver
where DID not in
(
    select Trip.DID
    from Trip
        where MONTH(Trip.TripTime) = '4' and YEAR(Trip.TripTime) = '2020'
    group by Trip.DID
)
```



Trip table:





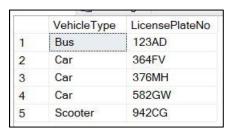
(f) What is the most type of vehicle (car, bus, and scooter) requested last month?

```
--(f) What is the most type of vehicle (car, bus, and scooter)
requested last month?
                                                                         🖽 Results 📑 Messages
select VehicleType
                                                                              VehicleType
from Vehicle VehicleType
                                                                              Bus
where Vehicle_VehicleType.LicensePlateNo =
       select distinct Trip.LicensePlateNo
    from Trip
       where MONTH(Trip.TripTime) = '4' and YEAR(Trip.TripTime) =
'2020'
    group by Trip.LicensePlateNo
       having count(Trip.LicensePlateNo) in
                                                                          Query executed successfully
              select max(x) as highest_total
              from
                     select Trip.LicensePlateNo, count(Trip.LicensePlateNo) as x
                     from Trip
                     where MONTH(Trip.TripTime) = '4' and YEAR(Trip.TripTime) = '2020'
                     group by Trip.LicensePlateNo
              ) as t
       )
)
```

Trip table:



<u>Vehicle-VehicleType table:</u>



3.1 All tables:

Driver table:

∭ F	Results	Messages			
	DID	DName	DEmail	DNumber	DPassword
1	1	Karim Mohamed	karim@gmail.com	1264831972	ASA965423
2	2	Ali Ahmed	ali@gmail.com	1548259040	EFC364985
3	3	Osama Mohmoud	osama@gmail.com	1064851221	OOG648523
4	4	Abdallah Morsi	abdallah@gmail.com	1223659804	FAA963275
5	5	Zedan Ahmed	zedan@gmail.com	1005660193	DKT086242

Payment:

	PID	TripFees	TID
1	10	35.5	2
2	20	50	1
3	30	10	5
4	40	25	4
5	50	35.5	3

Payment-PaymentMehod:

	PaymentMethod	PID
1	Cash	10
2	Cash	30
3	Master Card	50
4	Visa	20
5	Visa	40

Trip table:

	TID	Destination	TripTime	Rating	UID	DID	LicensePlateNo
1	1	Nasr City	2020-04-10	4.5	1	2	123AD
2	2	6 of October	2020-05-10	4.6	2	1	364FV
3	3	6 of October	2020-04-20	4.1	3	5	942CG
4	4	6 of October	2020-03-15	3.2	4	3	376MH
5	5	Maadi	2020-01-20	4.8	5	4	582GW
6	6	Nasr City	2020-02-10	4.9	3	2	123AD
7	7	AL-Mukattam	2020-04-30	4.5	1	2	123AD
8	8	6 of October	2020-04-20	4	5	4	123AD

<u>User table:</u>

	UID	UName	UEmail	PromoCode	PhoneNumber	Password
1	1	Ahmed Sayed	ahmed@gmail.com	NULL	1234567891	XN856982
2	2	Mohamed Saied	mohamed@gmail.com	PXY96	1298765432	AUF535895
3	3	Marwa Mohamed	marwa@gmail.com	NULL	1106987515	HFS954235
4	4	Samia Sleim	samia@gmail.com	ABR85	1086589421	NJN954321
5	5	Sarah Khaled	sarah@gmail.com	NULL	1264198752	YFS964826

<u>Vehicle:</u>

	LicensePlateNo	DID
1	123AD	4
2	364FV	2
3	376MH	3
4	582GW	1
5	942CG	5

Vehicle-color:

	Color	LicensePlateNo
1	Black	582GW
2	Green	942CG
3	Red	376MH
4	White	364FV
5	Yellow	123AD

Vehicle-VehicleType:

	VehicleType	LicensePlateNo
1	Bus	123AD
2	Car	364FV
3	Car	376MH
4	Car	582GW
5	Scooter	942CG