Database & Management System

ProjectReport

CAR RENTAL SYSTEM (ORACLE & MONGODB)

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INTRODUCTION

We have chosen to develop a Car Rental System. In this system, Customer can rent a car based on make and make a model. The Customer can come and book a car from the office or can book a car by contacting a the user.

History

In past, people used to write car rental information on the pages, and used to store them in the cupboards for the record, it was difficult to store the same record for the same person and car in one area. If that is made possible with great effort, it was difficult to find the records again if we wanted to use them again to look for information. If any car is booked, or not available, people had to look into the documents for the information to look for them, it was quite time consuming.

Database Management System

We have developed a car rental system application written in java which will hold all the bookings, cars, customers information. Billing information and time information. We will connect the database with the application to store the data in it. For the security measure that if something happens to the application, or it corrupts or crashes, the data in the application will be saved in the databases.

We have connected two databases with the application.

- Oracle
- MongoDB

REQUIREMENTS

- Car rental system should have collection of cars.
- Each car should belong to a particular Car Category.
- Customer based on the requirements and needs, rents a car.
- Based on his needs, the list of the cars will be shown to the customer along with the availability.
- Customer will select a car from the suggestions and can reseve it for rent.
- Billing will be generated when the car is generated.
- Customer can return the car before the due date, on the due date or he can return it late also.
- If a customer returns a car after the due date, additional late fee is calculated and will be added to the bill.
- Once the car has returned it becomes avilable for the booking
- Car price will be calculated based on the selected make and model.

ENTITIES

- **Customer**

  Customer will be the one who is using car rental system for reserving a car. He can be a member of the system or a non-member of the system.. Customer entity will store details like customer driving license number, email, address, name, and phone number.

- **Car**

  Car entity will have list of cars available in the system. Each car will be associated with a
  car category and car will have attributes like make, model, mileage and registration number. Car will also have separate flag to check the availability of the car.

- **Car Category**

  Every car has a car category. Price is calculated based on the car category. Car category will have attributes like no of person, no of luggage's, name, and cost per day and late fee per hour.

- **Location**

  Location entity here denotes the pickup and drop off location of the car. Customer can pick up the car from the particular location and can have same or different drop off location. Location will have attributes like Location id, name and address.

- **Booking**

  Each car reservation will be monitored in the entity called booking. Booking will have attributes like booking id, from date and time of booking and due return date and time and actual return date and time of the booking, and booking status. This booking amount might also include rental insurance and discount code.

- **Billing**

  When a customer returns a car, a bill will be generated on the particular booking. Billing have attributes like Bill ID, bill date, bill status, total late fee, tax amount, and total amount.

Relations

- **Car to Car Category**

  Every car is associated with a car category. Once customer selects a car, the cost per day is obtained from the car category that the selected car belongs to. The relation name is ‘Belongs to’.

- **Car to Location**

  Customer will be picking up or dropping the car in a particular location. Customer can pick up or drop-off the car at the particular location. So, cars will be present at a location. The relation name is ‘Current location’.

- **Booking to Billing**

  Once customer returns a car bill will be generated for each booking. There can be case like booking is cancelled in that case no bill will be associated with the booking. The relation name is ‘Gives’.

- **Booking to Location**

  Customer can pick a car for rent from a particular location. The relation name is ‘Pick up location’.

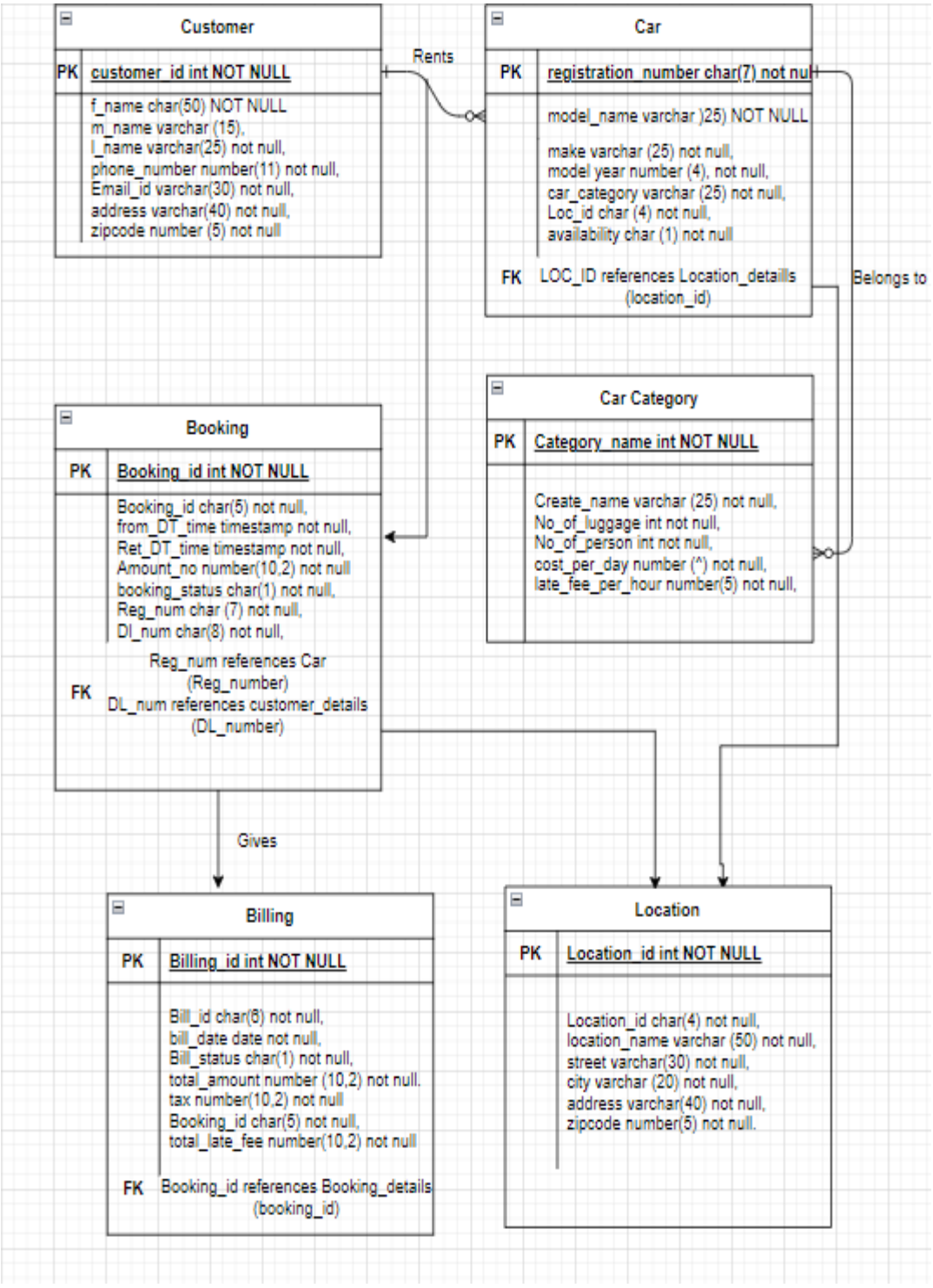
- **Booking to Location**

  Customer can drop off rental car in a particular location. The relation name is ‘Drop off location’.

- **Customer to Car to Booking**

  Customer will select car for rent. So the customer will be related to the both car and the booking. The relation between these 3 entities is a ternary relation and the relation name is ‘Rents’.

ERD DIAGRAM


Customer
PK
customer_id int NOT NULL
f_name char(50) NOT NULL
m_name varchar (15),
l_name varchar(25) not null,
phone_number number(11) not null,
Email_id varchar(30) not null,
address varchar(40) not null,
zipcode number (5) not null
Rents
Car
PK
registration_number char(7) not nul
model_name varchar)25) NOT NULL
make varchar (25) not null,
model year number (4), not null,
car_category varchar (25) not null,
Loc_id char (4) not null,
availability char (1) not null
FK
LOC_ID references Location_details (location_id)
Belongs to
Car Category
PK
Category_name int NOT NULL
Create_name varchar (25) not null,
No_of_luggage int not null,
No_of_person int not null,
cost_per_day number (^) not null,
late_fee_per_hour number(5) not null,
Booking
PK
Booking_id int NOT NULL
Booking_id char(5) not null,
from_DT_time timestamp not null,
Ret_DT_time timestamp not null,
Amount_no number(10,2) not null
booking_status char(1) not null,
Reg_num char (7) not null,
Dl_num char(8) not null,
FK
Reg_num references Car (Reg_number)
DL_num references customer_details (DL_number)
Gives
Billing
PK
Billing_id int NOT NULL
Bill_id char(8) not null,
bill_date date not null,
Bill_status char(1) not null,
total_amount number (10,2) not null.
tax number(10,2) not null
Booking_id char(5) not null,
total_late_fee number(10,2) not null
FK
Booking_id references Booking_details (booking_id)
Location
PK
Location_id int NOT NULL
Location_id char(4) not null,
location_name varchar (50) not null,
street varchar(30) not null,
city varchar (20) not null,
address varchar(40) not null,
zipcode number(5) not null.

Creation of Oracle and MongoDB databases

Working

- For the creation of the Car rental system database as an backend, I used Sql developer.
- First of all I opened the sql developer and gave the command connect /as sysdba to connect to the system and then I created the user of Car Rental System and gave all the privileges to the user, and then connected to it.

```
SQL*Plus: Release 11.2.0.2.0 Production on Mon Jan 9 13:28:44 2023

Copyright (c) 1982, 2014, Oracle.  All rights reserved.

SQL> connect /as sysdba;
Connected.
SQL> create user CarRentalSystem identified by 1234;

User created.

SQL> grant dba to CarRentalSystem;

Grant succeeded.

SQL> connect CarRentalSystem;
Enter password:
Connected.
```

For MongoDB:
I used use Car rental system for creation of Car rental System and created tables in it.

```
mongosh mongodb://127.0.0.1:27017/?directConnection=true&serverSelectionTimeoutMS=2000
Microsoft Windows [Version 10.0.19045.2364]
(c) Microsoft Corporation. All rights reserved.

C:\Users\dell>mongo
'mongo' is not recognized as an internal or external command,
operable program or batch file.

C:\Users\dell>mongosh
Current Mongosh Log ID: 63bfd8681db0f601faaf3d7a
Connecting to:          mongodb://127.0.0.1:27017/?directConnection=true&serverSelectionTimeoutMS=2000&appName=mongosh+1.6.1
Using MongoDB:          6.0.3
Using Mongosh:          1.6.1

For mongosh info see: https://docs.mongodb.com/mongodb-shell/

------
   The server generated these startup warnings when booting
   2023-01-12T13:04:02.066+05:00: Access control is not enabled for the database. Read and write access to data and configuration is unrestricted
------

------
   Enable MongoDB's free cloud-based monitoring service, which will then receive and display
   metrics about your deployment (disk utilization, CPU, operation statistics, etc).

   The monitoring data will be available on a MongoDB website with a unique URL accessible to you
   and anyone you share the URL with. MongoDB may use this information to make product
   improvements and to suggest MongoDB products and deployment options to you.

   To enable free monitoring, run the following command: db.enableFreeMonitoring()
   To permanently disable this reminder, run the following command: db.disableFreeMonitoring()
------

test> use RentalCarSystem
switched to db RentalCarSystem
RentalCarSystem>

RentalCarSystem> db.createCollection('CustomerDetails');
{ ok: 1 }
RentalCarSystem> db.createCollection('CarCategory');
{ ok: 1 }
```

Creation of Tables in MongoDB

```
RentalCarSystem>
BillingDetails
RentalCarSystem>
Car
RentalCarSystem>
CustomerDetails
RentalCarSystem>

RentalCarSystem>

RentalCarSystem> db.runCommand({whatsmyuri : 1})
{ you: '127.0.0.1:52141', ok: 1 }
```

- Then I started creating tables in the Car rental systems. The first table I created was Customer Details and inserted into the table as well along with the Primaryand Foreign key.
  Create Table: CREATE TABLE CUSTOMER_DETAILS (DL_NUMBER CHAR(8) NOT NULL, FNAME VARCHAR(25) NOT NULL, MNAME VARCHAR(15), LNAME VARCHAR(25) NOT NULL, PHONE_NUMBER NUMBER(11) NOT NULL, EMAIL_ID VARCHAR(30) NOT NULL, STREET VARCHAR(30) NOT NULL, CITY VARCHAR(20) NOT NULL,STATE_NAME VARCHAR(20) NOT NULL, ZIPCODE NUMBER(5) NOT NULL,CONSTRAINT CUSTOMERPKPRIMARY KEY (DL_NUMBER));
  Insertion: INSERT INTO CUSTOMER_DETAILS VALUES('F1234554', 'Awais',NULL,'Tanveer','03352563574', 'AwaisTanveer@gmail.com','Street # 2 valley Road','Rawalpindi','Punjab',46000);

```
SQL> CREATE TABLE CUSTOMER_DETAILS
  2  ( DL_NUMBER CHAR(8) NOT NULL,
  3   FNAME VARCHAR(25) NOT NULL,
  4   MNAME VARCHAR(15),
  5   LNAME VARCHAR(25) NOT NULL,
  6   PHONE_NUMBER NUMBER(11) NOT NULL,
  7   EMAIL_ID VARCHAR(30) NOT NULL,
  8   STREET VARCHAR(30) NOT NULL,
  9   CITY VARCHAR(20) NOT NULL,
 10   STATE_NAME VARCHAR(20) NOT NULL,
 11   ZIPCODE NUMBER(5) NOT NULL,
 12   CONSTRAINT CUSTOMERPK
 13   PRIMARY KEY (DL_NUMBER)
 14  );

Table created.

SQL> INSERT INTO CUSTOMER_DETAILS VALUES('F1234554', 'Awais',NULL,'Tanveer','03352563574', 'AwaisTanveer@gmail.com','Street # 2 valley Road','Rawalpindi','Punjab',46000
);

1 row created.

SQL> INSERT INTO CUSTOMER_DETAILS VALUES('F9764521', 'Zeeshan',NULL,'Khan','03345027756', 'Zeeshankhan253@gmail.com','Street # 23 Peshawar road','Rawalpindi','Punjab',4
6000);

1 row created.
```

For MongoDB:
I already have created the table I just inserted the values In it.

```
mongosh mongodb://127.0.0.1:27017/?directConnection=true&serverSelectionTimeoutMS=2000
RentalCarSystem> db.CustomerDetails.insertMany([{DL_NUMBER:'F1234554', FNAME:'Awais',MNAME:'NULL',LNAME:'Tanveer',PHONE_NUMBER:03352563574 ,EMAIL_ID:'AwaisTanveer@gmail
.com',STREET:'Street # 2 valley Road',CITY:'Rawalpindi',STATE_NAME:'Punjab',ZIPCODE:46000},
... {DL_NUMBER:'F9764521', FNAME:'Zeesahn',MNAME:'NULL',LNAME:'Khan',PHONE_NUMBER:03345027756 ,EMAIL_ID:'ZeeshanKhan253@gmail.com',STREET:'Street # 23 Peshawar Road',CI
CITY:'Rawalpindi',STATE_NAME:'Punjab',ZIPCODE:46000},
... {DL_NUMBER:'F2345611', FNAME:'Omer',MNAME:'Fayyaz',LNAME:'Khan',PHONE_NUMBER:03355026656 ,EMAIL_ID:'omerKhan3@gmail.com',STREET:'Street # 3 Chour Chowk',CITY:'Rawal
pindi',STATE_NAME:'Punjab',ZIPCODE:46000},
... {DL_NUMBER:' R8763578', FNAME:'Muneeb',MNAME:'NULL',LNAME:'Asif',PHONE_NUMBER:03354563565, EMAIL_ID:'Muneebasif@gmail.com',STREET:'Street # 26',CITY:'Islamabad',STA
STATE_NAME:'Federal Terrority',ZIPCODE:44000},
... {DL_NUMBER:' I3478953 ', FNAME:'Muhammad',MNAME:'NULL',LNAME:'Mubashir',PHONE_NUMBER:03356828212, EMAIL_ID:'Mubashiryusuf@gmail.com',STREET:'Street # 10 Eastridge',
CITY:'Rawalpindi',STATE_NAME:'Punjab',ZIPCODE:46000},
... {DL_NUMBER:' E7521097 ', FNAME:'Usama',MNAME:'NULL',LNAME:'Khalid',PHONE_NUMBER:03351111111, EMAIL_ID:'gamingworkstation@gmail.com',STREET:'Lane 4 Pasbaan Society',
CITY:'Rawalpindi',STATE_NAME:'Punjab',ZIPCODE:46000},
... {DL_NUMBER:' T0981237', FNAME:'Danish',MNAME:'NULL',LNAME:'Hasan',PHONE_NUMBER:03333333333, EMAIL_ID:'hasandanish@gmail.com',STREET:'Street #4 Commercial Market',CI
CITY:'Rawalpindi',STATE_NAME:'Punjab',ZIPCODE:46000},
... {DL_NUMBER:' F0091266', FNAME:'Hamza',MNAME:'Abdul',LNAME:'Majeed',PHONE_NUMBER:0335444444, EMAIL_ID:'hamza@gmail.com',STREET:'Street # 23 Sowan Gardens',CITY:'Isla
mabad',STATE_NAME:'Federal Terrority',ZIPCODE:44000},
... {DL_NUMBER:' P1234567', FNAME:'Shehwar',MNAME:'Waheed',LNAME:'Ahmed',PHONE_NUMBER:0335555555, EMAIL_ID:'chachawaheed@gmail.com',STREET:'Street # 40 I-14',CITY:'Isla
mabad',STATE_NAME:'Federal Terrority',ZIPCODE:44000},
... {DL_NUMBER:' V5690245', FNAME:'Ahmed',MNAME:'NULL',LNAME:'Sultan',PHONE_NUMBER:03356666666, EMAIL_ID:'ahmedSultan@gmail.com',STREET:'Street # 55',CITY:'Chakwaal',ST
STATE_NAME:'Punjab',ZIPCODE:21456}]);
{
  acknowledged: true,
  insertedIds: {
    '0': ObjectId("63bfe4dcdaa9637e8acced02"),
    '1': ObjectId("63bfe4dcdaa9637e8acced03"),
    '2': ObjectId("63bfe4dcdaa9637e8acced04"),
    '3': ObjectId("63bfe4dcdaa9637e8acced05"),
    '4': ObjectId("63bfe4dcdaa9637e8acced06"),
    '5': ObjectId("63bfe4dcdaa9637e8acced07"),
    '6': ObjectId("63bfe4dcdaa9637e8acced08"),
    '7': ObjectId("63bfe4dcdaa9637e8acced09"),
    '8': ObjectId("63bfe4dcdaa9637e8acced0a"),
    '9': ObjectId("63bfe4dcdaa9637e8acced0b")
  }
}
RentalCarSystem>
{ ok: 1 }
```

- Then I created Car Category table and insert attributes into the table along with the Primary and Foreign Keys.
  CREATE TABLE CAR_CATEGORY (CATEGORY_NAME VARCHAR(25) NOT NULL, NO_OF_LUGGAGE INTEGER NOT NULL, NO_OF_PERSON INTEGER NOT NULL, COST_PER_DAY NUMBER(6) NOT NULL, LATE_FEE_PER_HOUR NUMBER(5) NOT NULL, CONSTRAINT CARCATEGORYPK PRIMARY KEY (CATEGORY_NAME));

  INSERT INTO CAR_CATEGORY VALUES('ECONOMY',2,4, 5000,1500);

```
SQL> CREATE TABLE CAR_CATEGORY
  2  ( CATEGORY_NAME VARCHAR(25) NOT NULL,
  3   NO_OF_LUGGAGE INTEGER NOT NULL,
  4   NO_OF_PERSON INTEGER NOT NULL,
  5   COST_PER_DAY NUMBER(6) NOT NULL,
  6   LATE_FEE_PER_HOUR NUMBER(5) NOT NULL,
  7   CONSTRAINT CARCATEGORYPK
  8   PRIMARY KEY (CATEGORY_NAME)
  9  );

Table created.

SQL> INSERT INTO CAR_CATEGORY VALUES('ECONOMY',2,4, 5000,1500);

1 row created.

SQL> INSERT INTO CAR_CATEGORY VALUES('COMPACT',3,4,7500, 1500);

1 row created.

SQL> INSERT INTO CAR_CATEGORY VALUES('MID SIZE',3,5,5000,1500);

1 row created.
```

For MongoDB:
I inserted the values in the table Car Category.

```
RentalCarSystem> db.CarCategory.insertMany([{CategoryName:'Economy',NoOfLuggage:2,NoOfPerson:4,CostPerDay: 5000, LateFeePerHour: 1500},
...                         {CategoryName:'Economy',NoOfLuggage:2,NoOfPerson:4,CostPerDay: 5000, LateFeePerHour: 1500},
...                         {CategoryName:'Compact',NoOfLuggage:3,NoOfPerson:4,CostPerDay: 7500, LateFeePerHour: 1500},
...                         {CategoryName:'Mid Size',NoOfLuggage:3,NoOfPerson:5,CostPerDay: 5000, LateFeePerHour: 1500},
...                         {CategoryName:'Standard',NoOfLuggage:3,NoOfPerson:4,CostPerDay: 7500, LateFeePerHour: 1500},
...                         {CategoryName:'Full Size',NoOfLuggage:5,NoOfPerson:5,CostPerDay: 8000, LateFeePerHour: 1500},
...                             {CategoryName:'Luxury Car',NoOfLuggage:6,NoOfPerson:5,CostPerDay: 10000, LateFeePerHour: 1500}])
{
  acknowledged: true,
  insertedIds: {
    '0': ObjectId("63bfde33daa9637e8accecfb"),
    '1': ObjectId("63bfde33daa9637e8accecfc"),
    '2': ObjectId("63bfde33daa9637e8accecfd"),
    '3': ObjectId("63bfde33daa9637e8accecfe"),
    '4': ObjectId("63bfde33daa9637e8accecff"),
    '5': ObjectId("63bfde33daa9637e8acced00"),
    '6': ObjectId("63bfde33daa9637e8acced01")
  }
}
```

- Then I created location details table and inserted values into it along with the Primary and foreign keys.
  CREATE TABLE LOCATION_DETAILS (LOCATION_ID CHAR(4) NOT NULL, LOCATION_NAME VARCHAR(50) NOT NULL, STREET VARCHAR(30) NOT NULL, CITY VARCHAR(20) NOT NULL, STATE_NAME VARCHAR(20) NOT NULL, ZIPCODE NUMBER(5) NOT NULL, CONSTRAINT LOCATIONPK
  PRIMARY KEY (LOCATION_ID));
  INSERT INTO LOCATION_DETAILS VALUES('L101','Islamabad old Airport','Civil Lines','Rawalpindi','Punjab',75235);

```
SQL> CREATE TABLE LOCATION_DETAILS
  2  ( LOCATION_ID CHAR(4) NOT NULL,
  3   LOCATION_NAME VARCHAR(50) NOT NULL,
  4   STREET VARCHAR(30) NOT NULL,
  5   CITY VARCHAR(20) NOT NULL,
  6   STATE_NAME VARCHAR(20) NOT NULL,
  7   ZIPCODE NUMBER(5) NOT NULL,
  8   CONSTRAINT LOCATIONPK
  9   PRIMARY KEY (LOCATION_ID)
 10  );

Table created.

SQL> INSERT INTO LOCATION_DETAILS VALUES('L101','Islamabad old Airport','Civil Lines','Rawalpindi','Punjab',75235);

1 row created.
```

  For MongoDB:
  I inserted the values in the Location Details table.

```
RentalCarSystem>
{ ok: 1 }
RentalCarSystem> db.LocationDetails.insertMany([{LocationID:'L101',LocationName:'Islamabad Old Airport',Street:'Civil Lines',  City:'Rawalpindi', State: 'Punjab', Zipco
zipcode: 75235},
...                         {LocationID:'L102',LocationName:'Islamabad INTL Airport',Street:'Islamabad',  City:'Islamabad', State: 'Federal Terrority', Zipcode:
00045},
...                         {LocationID:'L103',LocationName:'Commercial Market',Street:'Street # 23',  City:'Islamabad', State: 'Punjab', Zipcode: 75261},
...                         {LocationID:'L104',LocationName:'Bahria Town',Street:'Phase 7',  City:'Rawalpindi', State: 'Punjab', Zipcode: 77094},
...                         {LocationID:'L105',LocationName:'Gulraiz Housing Society',Street:'Street # 4',  City:'Rawalpindi', State: 'Punjab', Zipcode: 20166},
```

- Then I created the Table Car and inserted values into it along with the Primary and Foreign Keys.
  CREATE TABLE CAR(REGISTRATION_NUMBER CHAR(7) NOT NULL, MODEL_NAME VARCHAR(25) NOT NULL, MAKE VARCHAR(25) NOT NULL, MODEL_YEAR NUMBER(4) NOT NULL, CAR_CATEGORY_NAME VARCHAR(25) NOT NULL, LOC_ID CHAR(4) NOT NULL, AVAILABILITY_FLAG CHAR(1) NOT NULL,
  CONSTRAINT CARPK PRIMARY KEY (REGISTRATION_NUMBER), CONSTRAINT CARFK1 FOREIGN KEY (CAR_CATEGORY_NAME) REFERENCES CAR_CATEGORY(CATEGORY_NAME),
  CONSTRAINT CARFK2 FOREIGN KEY (LOC_ID) REFERENCES LOCATION_DETAILS(LOCATION_ID)s);
  INSERT INTO CAR VALUES('ABX1234','Mehran','Suzuki',2014,'COMPACT','L101','A');

```
SQL> CREATE TABLE CAR
  2  ( REGISTRATION_NUMBER CHAR(7) NOT NULL,
  3   MODEL_NAME VARCHAR(25) NOT NULL,
  4   MAKE VARCHAR(25) NOT NULL,
  5   MODEL_YEAR NUMBER(4) NOT NULL,
  6   CAR_CATEGORY_NAME VARCHAR(25) NOT NULL,
  7   LOC_ID CHAR(4) NOT NULL,
  8   AVAILABILITY_FLAG CHAR(1) NOT NULL,
  9   CONSTRAINT CARPK
 10   PRIMARY KEY (REGISTRATION_NUMBER),
 11   CONSTRAINT CARFK1
 12   FOREIGN KEY (CAR_CATEGORY_NAME) REFERENCES
 13  CAR_CATEGORY(CATEGORY_NAME),
 14   CONSTRAINT CARFK2
 15   FOREIGN KEY (LOC_ID) REFERENCES LOCATION_DETAILS(LOCATION_ID)
 16  );

Table created.

SQL> INSERT INTO CAR VALUES('ABX1234','Mehran','Suzuki',2014,'COMPACT','L101','A');

1 row created.
```

For MongoDB: I inserted the value in the table.

```
RentalCarSystem> db.Car.insertMany([{RegistrationNumber:'ABX1234',ModelName:'Mehran',Make:'Suzuki',  Model:2014, CarCategoryName: 'Compact', LocationID: 'L101', Availab
AvailabilityFlag: 'A'},
...                 {RegistrationNumber:'HJK1234',ModelName:'City', Make:'Honda',  Model:2015, CarCategoryName: 'Economy', LocationID: 'L102', AvailabilityFlag: 'A'}
,
...                 {RegistrationNumber:'ASD9090',ModelName:'Accord',Make:'Honda',  Model:2016, CarCategoryName: 'MidSize', LocationID: 'L103', AvailabilityFlag: 'N'
},
...                 {RegistrationNumber:'CFT1900',ModelName:'328I',Make:'BMW',  Model:2015, CarCategoryName: 'Luxury Car', LocationID: 'L104', AvailabilityFlag: 'A'}
,
...                 {RegistrationNumber:'EDM8610',ModelName:'GLA',Make:'Mercedes Benz',  Model:2015, CarCategoryName: 'Standard', LocationID: 'L105', AvailabilityFla
AvailabilityFlag: 'A'},
...                 {RegistrationNumber:'JSL7920',ModelName:'Prado',Make:'Toyota',  Model:2013, CarCategoryName: 'Fullsize', LocationID: 'L106', AvailabilityFlag: 'A
'}]);
{
  acknowledged: true,
  insertedIds: {
    '0': ObjectId("63bfe8aadaa9637e8acced13"),
    '1': ObjectId("63bfe8aadaa9637e8acced14"),
```

- Then I created Booking Details and inserted values into it, along with the Primary and Foreign keys.

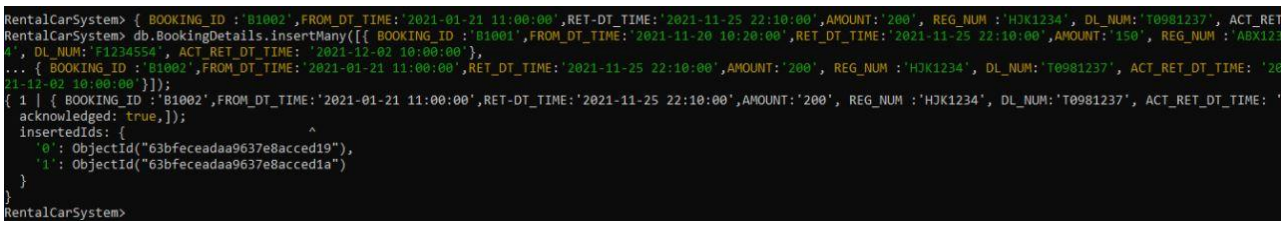
CREATE TABLE BOOKING_DETAILS(BOOKING_ID CHAR(5) NOT NULL, FROM_DT_TIME TIMESTAMP NOT NULL, RET_DT_TIME TIMESTAMP NOT NULL, AMOUNT NUMBER(10,2) NOT NULL, BOOKING_STATUS CHAR(1) NOT NULL, REG_NUM CHAR(7) NOT NULL, DL_NUM CHAR(8) NOT NULL, ACT_RET_DT_TIME TIMESTAMP, CONSTRAINT BOOKINGPK PRIMARY KEY (BOOKING_ID), CONSTRAINT BOOKINGFK1 FOREIGN KEY (REG_NUM) REFERENCES CAR(REGISTRATION_NUMBER), CONSTRAINT BOOKINGFK2 FOREIGN KEY (DL_NUM) REFERENCES CUSTOMER_DETAILS(DL_NUMBER));

INSERT INTO BOOKING_DETAILS VALUES('B1001',TO_TIMESTAMP('2021-11-20 10:20:00','YYYY-MM-DD HH24:MI:SS'),TO_TIMESTAMP('2021-11-25 22:10:00', 'YYYY-MM-DD HH24:MI:SS'),150,'R','ABX1234','F1234554',TO_TIMESTAMP('2021-12-02 10:00:00', 'YYYY-MM-DD HH24:MI:SS'));

```
SQL> CREATE TABLE BOOKING_DETAILS
  2  ( BOOKING_ID CHAR(5) NOT NULL, FROM_DT_TIME TIMESTAMP NOT NULL, RET_DT_TIME TIMESTAMP NOT NULL, AMOUNT NUMBER(10,2) NOT NULL, BOOKING_STATUS CHAR(1) NOT NULL,
  3    REG_NUM CHAR(7) NOT NULL, DL_NUM CHAR(8) NOT NULL, ACT_RET_DT_TIME TIMESTAMP,
  4   CONSTRAINT BOOKINGPK PRIMARY KEY (BOOKING_ID),
  5   CONSTRAINT BOOKINGFK1 FOREIGN KEY (REG_NUM) REFERENCES CAR(REGISTRATION_NUMBER),
  6   CONSTRAINT BOOKINGFK2 FOREIGN KEY (DL_NUM) REFERENCES CUSTOMER_DETAILS(DL_NUMBER)
  7  );

Table created.
```

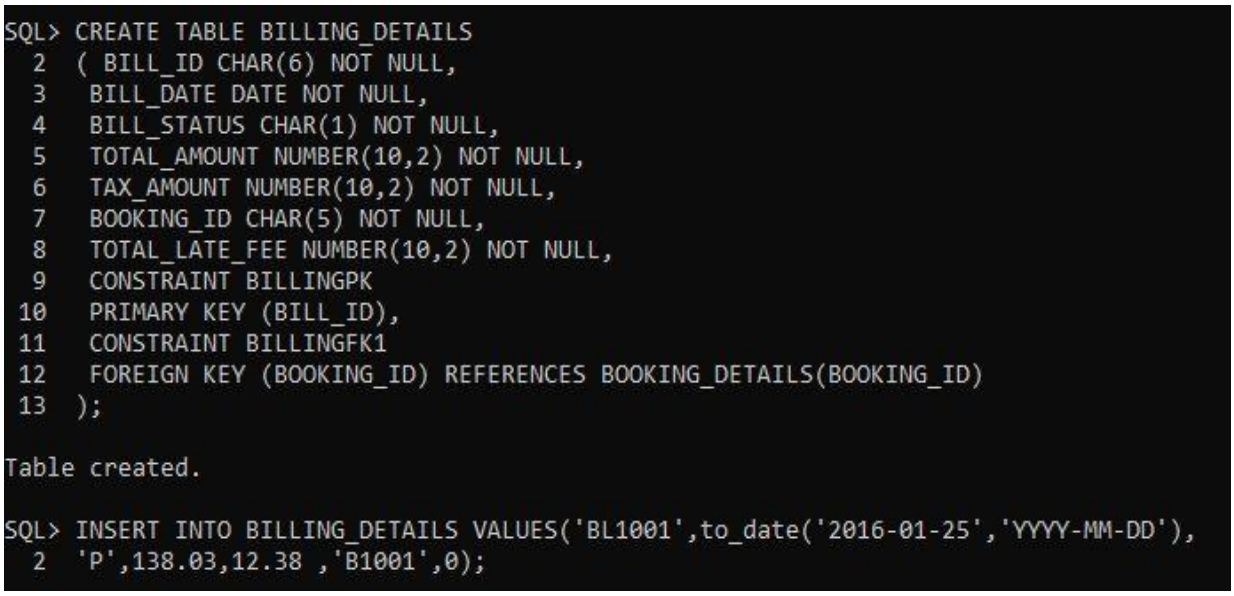
For MongoDB: I inserted values in it.



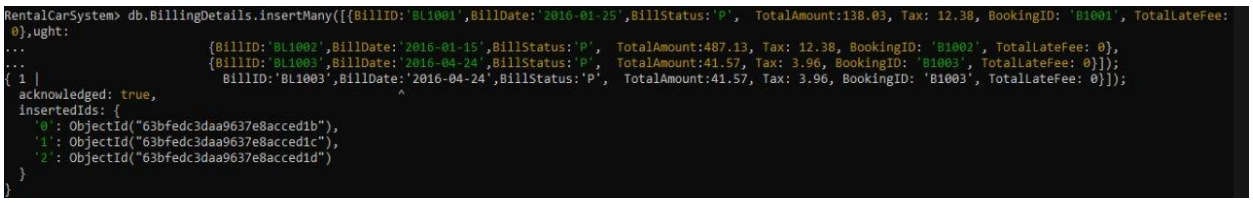
- Then I created Billing Details and inserted values into it, along with the Primary and Foreign keys.

CREATE TABLE BILLING_DETAILS (BILL_ID CHAR(6) NOT NULL, BILL_DATE DATE NOT NULL, BILL_STATUS CHAR(1) NOT NULL, TOTAL_AMOUNT NUMBER(10,2) NOT NULL, TAX_AMOUNT NUMBER(10,2) NOT NULL, BOOKING_ID CHAR(5) NOT NULL, TOTAL_LATE_FEE NUMBER(10,2) NOT NULL, CONSTRAINT BILLINGPK PRIMARY KEY (BILL_ID), CONSTRAINT BILLINGFK1
FOREIGN KEY (BOOKING_ID) REFERENCES BOOKING_DETAILS(BOOKING_ID));

INSERT INTO BILLING_DETAILS VALUES('BL1001',to_date('2016-01-25','YYYY-MM-DD'), 'P',138.03,12.38 ,'B1001',0);



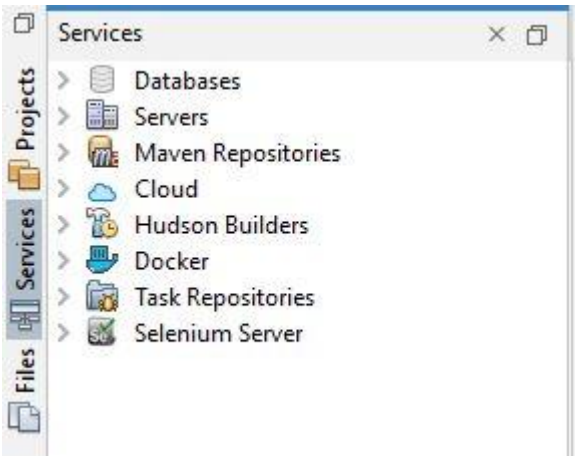
For MongoDB: I inserted values in it.



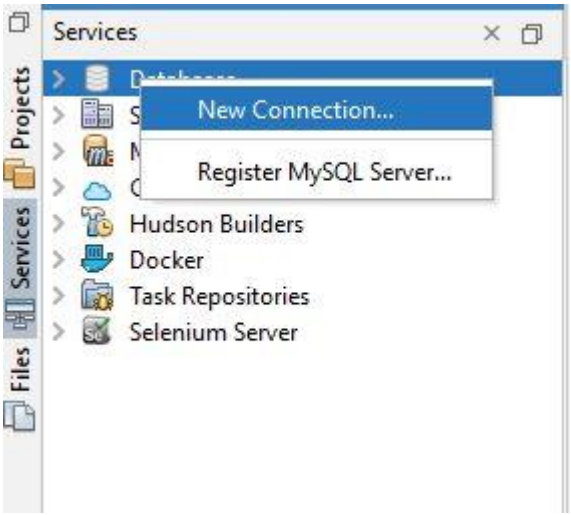
Integration of Databases

ORACLE

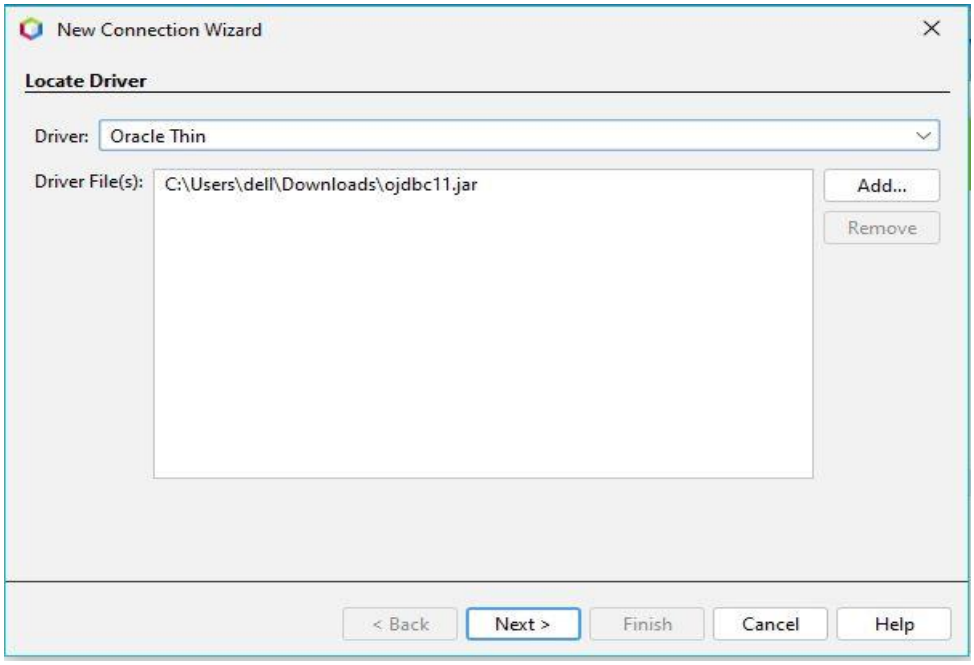
- First of all I opened the services of the project Car Rental System.

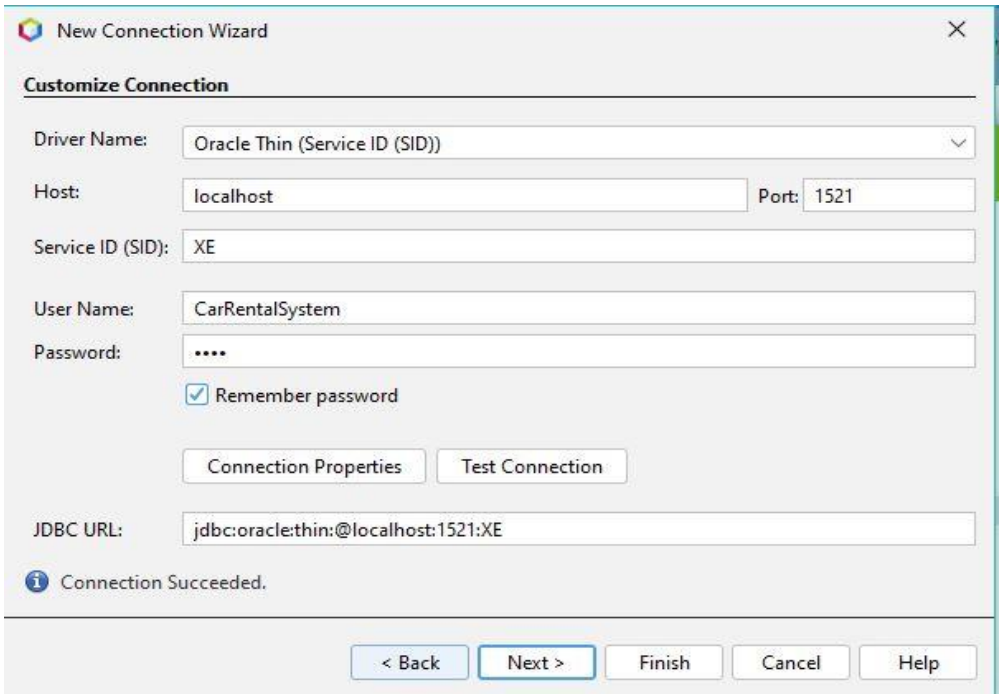


- Then tapping of the databases and created a new connection.

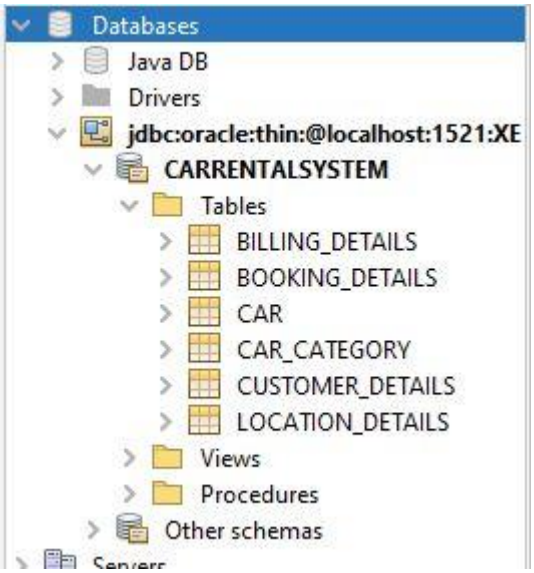


- Then I selected the Oracle thin and inserted the requirements that were asked.





- As we can see the connection has succeded in connecting to the database. It means the integration of the Oracle has been achieved.



- Then I ran the querie
  i.e. Select * from CARRENTALSYSTEM.CUSTOMER_DETAILS;

The output of the Querie.

Max. rows: 100 Fetched Rows: 10 Matching Rows:

#	DL_NUMBER	FNAME	MNAME	LNAME	PHONE_NUMBER	EMAIL_ID	STREET	CITY	STATE_NAME	ZIPCODE
1	F1234554	Awais	<NULL>	Tanveer	3352563574	AwaisTanveer@gmail....	Street # 2 valley Road	Rawalpindi	Punjab	46000
2	F9764521	Zeeshan	<NULL>	Khan	3345027756	Zeeshankhan253@gm...	Street # 23 Peshawar road	Rawalpindi	Punjab	46000
3	F2345611	Omer	Fayyaz	Khan	3355652356	OFK@gmail.com	Street # 2 Chor Chowk	Rawalpindi	Punjab	46000
4	R8763578	Muneeb	<NULL>	Asif	3354563565	Muneebasif@gmail.com	Street # 26	Islamabad	Federal Terrority	44000
5	I3478953	Muhammad	NULL	Mubashir	3005236541	m.mubashir@gmail.co...	street # 10 Eastridge	Rawalpindi	Punjab	46000
6	E7521097	Usama	<NULL>	Khalid	3348965235	OsamaKhalid@gmail.c...	Lane 4 Pasban Lane	Rawalpindi	Punjab	46000
7	T0981237	DANISH	<NULL>	HASSAN	3136598555	danishhasan@gmail.c...	Street # 4 Commercial M...	Rawalpindi	Punjab	46000
8	F0091266	Hamza	Abdul	Majeed	3345027756	HAMZA234@gmail.com	Street # 23 Sowan Gardens	E-11	Islamabad Terrority	44000
9	P1234567	Shahwar	<NULL>	Ahmed	3356565232	Shahwar.ahmed@gma...	Street # 40 1-14	Islamabad	Islamabad Terrority	44000
10	V5690245	Ahmed	<NULL>	Sultan	3324644221	Ahmedsultan@gmail.c...	Street # 55 Chakwal	Chakwal	Punjab	21456

Primary Keys

Table Name	Primary Key
Customer Details	DL_number
Car Category	Category_name
Location Details	Location_ID
Car	Registration_number
Booking Details	Booking_ID
Billing Details	Bill_ID

Foreign Keys

Table Name	Primary Key
Customer Details	Null
Car Category	Null
Location Details	Null
Car	Loc_ID references Location Details
Booking Details	Reg_num references Car DL_num references Customer Details
Billing Details	Booking_id references Booking Details

SQL QUERIES

- ## Customer_Details

```
CREATE TABLE CUSTOMER_DETAILS( DL_NUMBER CHAR(8) NOT NULL,
 FNAME VARCHAR(25) NOT NULL, MNAME VARCHAR(15), LNAME VARCHAR(25) NOT NULL,
 PHONE_NUMBER NUMBER(11) NOT NULL, EMAIL_ID VARCHAR(30) NOT NULL, STREET
VARCHAR(30) NOT NULL, CITY VARCHAR(20) NOT NULL, STATE_NAME VARCHAR(20) NOT
NULL, ZIPCODE NUMBER(5) NOT NULL, CONSTRAINT CUSTOMERPK
 PRIMARY KEY (DL_NUMBER));

==============================Insertion==============================
INSERT INTO CUSTOMER_DETAILS VALUES('F1234554',
'Awais',NULL,'Tanveer','03352563574', 'AwaisTanveer@gmail.com','Street # 2 valley
Road','Rawalpindi','Punjab',46000);
INSERT INTO CUSTOMER_DETAILS VALUES('F9764521',
'Zeeshan',NULL,'Khan','03345027756', 'Zeeshankhan253@gmail.com','Street # 23 Peshawar
road','Rawalpindi','Punjab',46000);
INSERT INTO CUSTOMER_DETAILS VALUES('F2345611',
'Omer','Fayyaz','Khan','03355652356', 'OFK@gmail.com','Street # 2 Chor
Chowk','Rawalpindi','Punjab',46000);
INSERT INTO CUSTOMER_DETAILS VALUES('R8763578', 'Muneeb',NULL,'Asif','03354563565',
'Muneebasif@gmail.com','Street # 26','Islamabad','Federal Terrority',44000);
INSERT INTO CUSTOMER_DETAILS VALUES('I3478953',
'Muhammad','NULL','Mubashir','03005236541', 'm.mubashir@gmail.com','street # 10
Eastridge','Rawalpindi','Punjab',46000);
INSERT INTO CUSTOMER_DETAILS VALUES('E7521097',
'Usama',NULL,'Khalid','03348965235', 'OsamaKhalid@gmail.com','Lane 4 Pasban
Lane','Rawalpindi','Punjab',46000);
INSERT INTO CUSTOMER_DETAILS VALUES('T0981237',
'DANISH',NULL,'HASSAN','03136598555', 'danishhasan@gmail.com','Street # 4 Commercial
Market','Rawalpindi','Punjab',46000);
INSERT INTO CUSTOMER_DETAILS VALUES('F0091266',
'Hamza','Abdul','Majeed','03345027756', 'HAMZA234@gmail.com','Street # 23 Sowan
Gardens','E-11','Islamabad Terrority',44000);
INSERT INTO CUSTOMER_DETAILS VALUES('P1234567',
'Shahwar',NULL,'Ahmed','03356565232', 'Shahwar.ahmed@gmail.com','Street # 40 1-
14','Islamabad','Islamabad Terrority',44000);
INSERT INTO CUSTOMER_DETAILS VALUES('V5690245','Ahmed',Null,'Sultan','03324644221',
'Ahmedsultan@gmail.com','Street # 55 Chakwal','Chakwal','Punjab',21456);
```

- ## Car_Category

```
CREATE TABLE CAR_CATEGORY CATEGORY_NAME VARCHAR(25)NOT NULL,
NO_OF_LUGGAGE INTEGER NOT NULL, NO_OF_PERSON INTEGER NOT NULL,
COST_PER_DAY NUMBER(6) NOT NULL, LATE_FEE_PER_HOUR NUMBER(5) NOT NULL,
CONSTRAINT CARCATEGORYPK PRIMARY KEY (CATEGORY_NAME));

==============================Insertion==============================
INSERT INTO CAR_CATEGORY VALUES('ECONOMY',2,4, 5000,1500);
INSERT INTO CAR_CATEGORY VALUES('COMPACT',3,4,7500, 1500);
INSERT INTO CAR_CATEGORY VALUES('MID SIZE',3,5,5000,1500);
INSERT INTO CAR_CATEGORY VALUES('STANDARD',3,4,7500,1500);
INSERT INTO CAR_CATEGORY VALUES('FULL SIZE',5,5,8000,1500);
INSERT INTO CAR_CATEGORY VALUES('LUXURY CAR',6,5,10000,2000);
```

- ## Car

```
CREATE TABLE CAR
( REGISTRATION_NUMBER CHAR(7) NOT NULL,MODEL_NAME VARCHAR(25) NOT NULL,
 MAKE VARCHAR(25) NOT NULL, MODEL_YEAR NUMBER(4) NOT NULL,
CAR_CATEGORY_NAME VARCHAR(25) NOT NULL, LOC_ID CHAR(4) NOT NULL,
AVAILABILITY_FLAG CHAR(1) NOT NULL,CONSTRAINT CARPK PRIMARY KEY
(REGISTRATION_NUMBER), CONSTRAINT CARFK1 FOREIGN KEY (CAR_CATEGORY_NAME)
REFERENCES CAR_CATEGORY(CATEGORY_NAME), CONSTRAINT CARFK2
FOREIGN KEY (LOC_ID) REFERENCES LOCATION_DETAILS(LOCATION_ID));

==============================Insertion==============================
INSERT INTO CAR VALUES('ABX1234','Mehran','Suzuki',2014,'COMPACT','L101','A');
INSERT INTO CAR VALUES('HJK1234','City','HONDA',2015,'ECONOMY','L102','N');
INSERT INTO CAR VALUES('ASD9090','ACCORD','HONDA',2016,'MID SIZE','L103','A');
INSERT INTO CAR VALUES('CFT1908','328I','BMW',2015,'LUXURY CAR','L104','A');
INSERT INTO CAR VALUES('EDM8610','GLA','MERCEDEZ BENZ',2015,'STANDARD','L102','A');
INSERT INTO CAR VALUES('JSL7920','Prado','Toyota',2013,'FULL SIZE','L106','A');
```

- ## Location_Details

```
CREATE TABLE LOCATION_DETAILS( LOCATION_ID CHAR(4) NOT NULL, LOCATION_NAME
VARCHAR(50) NOT NULL, STREET VARCHAR(30) NOT NULL, CITY VARCHAR(20) NOT NULL,
STATE_NAME VARCHAR(20) NOT NULL, ZIPCODE NUMBER(5) NOT NULL, CONSTRAINT
LOCATIONPK PRIMARY KEY (LOCATION_ID));

==============================Insertion==============================
INSERT INTO LOCATION_DETAILS VALUES('L101','Islamabad old Airport','Civil
Lines','Rawalpindi','Punjab',75235);
INSERT INTO LOCATION_DETAILS VALUES('L102','Islamabad INTL
AIRPORT','Islamabad','Islamabad','Federal Territory',90045);
```

```
INSERT INTO LOCATION_DETAILS VALUES('L103','Commercial Market','Street #
23','Rawalpindi','Punjab',75261);
INSERT INTO LOCATION_DETAILS VALUES('L104','Bahria Town','Phase
7','Rawalpindi','Punjab',77094);
INSERT INTO LOCATION_DETAILS VALUES('L105','Gulraiz Housing Society','Street #
4','Rawalpindi','Punjab',20166);
INSERT INTO LOCATION_DETAILS VALUES('L106','Scheme 3','Main Car
chowk','Rawalpindi','Punjab',07114);
INSERT INTO LOCATION_DETAILS VALUES('L107','Westridge','Main Westridge
Market','Rawalpindi','Punjab',84122);
```

- ## Booking_Details

```
CREATE TABLE BOOKING_DETAILS( BOOKING_ID CHAR(5) NOT NULL, FROM_DT_TIME
TIMESTAMP NOT NULL, RET_DT_TIME TIMESTAMP NOT NULL, AMOUNT NUMBER(10,2)
NOT NULL, BOOKING_STATUS CHAR(1) NOT NULL,  REG_NUM CHAR(7) NOT NULL, DL_NUM
CHAR(8) NOT NULL, ACT_RET_DT_TIME TIMESTAMP, CONSTRAINT BOOKINGPK PRIMARY
KEY (BOOKING_ID),  CONSTRAINT BOOKINGFK1 FOREIGN KEY (REG_NUM) REFERENCES
CAR(REGISTRATION_NUMBER), CONSTRAINT BOOKINGFK2 FOREIGN KEY (DL_NUM)
REFERENCES CUSTOMER_DETAILS(DL_NUMBER));

==========Insertion==========
INSERT INTO BOOKING_DETAILS VALUES('B1001',TO_TIMESTAMP('2021-11-20
10:20:00','YYYY-MM-DD HH24:MI:SS'),TO_TIMESTAMP('2021-11-25 22:10:00', 'YYYY-MM-
DD HH24:MI:SS'),150,'R','ABX1234','F1234554',TO_TIMESTAMP('2021-12-02 10:00:00',
'YYYY-MM-DD HH24:MI:SS'));
INSERT INTO BOOKING_DETAILS VALUES('B1002',TO_TIMESTAMP(' 2021-01-21
11:00:00','YYYY-MM-DD HH24:MI:SS'),TO_TIMESTAMP('2021-01-24 10:00:00', 'YYYY-MM-
DD HH24:MI:SS'),90,'C','HJK1234','T0981237',NULL);
INSERT INTO BOOKING_DETAILS VALUES('B1003',TO_TIMESTAMP('2021-02-10
13:00:00','YYYY-MM-DD HH24:MI:SS'),TO_TIMESTAMP('2021-01-15 13:00:00', 'YYYY-MM-
DD HH24:MI:SS'),450,'R','JSL7920','R8763578',TO_TIMESTAMP('2016-01-15 13:00:00',
'YYYY-MM-DD HH24:MI:SS'));
INSERT INTO BOOKING_DETAILS VALUES('B1004',TO_TIMESTAMP('2022-04-24
13:00:00','YYYY-MM-DD HH24:MI:SS'),TO_TIMESTAMP('2022-04-25 20:30:00', 'YYYY-MM-
DD HH24:MI:SS'), 48,'R','ASD9090','F0091266',TO_TIMESTAMP('2016-04-23 20:30:00',
'YYYY-MM-DD HH24:MI:SS'));
INSERT INTO BOOKING_DETAILS VALUES('B1005',TO_TIMESTAMP('2021-04-18
09:00:00','YYYY-MM-DD HH24:MI:SS'),TO_TIMESTAMP('2021-04-25 09:00:00', 'YYYY-MM-
DD HH24:MI:SS'),266,'B','CFT1908','P1234567',NULL);
INSERT INTO BOOKING_DETAILS VALUES('B1006',TO_TIMESTAMP('2022-04-21
17:00:00','YYYY-MM-DD HH24:MI:SS'),TO_TIMESTAMP('2022-04-25 17:00:00', 'YYYY-MM-
DD HH24:MI:SS'), 168,'B','EDM8610','V5690245',NULL);
```

```
INSERT INTO BOOKING_DETAILS VALUES('B1007',TO_TIMESTAMP('2022-04-16
08:00:00','YYYY-MM-DD HH24:MI:SS'),TO_TIMESTAMP('2022-04-25 17:00:00', 'YYYY-MM-
DD HH24:MI:SS'), 405,'B','SDF4567','I3478953',NULL);
INSERT INTO BOOKING_DETAILS VALUES('B1008',TO_TIMESTAMP('2021-04-11
08:00:00','YYYY-MM-DD HH24:MI:SS'),TO_TIMESTAMP('2021-04-25 17:00:00', 'YYYY-MM-
DD HH24:MI:SS'), 630,'B','HJK1234','T0981237',NULL);
```

- ## Billing_Details

```
CREATE TABLE BILLING_DETAILS( BILL_ID CHAR(6) NOT NULL, BILL_DATE DATE NOT NULL,
BILL_STATUS CHAR(1) NOT NULL, TOTAL_AMOUNT NUMBER(10,2) NOT NULL,
TAX_AMOUNT NUMBER(10,2) NOT NULL, BOOKING_ID CHAR(5) NOT NULL,
TOTAL_LATE_FEE NUMBER(10,2) NOT NULL, CONSTRAINT BILLINGPK PRIMARY KEY
(BILL_ID), CONSTRAINT BILLINGFK1 FOREIGN KEY (BOOKING_ID) REFERENCES
BOOKING_DETAILS(BOOKING_ID));

==============================Insertion==============================
INSERT INTO BILLING_DETAILS VALUES('BL1001',to_date('2016-01-25','YYYY-MM-DD'),
'P',138.03,12.38 ,'B1001',0);
INSERT INTO BILLING_DETAILS VALUES('BL1002',to_date('2016-01-15','YYYY-MM-DD'),
'P',487.13 ,12.38 ,'B1003',0);
INSERT INTO BILLING_DETAILS VALUES('BL1003',to_date('2016-04-24','YYYY-MM-DD'),
'P',41.57 ,3.96 ,'B1004',0);
```

CONCLUSION

During the course of this project, we learnt a lot of the work and best practices that go into creating a database, the rules to construct a good ER diagram,how to derive the functional dependencies and how to normalize the relational schema. We learnt on how to design a system from Database perspective and how to efficiently store and manipulate data.

THE END!