EZ CAR RENTAL

❖ Requirement #1

Business Requirements

- A Business Analyst was hired by Mr. Rodriguez to compile the list or requirements based on the results of interviews and conversations with the various business stakeholders.
- Below are the requirements captured by the Business Analyst:

EZ-Car Rental is a car rental company that rents vehicles to customers in several countries. They have rental agency branch locations in US, Canada, Mexico, UK, Japan & Australia. The rental agencies are in cities throughout each country and there can be more than one rental agency in a city, for example New York City has 2 rental agencies or branches in Manhattan one in Brooklyn and two in Queens near each airport. Because there are multiple rental agencies, a customer can pick up a vehicle in one location and drop it off at another.

A rental agency or branch is identified by a rental agency ID, address which is composed of street address, city, state, country & zip code. In addition, we also need to capture the phone number of the rental agency.

EZ-Car Rental offer their services to two types of customers, corporate customers & consumers/private customers. The application should store the following information about all types of customers: a customer ID which is their driver license number, driver license expiration date, customer name which is composed of first name, last name, address which is composed of street number & name, city, state & zip code. In addition, we need to store the date of birth, mobile number, email, and credit card which is composed of credit card number, credit card owner name, merchant name & expiration date. A customer can have many credit cards they can use to pay for rental transaction. In addition, the credit card used by a customer can be co-owned by many individuals such a family member or corporate entity the customer works for.

For corporate customers we must store the company name, company ID (we store an ID for each company), Company contact which is composed of contact name & phone number. Finally, we need also need store the corporate rate.

For our private consumer customers, any discount code and discount description. In addition, for our private customers, we offer a frequent rental program called EZPlus where they earn points every time they rent a car and can leverage these points to pay for their next rental. Therefore, we need to store their EZPlus number and EZPlus earned points.

In our business, we only have consumer/private or corporate customers. No other type of customer exists. If a private customer wishes to rent and also works for a company that also rents from us, each of these transactions must be separate customer accounts. you can only be a consumer or corporate customer not both.

A vehicle must first be reserved before it can be rented, therefore there is a distinction between a reservation and a rental. A reservation guarantees a vehicle will be ready for you to pick-up and rent. A rental means a customer complied with the reservation and picked up the vehicle.

A reservation is not made for a specific vehicle, but for a vehicle rental category at a rental agency location. We have the following vehicle rental categories: Car (economy, intermediate, full size, luxury), SUV, or Van. Each of these categories have a different price range. Therefore, a vehicle rental category has a rental category ID that identifies the category of the vehicle being reserved, rental category name (ex. for car (economy, intermediate, full size, luxury), SUV, or Van) and finally rental category rate. Note that a vehicle rental category can have one, none or many vehicles available to rent, nevertheless, a vehicle can only belong to one vehicle rental category.

The reservation process involves a customer reserving a vehicle rental category to be pick-up/drop-off at a rental agency. Therefore, the reservation process requires the customer, vehicle rental category & rental agency of pick-up & drop-off. For a reservation we wish to capture a unique confirmation number to be used to track the reservation. In our business, for a reservation, we must adhere to the following rules:

▪ Each reservation has a pick-up rental agency. A reservation can only have one pick-up rental agency location, but a rental agency can have many reservation pick-ups happening.

▪ Each reservation has a drop-off rental agency (may be different than pick-up rental agency). A reservation can only have one drop-off rental agency location, but a rental agency can have many reservation drop-offs happening

Based on these two rules, the reservation process must capture the pick-up rental agency ID in addition the target drop-off rental agency ID. In addition, the reservation must capture the rental date, return date, rental time, return time of the reservation to provide estimated cost of the rental. In addition, we must capture the reservation status (e.g. confirmed, cancelled, completed), reservation status ID for each reservation status. Finally estimated cost, which is derived from the rental & returned date & time. A vehicle rental category can be reserved from zero or many rental locations, and many or no customers.

The rental process means the customer complied with the reservation and is actually renting the reserved vehicle. The rental process includes the customer, the actual vehicle & rental agency of pick-up & drop-off. The rental process requires a rental agreement number to uniquely identify the rental. Note that in our business, a rental must adhere to the following rules:

▪ Each rental has a pick-up rental agency. A rental can only have one pick-up rental agency location, but a rental agency can have many rental pick-ups happening.

▪ Each rental has a drop-off rental agency (may be different than pick-up rental agency). A rental can only have one drop-off rental agency location, but a rental agency can have many rental drop-offs happening

Because a customer can pick up and drop off a vehicle at different location, for each rental, the system must capture the pick-up rental agency ID in addition, drop off Agency ID (can be different than pick-up). In addition, the rental must capture the pick-up date, drop-off date, pick-up time, drop-off time of the rental to provide the actual cost of the rental. Also, the pick-up odometer value & drop-off odometer value to determine the number of miles of the rental. Another attribute is rental cost, which is derived from the pick-up, drop-off dates/times. In addition, a rental process needs to capture the fuel options provided to customers, we need the fuel option ID that identifies each fuel option & fuel option description (e.g. pay-in-advance return with empty tank at no additional cost, pay-for-used fuel only, self-service). Finally, insurance cost must be captured. Note that at this time, all our customers must pay for insurance and we will calculate this cost automatically for full coverage of our vehicles and passengers with no options to opt-out. A customer must pay insurance when renting. Note that a vehicle can be rented from zero or many rental locations, and many or no customers.

Note that we decided to capture the pick-up & drop-off location, date, time & cost when doing both a reservation and rental because a customer may reserve for a location, date & cost, but totally change their mind when picking up the vehicle etc., and any of these are subject to change via reservation or in the agency location, and we need to capture the history of all these transactions.

EZ-Car Rental has a system to manage their vehicles for renting, maintenance, selling, etc., by classifying them into three vehicle classes: cars, minivans/SUVs, and Vans. All these types of vehicles share the following common characteristics:

▪ Each vehicle is identified by the vehicle id or VIN number, the name of the vehicle composed of make, model & year. The vehicle rental category ID from the vehicle rental category (ex. car (for car is economy, intermediate, full size, luxury), SUV, or Van). Additional attributes of vehicle are: color, plate number, mileage, transmission type (ex. manual or automatic), seat capacity, daily rental cost, vehicle status (ex. reserved, rented, available, maintenance, off-duty), Vehicle Status ID which is the ID number assigned to each of the status (ex. reserved, rented, available, maintenance, off-duty), ID of the rental agency vehicle belongs to or assigned to & finally the current agency location ID where vehicle is currently located since vehicle can be drop-off at any location within a country. Note that for transmission type, and vehicle status we are only interested in the value of these types, no further details about the types are required.

▪ Cars are vehicles that have a trunk capacity in volume, for example a luxury Mercedes E class car has a trunk capacity of 18 cubic ft.

▪ Minivans & SUVs are vehicles with a towing capacity in pounds and additional attribute of these vehicle types is the indication if they are all wheel drive (AWD) which is a yes or no value.

▪ Finally, Vans, are vehicles with a cargo capacity in volume & maximum payload in pounds.

Note that there are other types of vehicles of interest that we may want to store data on other than cars, minivans, SUVs and vans. In addition, a vehicle can only be classified as a car, minivan/SUV or van or other. Not any combination of these, for example, a car is not a van or SUV etc., or the other way around.

In a future upgrade of this application, we wish to also provide insurance options to our customers, in addition to login features so each customer has access to their accounts etc., and finally providing a more efficient way to process invoices for payments.

Requirement#2

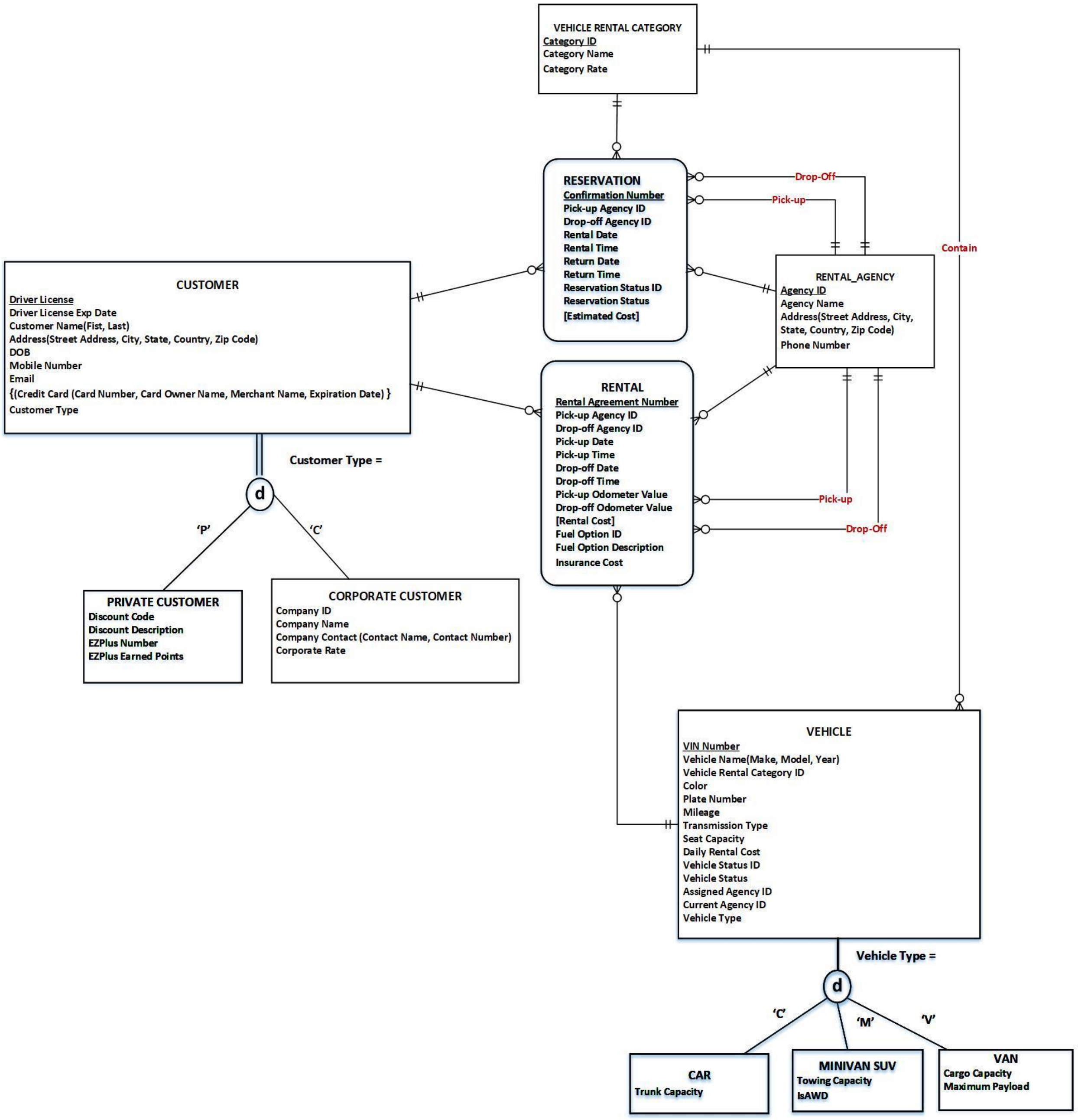
EER Model

DIAGRAM #1 – The EER Conceptual Model:

Objectives:

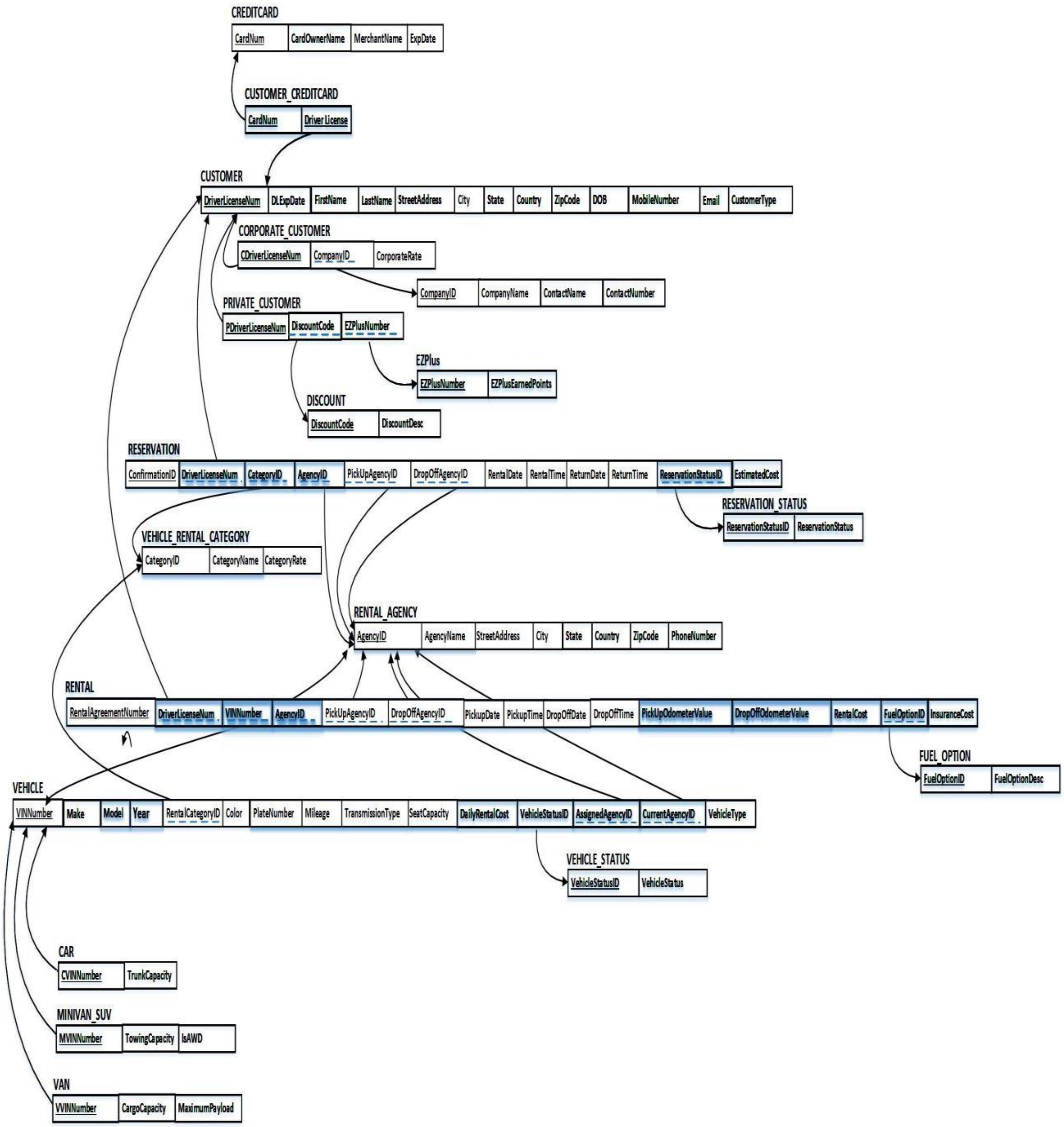
- Define terms related to entity relationship modeling, including entity, entity instance, attribute, relationship and cardinality, and primary key.
- Describe the entity modeling process.
- Discuss how to draw an entity relationship diagram.
- Describe how to recognize entities, attributes, relationships, and cardinalities.

Database Model A database can be modeled as – a collection of entities, – relationship among entities. Database systems are often modeled using an Entity Relationship (ER) diagram as the "blueprint" from which the actual data is stored — the output of the design phase. ER model allows us to sketch database designs. ERD is a model that identifies the concepts or entities that exist in a system and the relationships between those entities and Cardinality specifies how many instances of an entity relate to one instance of another entity. Ordinality is also closely linked to cardinality. While cardinality specifies the occurrences of a relationship, ordinality describes the relationship as either mandatory or optional. In other words, cardinality specifies the maximum number of relationships and ordinality specifies the absolute minimum number of relationships.The database analyst/designer gains a better understanding of the information to be contained in the database through the process of constructing the ERD. Here is EZ rental ERD diagram is given bellow:



Requirement#3

Normalization is process used to organize a database into tables and columns. The idea is that a table should be about a *specific* topic and that only those columns which support that topic are included. There are three main reasons to normalize a database. The first is to minimize duplicate data, the second is to minimize or avoid data modification issues, and the third is to simplify queries. Here looks bellow the normalize model of ERD model:


CREDITCARD
CardNum CardOwnerName MerchantName ExpDate
CUSTOMER_CREDITCARD
CardNum Driver License
CUSTOMER
DriverLicenseNum DLExpDate FirstName LastName StreetAddress City State Country ZipCode DOB MobileNumber Email CustomerType
CORPORATE_CUSTOMER
CDriverLicenseNum CompanyID CorporateRate
CompanyID CompanyName ContactName ContactNumber
PRIVATE_CUSTOMER
PDriverLicenseNum DiscountCode EZPlusNumber
EZPlus
EZPlusNumber EZPlusEarnedPoints
DISCOUNT
DiscountCode DiscountDesc
RESERVATION
ConfirmationID DriverLicenseNum CategoryID AgencyID PickUpAgencyID DropOffAgencyID RentalDate RentalTime ReturnDate ReturnTime ReservationStatusID EstimatedCost
RESERVATION_STATUS
ReservationStatusID ReservationStatus
VEHICLE_RENTAL_CATEGORY
CategoryID CategoryName CategoryRate
RENTAL_AGENCY
AgencyID AgencyName StreetAddress City State Country ZipCode PhoneNumber
RENTAL
RentalAgreementNumber DriverLicenseNum VINNumber AgencyID PickUpAgencyID DropOffAgencyID PickupDate PickupTime DropOffDate DropOffTime PickUpOdometerValue DropOffOdometerValue RentalCost FuelOptionID InsuranceCost
FUEL_OPTION
FuelOptionID FuelOptionDesc
VEHICLE
VINNumber Make Model Year RentalCategoryID Color PlateNumber Mileage TransmissionType SeatCapacity DailyRentalCost VehicleStatusID AssignedAgencyID CurrentAgencyID VehicleType
VEHICLE_STATUS
VehicleStatusID VehicleStatus
CAR
CVINNumber TrunkCapacity
MINIVAN_SUV
MVINNumber TowingCapacity IsAWD
VAN
VVINNumber CargoCapacity MaximumPayload

Requirement#4:

One of the most important parts of an Oracle database is its data dictionary, which is a read-only set of tables that provides information about the database. A data dictionary contains:

- The definitions of all schema objects in the database (tables, views, indexes, clusters, synonyms, sequences, procedures, functions, packages, triggers, and so on)
- How much space has been allocated for, and is currently used by, the schema objects
- Default values for columns
- Integrity constraint information
- Privileges and roles each user has been granted
- Auditing information, such as who has accessed or updated various schema objects

Here is the data dictionary for EZ Rental car ERD model.

CUSTOMER						
Attribute Name	*Data Type*	*Oracle Data Type*	*Required?*	*Length/ Size/Format*	*Constructor*	*Description/purpose*
DriverLicenseNum	Number	NUMBER(X)	Y	15	Primary Key	Unique identifier for a customer instance
DLExpDate	date	Date	Y	N/A	NOT NULL	License Expiration Date
FirstName	Variable Character	VARCHAR2(X)	Y	15	NOT NULL	Customer’s First Name
LastName	Variable Character	VARCHAR2(X)	Y	15	NOT NULL	Customer’s last Name
StreetAddress	Variable Character	VARCHAR2(X)	Y	40	NOT NULL	Customer Street address
City	Variable Character	NUMBER(X)	Y	20	NOT NULL	City name
State	Variable Character	VARCHAR2(X)	Y	6	NOT NULL	State Name
Country	Variable Character	VARCHAR2(X)	Y	20	NOT NULL	Country name
ZipCode	Number	NUMBER(X)	Y	10	NOT NULL	Zip code
MobileNumber	Number	NUMBER(X)	Y	15	NOT NULL	Mobile number
Email	Variable Character	VARCHAR2(X)	Y	40	NULL	Email address optional
CustomerType	Character	CHAR(X)	Y	1	NOT NULL	C for corporate and p for private customer

CUSTOMER_CREDITCARD						
Attribute Name	*Data Type*	*Oracle Data Type*	*Required ?*	*Length/ Size/Forma t*	*Constructor*	*Description/purpose*
CardNum	Number	NUMBER(X)	Y	20	Primary Key	Unique identifier for a customer credit card
DriverLicense	Number	NUMBER(X)	Y	15	Primary key	Customer’s License Number

CREDITCARD

Attribute Name	*Data Type*	*Oracle Data Type*	*Required?*	*Length/ Size/Format*	*Constructor*	*Description/purpose*
CardNum	Number	NUMBER(X)	Y	20	Primary Key	Unique identifier for a credit card instance
CardOwnerName	Variable Character	VARCHAR2(X)	Y	30	NOT NULL	Credit card owner's name
MerchatName	Variable Character	VARCHAR2(X)	Y	10	NOT NULL	Credit card provider Name
ExpDate	date	DATE	Y	N/A	NOT NULL	Expiration Date

CORPORATE_CUSTOMER

Attribute Name	*Data Type*	*Oracle Data Type*	*Required?*	*Length/ Size/Format*	*Constructor*	*Description/purpose*
CDriverLicenseNum	Number	NUMBER(X)	Y	15	Primary Key	Unique identifier for a customer instance
CompanyID	Variable Character	VARCHAR2(X)	Y	10	Foreign key	Refers to the table Company
CorporateRate	Decimal	DECIMAL(X)	Y	8,2	NOT NULL	Rate for corporate customer

COMPANY

Attribute Name	*Data Type*	*Oracle Data Type*	*Required?*	*Length/ Size/Format*	*Constructor*	*Description/purpose*
CompanyID	Variable character	VARCHAR2(X)	Y	10	Primary Key	Unique identifier for Company instance
CompanyName	Variable character	VARCHAR2(X)	Y	30	NOT NULL	Company's Name
ContactName	Variable character	VARCHAR2(X)	Y	20	NOT NULL	Contact Name
ContactNumber	Number	NUMBER(X)	Y	15	NOT NULL	Customer phone number

PRIVATE_CUSTOMER

Attribute Name	*Data Type*	*Oracle Data Type*	*Required?*	*Length/ Size/Format*	*Constructor*	*Description/purpose*
PDriverLicenseNum	Number	NUMBER(X)	Y	15	Primary Key	Unique identifier for a private customer instance
DiscountCode	Variable character	VARCHAR2(X)	Y	10	Foreign key	Reference to the table Discount
EZPlusNumber	Variable character	VARCHAR2(X)	Y	15	Foreign key	Reference to the table EZplus

DISCOUNT

Attribute Name	*Data Type*	*Oracle Data Type*	*Required?*	*Length/ Size/Format*	*Constructor*	*Description/purpose*

DiscountCode	Variable character	VARCHAR2(X)	Y	10	Primary Key	Unique identifier for Discount table
DiscountDesc	Variable character	VARCHAR2(X)	Y	20	NOT NULL	Description of discount

EZPLUS

Attribute Name	***Data Type***	***Oracle Data Type***	***Required?***	***Length/ Size/Format***	***Constructor***	***Description/purpose***
EZPlusNumber	Variable character	VARCHAR2(X)	Y	15	Primary Key	Unique identifier for table EZplus
EZPlusEarnedPoints	Number	NUMBER(X)	Y	6	NOT NULL	Earned points by rental

RESERVATION

Attribute Name	***Data Type***	***Oracle Data Type***	***Required?***	***Length/ Size/Format***	***Constructor***	***Description/purpose***
ConformationID	Variable Character	VARCHAR2(X)	Y	15	Primary Key	Unique identifier for Reservation table
DriverLicenseNum	Number	NUMBER(X)	Y	15	Foreign key	Reference to the customer table
CategoryID	Variable Character	VARCHAR2(X)	Y	10	Foreign key	Reference to the Vehicle rental category table
AgencyID	Variable Character	VARCHAR2(X)	Y	10	Foreign key	Reference to the Rental Agency table
PickUpAgencyID	Variable Character	VARCHAR2(X)	Y	10	Foreign key	Reference to the Rental Agency table
DropOffAgencyID	Variable Character	VARCHAR2(X)	Y	10	Foreign key	Reference to the Rental Agency table
RentalDate	date	DATE	Y	N/A	NOT NULL	Rental date
RentalTime	Number	NUMBER(X)	Y	4	NOT NULL	Rental time
ReturnDate	date	DATE	Y	N/A	NOT NULL	Return date
ReturnTime	Number	NUMBER(X)	Y	4	NOT NULL	Return time
ReservationStatusID	Variable Character	VARCHAR2(X)	Y	15	Foreign key	Reference to the table Reservation status
EstimatedCost	Decimal	DECIMAL(X)	Y	8,2	NOT NULL	Estimated cost

VEHICLE_RENTAL_CATEGORY

Attribute Name	***Data Type***	***Oracle Data Type***	***Required?***	***Length/ Size/Format***	***Constructor***	***Description/purpose***
CategoryID	Variable Character	VARCHAR2(X)	Y	10	Primary Key	Unique identifier for table Vehicle Rental Category
CategoryName	Variable Character	VARCHAR2(X)	Y	10	NOT NULL	Category Name

CategoryRate	Decimal	DECIMAL(X)	Y	8,2	NOT NULL	Rate for that category

RESERVATION_STATUS						
Attribute Name	***Data Type***	***Oracle Data Type***	***Required?***	***Length/ Size/Format***	***Constructor***	***Description/purpose***
ReservationStatusID	Variable Character	VARCHAR2(X)	Y	15	Primary Key	Unique identifier for Reservation Status table
ReservationStatus	Variable Character	VARCHAR2(X)	Y	10	NOT NULL	Status of reservation

RENTAL_AGENCY						
Attribute Name	***Data Type***	***Oracle Data Type***	***Required?***	***Length/ Size/Format***	***Constructor***	***Description/purpose***
AgencyID	Variable Character	VARCHAR2(X)	Y	10	Primary Key	Unique identifier for Rental Agency table
AgencyName	Variable Character	VARCHAR2(X)	Y	25	NOT NULL	Rental Agency Name
StreetAddress	Variable Character	VARCHAR2(X)	Y	40	NOT NULL	Rental Agency address
City	Variable Character	VARCHAR2(X)	Y	20	NOT NULL	City name
State	Variable Character	VARCHAR2(X)	Y	6	NOT NULL	State name
Country	Variable Character	VARCHAR2(X)	Y	20	NOT NULL	County name
ZipCode	Number	NUMBER(X)	Y	10	NOT NULL	Agency zip code
PhoneNumber	Number	NUMBER(X)	Y	15	NOT NULL	Agency Phone number

RENTAL						
Attribute Name	***Data Type***	***Oracle Data Type***	***Required?***	***Length/ Size/Format***	***Constructor***	***Description/purpose***
RentalAgreementNumber	Variable Character	VARCHAR2(X)	Y	15	Primary Key	Unique identifier for table Rental
DriverLicenseNumber	Number	NUMBER(X)	Y	15	Foreign key	Reference to the customer table
VINNumber	Variable Character	VARCHAR2(X)	Y	20	Foreign key	Reference to the Vehicle table
AgencyID	Variable Character	VARCHAR2(X)	Y	10	Foreign key	Reference to the Rental Agency table
PickUpAgencyID	Variable Character	VARCHAR2(X)	Y	10	Foreign key	Reference to the Rental Agency table
DropOffAgencyID	Variable Character	VARCHAR2(X)	Y	10	Foreign key	Reference to the Rental Agency table
PickupDate	date	DATE	Y	N/A	NOT NULL	Vehicle pickup date
PickupTime	Number	NUMBER(X)	Y	4	NOT NULL	Vehicle pickup time
DropOffDate	date	DATE	Y	N/A	NOT NULL	Vehicle Dropoff date

DropOffTime	Number	NUMBER(X)	Y	4	NOT NULL	Vehicle Dropoff time
PickUpOdometerValue	Number	NUMBER(X)	Y	10	NOT NULL	Odometer start reading
DropOffOdometerValue	Number	NUMBER(X)	Y	10	NOT NULL	Odometer end reading
RentalCost	Decimal	DECIMAL(X)	Y	8,2	NOT NULL	Total Rental cost
FeulOptionID	Variable Character	VARCHAR2(X)	Y	10	Foreign key	Reference to the Fuel option table
InsuranceCost	Decimal	DECIMAL(X)	Y	8,2	NOT NULL	Insurance cost

FUEL_OPTION						
Attribute Name	*Data Type*	*Oracle Data Type*	*Required?*	*Length/ Size/Format*	*Constructor*	*Description/purpose*
FuelOptionID	Variable Character	VARCHAR2(X)	Y	10	Primary Key	Unique identifier for the Fuel option table
FuelOptionDesc	Variable Character	VARCHAR2(X)	Y	20	NOT NULL	Fuel description

VEHICLE						
Attribute Name	***Data Type***	***Oracle Data Type***	***Required?***	***Length/ Size/Format***	***Constructor***	***Description/purpose***
VINNumber	Variable Character	VARCHAR2(X)	Y	20	Primary Key	Unique identifier for Vehicle table
Make	Variable Character	VARCHAR2(X)	Y	15	NOT NULL	Name of the maker
Model	Variable Character	VARCHAR2(X)	Y	15	NOT NULL	Name of model
Year	Number	NUMBER(X)	Y	4	NOT NULL	Year built
RentalCategoryID	Variable Character	VARCHAR2(X)	Y	10	Foreign key	Reference to the Vehicle Rental category
Color	Variable Character	VARCHAR2(X)	Y	10	NOT NULL	Vehicle color
PlateNumber	Variable Character	VARCHAR2(X)	Y	10	NOT NULL	Vehicle plate Number
Mileage	Number	NUMBER(X)	Y	6	NOT NULL	mileage
TransmissionType	Variable Character	VARCHAR2(X)	Y	10	NOT NULL	Types of Transmission
SeatCapacity	Number	NUMBER(X)	Y	3	NOT NULL	Numbers of seat
DailyRentalCost	Decimal	DECIMAL(X)	Y	8,2	NOT NULL	Daily Rental cost
VehicleStatusID	Variable Character	VARCHAR2(X)	Y	15	Foreign key	Reference to the Vehicle Status Table
AssignedAgencyID	Variable Character	VARCHAR2(X)	Y	10	Foreign key	Reference to the Rental Agency table

CurrentAgencyID	Variable Character	VARCHAR2(X)	Y	10	Foreign key	Reference to the Rental Agency table
VehicleType	Variable Character	VARCHAR2(X)	Y	10	NOT NULL	Vehicle type

VEHICLE_STATUS						
Attribute Name	***Data Type***	***Oracle Data Type***	***Required?***	***Length/ Size/Format***	***Constructor***	***Description/purpose***
VehicleStatusID	Variable Character	VARCHAR2(X)	Y	15	Primary Key	Unique identifier for a customer instance
VehicleStatus	Variable Character	VARCHAR2(X)	Y	15	NOT NULL	Vehicle status

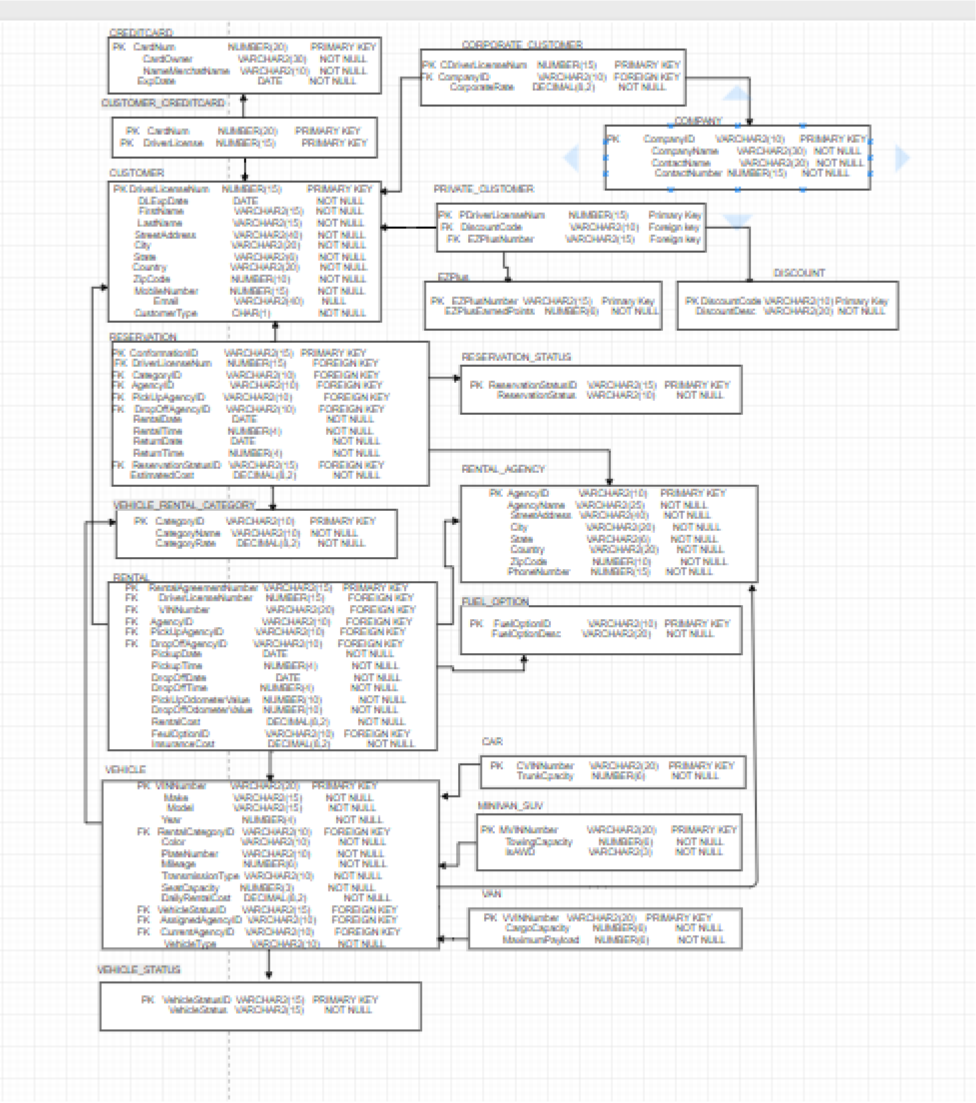
CAR						
Attribute Name	***Data Type***	***Oracle Data Type***	***Required?***	***Length/ Size/Format***	***Constructor***	***Description/purpose***
CVINNumber	Variable Character	VARCHAR2(X)	Y	20	Primary Key	Unique identifier for Vehicle table
TrunkCpacity	Number	NUMBER(X)	Y	6	NOT NULL	Trunk capacity in cubic feet

MINIVAN_SUV						
Attribute Name	***Data Type***	***Oracle Data Type***	***Required?***	***Length/ Size/Format***	***Constructor***	***Description/purpose***
MVINNumber	Variable Character	VARCHAR2(X)	Y	20	Primary Key	Unique identifier for table Minivan SUV table
TowingCapacity	Number	NUMBER(X)	Y	6	NOT NULL	Towing capacity in pounds
IsAWD	Variable Character	VARCHAR2(X)	Y	3	NOT NULL	AWD yes or no

VAN						
Attribute Name	***Data Type***	***Oracle Data Type***	***Required?***	***Length/ Size/Format***	***Constructor***	***Description/purpose***
VVINNumber	Variable Character	VARCHAR2(X)	Y	20	Primary Key	Unique identifier for the Van table
CargoCapacity	Number	NUMBER(X)	Y	6	NOT NULL	Cargo capacity in cubic feet
MaximumPayload	Number	NUMBER(X)	Y	6	NOT NULL	Maximum payload

Requirement #5:

A database designer creates a database schema to help programmers whose software will interact with the database. The process of creating a database schema is called data modeling. When following the three-schema approach to database design, this step would follow the creation of a conceptual schema. Conceptual schemas focus on an organization’s informational needs rather than the structure of a database. In the Oracle database system, the term *database schema*, which is also known as "SQL schema,". Each one contains all the objects created by a specific database user. Those objects may include tables, views, synonyms, and more.



CREDITCARD

PK	CardNum	NUMBER(20)	PRIMARY KEY
	CardOwner	VARCHAR2(30)	NOT NULL
	NameMerchatName	VARCHAR2(10)	NOT NULL
	ExpDate	DATE	NOT NULL

CUSTOMER_CREDITCARD

PK	CardNum	NUMBER(20)	PRIMARY KEY
PK	DriverLicense	NUMBER(15)	PRIMARY KEY

CUSTOMER

PK	DriverLicenseNum	NUMBER(15)	PRIMARY KEY
	DLExpDate	DATE	NOT NULL
	FirstName	VARCHAR2(15)	NOT NULL
	LastName	VARCHAR2(15)	NOT NULL
	StreetAddress	VARCHAR2(40)	NOT NULL
	City	VARCHAR2(20)	NOT NULL
	State	VARCHAR2(6)	NOT NULL
	Country	VARCHAR2(20)	NOT NULL
	ZipCode	NUMBER(10)	NOT NULL
	MobileNumber	NUMBER(15)	NOT NULL
	Email	VARCHAR2(40)	NULL
	CustomerType	CHAR(1)	NOT NULL

CORPORATE_CUSTOMER

PK	CDriverLicenseNum	NUMBER(15)	PRIMARY KEY
FK	CompanyID	VARCHAR2(10)	FOREIGN KEY
	CorporateRate	DECIMAL(8,2)	NOT NULL

COMPANY

PK	CompanyID	VARCHAR2(10)	PRIMARY KEY
	CompanyName	VARCHAR2(30)	NOT NULL
	ContactName	VARCHAR2(20)	NOT NULL
	ContactNumber	NUMBER(15)	NOT NULL

PRIVATE_CUSTOMER

PK	PDriverLicenseNum	NUMBER(15)	Primary Key
FK	DiscountCode	VARCHAR2(10)	Foreign key
FK	EZPlusNumber	VARCHAR2(15)	Foreign key

EZPlus

PK	EZPlusNumber	VARCHAR2(15)	Primary Key
	EZPlusEarnedPoints	NUMBER(6)	NOT NULL

DISCOUNT

PK	DiscountCode	VARCHAR2(10)	Primary Key
	DiscountDesc	VARCHAR2(30)	NOT NULL

RESERVATION

PK	ConformationID	VARCHAR2(15)	PRIMARY KEY
FK	DriverLicenseNum	NUMBER(15)	FOREIGN KEY
FK	CategoryID	VARCHAR2(10)	FOREIGN KEY
FK	AgencyID	VARCHAR2(10)	FOREIGN KEY
FK	PickUpAgencyID	VARCHAR2(10)	FOREIGN KEY
FK	DropOffAgencyID	VARCHAR2(10)	FOREIGN KEY
	RentalDate	DATE	NOT NULL
	RentalTime	NUMBER(4)	NOT NULL
	ReturnDate	DATE	NOT NULL
	ReturnTime	NUMBER(4)	NOT NULL
FK	ReservationStatusID	VARCHAR2(15)	FOREIGN KEY
	EstimatedCost	DECIMAL(8,2)	NOT NULL

RESERVATION_STATUS

PK	ReservationStatusID	VARCHAR2(15)	PRIMARY KEY
	ReservationStatus	VARCHAR2(10)	NOT NULL

VEHICLE_RENTAL_CATEGORY

PK	CategoryID	VARCHAR2(10)	PRIMARY KEY
	CategoryName	VARCHAR2(10)	NOT NULL
	CategoryRate	DECIMAL(8,2)	NOT NULL

RENTAL_AGENCY

PK	AgencyID	VARCHAR2(10)	PRIMARY KEY
	AgencyName	VARCHAR2(25)	NOT NULL
	StreetAddress	VARCHAR2(40)	NOT NULL
	City	VARCHAR2(20)	NOT NULL
	State	VARCHAR2(6)	NOT NULL
	Country	VARCHAR2(20)	NOT NULL
	ZipCode	NUMBER(10)	NOT NULL
	PhoneNumber	NUMBER(15)	NOT NULL

RENTAL

PK	RentalAgreementNumber	VARCHAR2(15)	PRIMARY KEY
FK	DriverLicenseNumber	NUMBER(15)	FOREIGN KEY
FK	VINNumber	VARCHAR2(20)	FOREIGN KEY
FK	AgencyID	VARCHAR2(10)	FOREIGN KEY
FK	PickUpAgencyID	VARCHAR2(10)	FOREIGN KEY
FK	DropOffAgencyID	VARCHAR2(10)	FOREIGN KEY
	PickupDate	DATE	NOT NULL
	PickupTime	NUMBER(4)	NOT NULL
	DropOffDate	DATE	NOT NULL
	DropOffTime	NUMBER(4)	NOT NULL
	PickUpOdometerValue	NUMBER(10)	NOT NULL
	DropOffOdometerValue	NUMBER(10)	NOT NULL
	RentalCost	DECIMAL(8,2)	NOT NULL
	FeulOptionID	VARCHAR2(10)	FOREIGN KEY
	InsuranceCost	DECIMAL(8,2)	NOT NULL

FUEL_OPTION

PK	FuelOptionID	VARCHAR2(10)	PRIMARY KEY
	FuelOptionDesc	VARCHAR2(20)	NOT NULL

CAR

PK	CVINNumber	VARCHAR2(20)	PRIMARY KEY
	TrunkCpacity	NUMBER(6)	NOT NULL

MINIVAN_SUV

PK	MVINNumber	VARCHAR2(20)	PRIMARY KEY
	TowingCapacity	NUMBER(6)	NOT NULL
	isAWD	VARCHAR2(3)	NOT NULL

VAN

PK	VVINNumber	VARCHAR2(20)	PRIMARY KEY
	CargoCapacity	NUMBER(6)	NOT NULL
	MaximumPayload	NUMBER(6)	NOT NULL

VEHICLE

PK	VINNumber	VARCHAR2(20)	PRIMARY KEY
	Make	VARCHAR2(15)	NOT NULL
	Model	VARCHAR2(15)	NOT NULL
	Year	NUMBER(4)	NOT NULL
FK	RentalCategoryID	VARCHAR2(10)	FOREIGN KEY
	Color	VARCHAR2(10)	NOT NULL
	PlateNumber	VARCHAR2(10)	NOT NULL
	Mileage	NUMBER(6)	NOT NULL
	TransmissionType	VARCHAR2(10)	NOT NULL
	SeatCapacity	NUMBER(3)	NOT NULL
	DailyRentalCost	DECIMAL(8,2)	NOT NULL
FK	VehicleStatusID	VARCHAR2(15)	FOREIGN KEY
FK	AssignedAgencyID	VARCHAR2(10)	FOREIGN KEY
FK	CurrentAgencyID	VARCHAR2(10)	FOREIGN KEY
	VehicleType	VARCHAR2(10)	NOT NULL

VEHICLE_STATUS

PK	VehicleStatusID	VARCHAR2(15)	PRIMARY KEY
	VehicleStatus	VARCHAR2(15)	NOT NULL

Requirement#6: The present database industry incorporates DDL into any formal language describing data. However, it is considered to be a subset of SQL (Structured Query Language). SQL often uses imperative verbs with normal English such as sentences to implement database modifications. Hence, DDL does not show up as a different language in an SQL database, but does define changes in the database schema. We need create tables statement to get some data from tables.

```
CREATE TABLE CUSTOMER
(
   DriverLicenseNum     NUMBER(15)         PRIMARY KEY,
   DLExpDate                DATE                     NOT NULL,
   FirstName                VARCHAR2(15)      NOT NULL,
   LastName                 VARCHAR2(15)      NOT NULL,
   StreetAddress            VARCHAR2(40)      NOT NULL,
   City                        VARCHAR2(20)      NOT NULL,
   State                       VARCHAR2(6)       NOT NULL,
   Country                    VARCHAR2(20)      NOT NULL,
   ZipCode                    NUMBER(10)         NOT NULL,
   MobileNumber            NUMBER(15)         NOT NULL,
   Email                       VARCHAR2(40)      NULL,
   CustomerType             CHAR(1)              NOT NULL
);
CREATE TABLE CREDITCARD
(
   CardNum                 NUMBER(20)      PRIMARY KEY,
   CardOwner              VARCHAR2(30)    NOT NULL,
   NameMerchatName   VARCHAR2(10)    NOT NULL,
   ExpDate                     DATE                  NOT NULL
);
CREATE TABLE COMPANY
(
   CompanyID         VARCHAR2(10)    PRIMARY KEY,
   CompanyName    VARCHAR2(30)   NOT NULL,
   ContactName       VARCHAR2(20)   NOT NULL,
   ContactNumber    NUMBER(15)       NOT NULL
);
CREATE TABLE EZPlus
(
  EZPlusNumber         VARCHAR2(15)  Primary Key,
  EZPlusEarnedPoints   NUMBER(6)      NOT NULL
);
CREATE TABLE DISCOUNT
(
  DiscountCode  VARCHAR2(10) Primary Key,
  DiscountDesc  VARCHAR2(20)  NOT NULL
);
CREATE TABLE RESERVATION_STATUS
(
  ReservationStatusID     VARCHAR2(15)     PRIMARY KEY,
  ReservationStatus          VARCHAR2(10)      NOT NULL
);
CREATE TABLE VEHICLE_RENTAL_CATEGORY
(
  CategoryID        VARCHAR2(10)     PRIMARY KEY,
  CategoryName    VARCHAR2(10)     NOT NULL,
  CategoryRate       DECIMAL(8,2)      NOT NULL
);
CREATE TABLE RENTAL_AGENCY
(
  AgencyID           VARCHAR2(10)     PRIMARY KEY,
  AgencyName         VARCHAR2(25)     NOT NULL,
  StreetAddress      VARCHAR2(40)     NOT NULL,
  City                    VARCHAR2(20)     NOT NULL,
  State                     VARCHAR2(6)      NOT NULL,
  Country               VARCHAR2(20)     NOT NULL,
  ZipCode                 NUMBER(10)      NOT NULL,
  PhoneNumber         NUMBER(15)      NOT NULL
);

CREATE TABLE FUEL_OPTION
(
  FuelOptionID       VARCHAR2(10)        PRIMARY KEY,
  FuelOptionDesc     VARCHAR2(20)        NOT NULL
);
CREATE TABLE VEHICLE_STATUS
(
  VehicleStatusID    VARCHAR2(15)     PRIMARY KEY,
  VehicleStatus      VARCHAR2(15)       NOT NULL
);
CREATE TABLE CUSTOMER_CREDITCARD
(
  CardNum           NUMBER(20),
  DriverLicense     NUMBER(15),
  PRIMARY KEY(CardNum,DriverLicense),
  CONSTRAINT  DriverLicense_FK FOREIGN KEY (DriverLicense) REFERENCES
CUSTOMER(DriverLicenseNum),
  CONSTRAINT  CardNum_FK FOREIGN KEY (CardNum) REFERENCES
CREDITCARD(CardNum)
);
CREATE TABLE CORPORATE_CUSTOMER
(
  CDriverLicenseNum   NUMBER(15)      PRIMARY KEY,
  CompanyID                 VARCHAR2(10),
  CorporateRate             DECIMAL(8,2)     NOT NULL,
  CONSTRAINT CompanyID_FK FOREIGN KEY (CompanyID) REFERENCES
COMPANY(CompanyID),
  CONSTRAINT  CDriverLicenseNum_FK FOREIGN KEY (CDriverLicenseNum)
REFERENCES CUSTOMER(DriverLicenseNum)
);
```

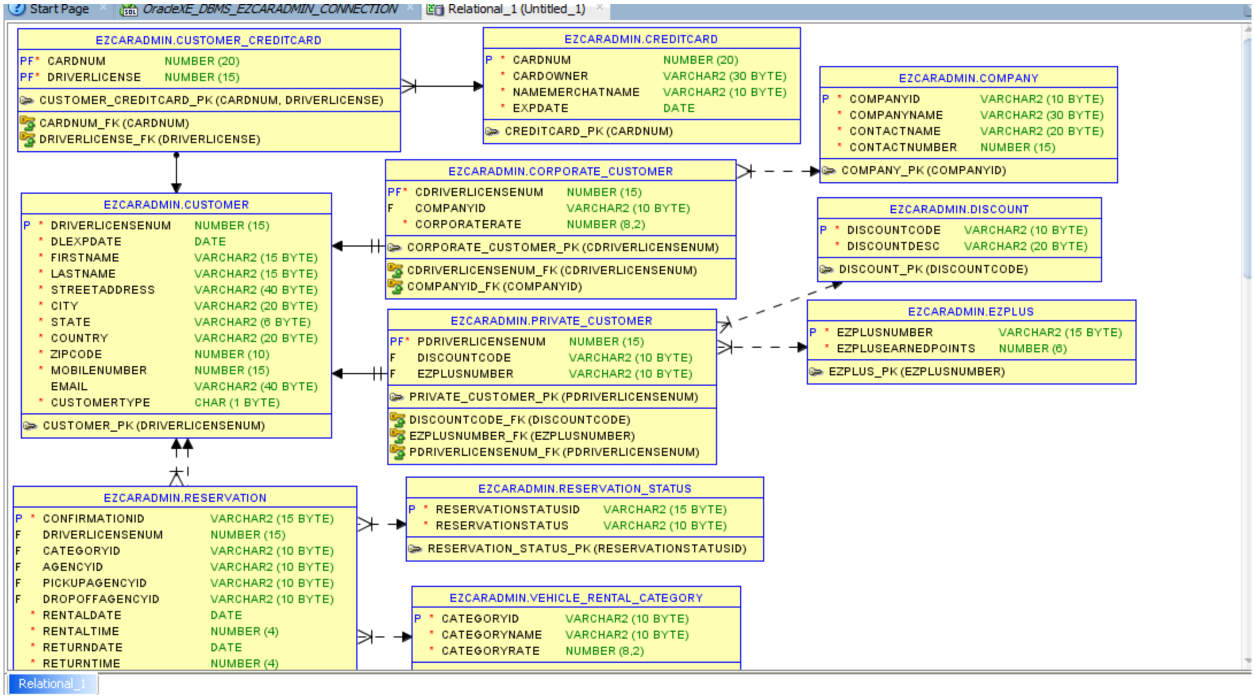
```
CREATE TABLE PRIVATE_CUSTOMER
(
   PDriverLicenseNum    NUMBER(15)      PRIMARY KEY,
   DiscountCode             VARCHAR2(10),
   EZPlusNumber           VARCHAR2(10),
   CONSTRAINT DiscountCode_FK FOREIGN KEY (DiscountCode) REFERENCES
DISCOUNT(DiscountCode),
   CONSTRAINT EZPlusNumber_FK FOREIGN KEY (EZPlusNumber) REFERENCES
EZPlus(EZPlusNumber),
   CONSTRAINT  PDriverLicenseNum_FK FOREIGN KEY (PDriverLicenseNum)
REFERENCES CUSTOMER(DriverLicenseNum)

);
CREATE TABLE RESERVATION
(
 ConfirmationID       VARCHAR2(15)      PRIMARY KEY,
 DriverLicenseNum    NUMBER(15),
 CategoryID              VARCHAR2(10),
 AgencyID                 VARCHAR2(10),
 PickUpAgencyID      VARCHAR2(10),
 DropOffAgencyID    VARCHAR2(10),
 RentalDate                  DATE                      NOT NULL,
 RentalTime                  NUMBER(4)            NOT NULL,
 ReturnDate                DATE                        NOT NULL,
 ReturnTime                NUMBER(4)               NOT NULL,
 ReservationStatusID  VARCHAR2(15),
 EstimatedCost            DECIMAL(8,2)         NOT NULL,
 CONSTRAINT  DriverLN_FK FOREIGN KEY (DriverLicenseNum) REFERENCES
CUSTOMER(DriverLicenseNum),
 CONSTRAINT  CID_FK FOREIGN KEY (CategoryID) REFERENCES
VEHICLE_RENTAL_CATEGORY(CategoryID),
 CONSTRAINT  AID_FK FOREIGN KEY (AgencyID) REFERENCES
RENTAL_AGENCY(AgencyID),
 CONSTRAINT  PID_FK FOREIGN KEY (PickUpAgencyID) REFERENCES
RENTAL_AGENCY(AgencyID),
 CONSTRAINT  DID_FK FOREIGN KEY (DropOffAgencyID) REFERENCES
RENTAL_AGENCY(AgencyID),
 CONSTRAINT  ReservationStatusID_FK FOREIGN KEY (ReservationStatusID)
REFERENCES RESERVATION_STATUS(ReservationStatusID)
 );
 CREATE TABLE VEHICLE
(
 VINNumber       VARCHAR2(20)      PRIMARY KEY,
 Make                   VARCHAR2(15)      NOT NULL,
 Model                   VARCHAR2(15)      NOT NULL,
 Year                     NUMBER(4)           NOT NULL,
 RentalCategoryID   VARCHAR2(10),
 Color              VARCHAR2(10)     NOT NULL,
 PlateNumber        NUMBER(10)       NOT NULL,
 Mileage            NUMBER(6)        NOT NULL,
 TransmissionType   VARCHAR2(10)     NOT NULL,
 SeatCapacity       NUMBER(3)        NOT NULL,
 DailyRentalCost    DECIMAL(8,2)     NOT NULL,
 VehicleStatusID    VARCHAR2(15),
 AssignedAgencyID   VARCHAR2(10),
 CurrentAgencyID    VARCHAR2(10),
 VehicleType        VARCHAR2(10)     NOT NULL,
 CONSTRAINT  RentalCategoryID_FK FOREIGN KEY (RentalCategoryID) REFERENCES
VEHICLE_RENTAL_CATEGORY(CategoryID),
 CONSTRAINT  VehicleStatusID_FK FOREIGN KEY (VehicleStatusID) REFERENCES
VEHICLE_STATUS(VehicleStatusID),
 CONSTRAINT  AssignedAgencyID_FK FOREIGN KEY (AssignedAgencyID) REFERENCES
RENTAL_AGENCY(AgencyID),
 CONSTRAINT  CurrentAgencyID_FK FOREIGN KEY (CurrentAgencyID) REFERENCES
RENTAL_AGENCY(AgencyID)

);
CREATE TABLE RENTAL
(
 RentalAgreementNumber     VARCHAR2(15)     PRIMARY KEY,
 DriverLicenseNum          NUMBER(15),
 VINNumber                 VARCHAR2(20),
 AgencyID                  VARCHAR2(10),
 PickUpAgencyID            VARCHAR2(10),
 DropOffAgencyID           VARCHAR2(10),
 PickUpDate                DATE             NOT NULL,
 PickUpTime                NUMBER(4)        NOT NULL,
 DropOffDate               DATE             NOT NULL,
 DropOffTime               NUMBER(4)        NOT NULL,
 PickUpOdometerValue       NUMBER(10)       NOT NULL,
 DropOffOdometerValue      NUMBER(10)       NOT NULL,
 RentalCost                DECIMAL(8,2)     NOT NULL,
 FuelOptionID              VARCHAR2(10),
 InsurenceCost             DECIMAL(8,2)     NOT NULL,
 CONSTRAINT  DLN_FK FOREIGN KEY (DriverLicenseNum) REFERENCES
CUSTOMER(DriverLicenseNum),
 CONSTRAINT  VINNum_FK FOREIGN KEY (VINNumber) REFERENCES
VEHICLE(VINNumber),
 CONSTRAINT  AgnID_FK FOREIGN KEY (AgencyID) REFERENCES
RENTAL_AGENCY(AgencyID),
 CONSTRAINT  PickID_FK FOREIGN KEY (PickUpAgencyID) REFERENCES
RENTAL_AGENCY(AgencyID),
 CONSTRAINT  DropID_FK FOREIGN KEY (DropOffAgencyID) REFERENCES
RENTAL_AGENCY(AgencyID),
 CONSTRAINT  FuelOptionID_FK FOREIGN KEY (FuelOptionID) REFERENCES
FUEL_OPTION(FuelOptionID)
);
CREATE TABLE CAR
(
 CVINNumber       VARCHAR2(20)       PRIMARY KEY,
 TrunkCapacity      NUMBER(6)              NOT NULL,
 CONSTRAINT  CVINNumber_FK FOREIGN KEY (CVINNumber) REFERENCES
VEHICLE(VINNumber)
);
CREATE TABLE MINIVAN_SUV
(
 MVINNumber       VARCHAR2(20)         PRIMARY KEY,
 TowingCapacity       NUMBER(6)              NOT NULL,
 IsAWD             VARCHAR2(3)                  NOT NULL,
 CONSTRAINT  MVINNumber_FK FOREIGN KEY (MVINNumber) REFERENCES
VEHICLE(VINNumber)
);
CREATE TABLE VAN
(
 VVINNumber       VARCHAR2(20)       PRIMARY KEY,
 CargoCapacity        NUMBER(6)              NOT NULL,
 MaximumPayload       NUMBER(6)          NOT NULL,
 CONSTRAINT  VVINNumber_FK FOREIGN KEY (VVINNumber) REFERENCES
VEHICLE(VINNumber)
);

COMMIT;
```

REQUIREMENT#7: A physical data model (or database design) is a representation of a data design as implemented, or intended to be implemented, in a database management system. In the lifecycle of a project it typically derives from a logical data model, though it may be reverse-engineered from a given database implementation. A complete physical data model will include all the database artifacts required to create relationships between tables or to achieve performance goals, such as indexes, constraint definitions, linking tables, partitioned tables or clusters. Analysts can usually use a physical data model to calculate storage estimates; it may include specific storage allocation details for a given database system. I created this physical schema to see that my ERD is similar to this or not.


Start Page
OracleXE_DBMS_EZCARADMIN_CONNECTION
Relational_1 (Untitled_1)
Relational_1

```
EZCARADMIN.CUSTOMER_CREDITCARD
PF* CARDNUM          NUMBER (20)
PF* DRIVERLICENSE    NUMBER (15)
CUSTOMER_CREDITCARD_PK (CARDNUM, DRIVERLICENSE)
CARDNUM_FK (CARDNUM)
DRIVERLICENSE_FK (DRIVERLICENSE)
```

```
EZCARADMIN.CREDITCARD
P * CARDNUM            NUMBER (20)
  * CARDOWNER          VARCHAR2 (30 BYTE)
  * NAMEMERCHATNAME    VARCHAR2 (10 BYTE)
  * EXPDATE            DATE
CREDITCARD_PK (CARDNUM)
```

```
EZCARADMIN.COMPANY
P * COMPANYID        VARCHAR2 (10 BYTE)
  * COMPANYNAME      VARCHAR2 (30 BYTE)
  * CONTACTNAME      VARCHAR2 (20 BYTE)
  * CONTACTNUMBER    NUMBER (15)
COMPANY_PK (COMPANYID)
```

```
EZCARADMIN.CORPORATE_CUSTOMER
PF* CDRIVERLICENSENUM    NUMBER (15)
F   COMPANYID            VARCHAR2 (10 BYTE)
  * CORPORATERATE        NUMBER (8,2)
CORPORATE_CUSTOMER_PK (CDRIVERLICENSENUM)
CDRIVERLICENSENUM_FK (CDRIVERLICENSENUM)
COMPANYID_FK (COMPANYID)
```

```
EZCARADMIN.CUSTOMER
P * DRIVERLICENSENUM    NUMBER (15)
  * DLEXPDATE           DATE
  * FIRSTNAME           VARCHAR2 (15 BYTE)
  * LASTNAME            VARCHAR2 (15 BYTE)
  * STREETADDRESS       VARCHAR2 (40 BYTE)
  * CITY                VARCHAR2 (20 BYTE)
  * STATE               VARCHAR2 (6 BYTE)
  * COUNTRY             VARCHAR2 (20 BYTE)
  * ZIPCODE             NUMBER (10)
  * MOBILENUMBER        NUMBER (15)
    EMAIL               VARCHAR2 (40 BYTE)
  * CUSTOMERTYPE        CHAR (1 BYTE)
CUSTOMER_PK (DRIVERLICENSENUM)
```

```
EZCARADMIN.DISCOUNT
P * DISCOUNTCODE    VARCHAR2 (10 BYTE)
  * DISCOUNTDESC    VARCHAR2 (20 BYTE)
DISCOUNT_PK (DISCOUNTCODE)
```

```
EZCARADMIN.PRIVATE_CUSTOMER
PF* PDRIVERLICENSENUM    NUMBER (15)
F   DISCOUNTCODE         VARCHAR2 (10 BYTE)
F   EZPLUSNUMBER         VARCHAR2 (10 BYTE)
PRIVATE_CUSTOMER_PK (PDRIVERLICENSENUM)
DISCOUNTCODE_FK (DISCOUNTCODE)
EZPLUSNUMBER_FK (EZPLUSNUMBER)
PDRIVERLICENSENUM_FK (PDRIVERLICENSENUM)
```

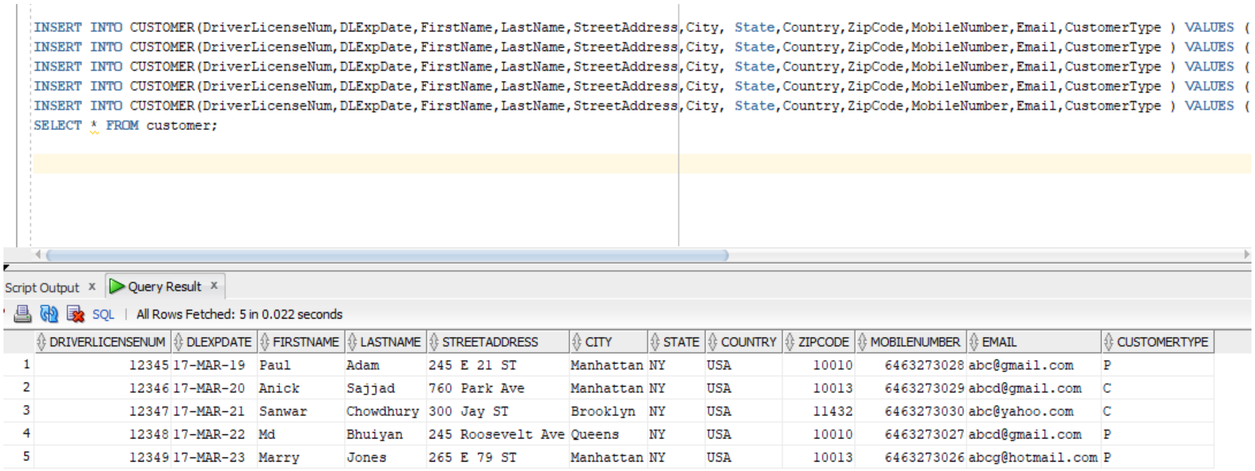
```
EZCARADMIN.EZPLUS
P * EZPLUSNUMBER          VARCHAR2 (15 BYTE)
  * EZPLUSEARNEDPOINTS    NUMBER (6)
EZPLUS_PK (EZPLUSNUMBER)
```

```
EZCARADMIN.RESERVATION
P * CONFIRMATIONID      VARCHAR2 (15 BYTE)
F   DRIVERLICENSENUM    NUMBER (15)
F   CATEGORYID          VARCHAR2 (10 BYTE)
F   AGENCYID            VARCHAR2 (10 BYTE)
F   PICKUPAGENCYID      VARCHAR2 (10 BYTE)
F   DROPOFFAGENCYID     VARCHAR2 (10 BYTE)
  * RENTALDATE          DATE
  * RENTALTIME          NUMBER (4)
  * RETURNDATE          DATE
  * RETURNTIME          NUMBER (4)
```

```
EZCARADMIN.RESERVATION_STATUS
P * RESERVATIONSTATUSID    VARCHAR2 (15 BYTE)
  * RESERVATIONSTATUS      VARCHAR2 (10 BYTE)
RESERVATION_STATUS_PK (RESERVATIONSTATUSID)
```

```
EZCARADMIN.VEHICLE_RENTAL_CATEGORY
P * CATEGORYID      VARCHAR2 (10 BYTE)
  * CATEGORYNAME    VARCHAR2 (10 BYTE)
  * CATEGORYRATE    NUMBER (8,2)
```

Requirement#8A1: Here I created DDL for my customer table and inserted in my SQL server. The screenshot is given bellow:

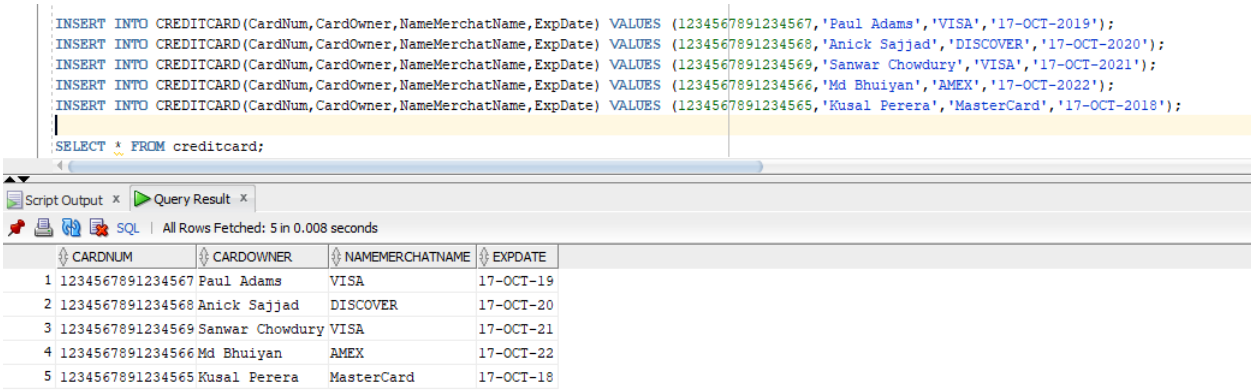


```
INSERT INTO CUSTOMER(DriverLicenseNum,DLExpDate,FirstName,LastName,StreetAddress,City, State,Country,ZipCode,MobileNumber,Email,CustomerType ) VALUES (
INSERT INTO CUSTOMER(DriverLicenseNum,DLExpDate,FirstName,LastName,StreetAddress,City, State,Country,ZipCode,MobileNumber,Email,CustomerType ) VALUES (
INSERT INTO CUSTOMER(DriverLicenseNum,DLExpDate,FirstName,LastName,StreetAddress,City, State,Country,ZipCode,MobileNumber,Email,CustomerType ) VALUES (
INSERT INTO CUSTOMER(DriverLicenseNum,DLExpDate,FirstName,LastName,StreetAddress,City, State,Country,ZipCode,MobileNumber,Email,CustomerType ) VALUES (
INSERT INTO CUSTOMER(DriverLicenseNum,DLExpDate,FirstName,LastName,StreetAddress,City, State,Country,ZipCode,MobileNumber,Email,CustomerType ) VALUES (
SELECT * FROM customer;
```

All Rows Fetched: 5 in 0.022 seconds

	DRIVERLICENSENUM	DLEXPDATE	FIRSTNAME	LASTNAME	STREETADDRESS	CITY	STATE	COUNTRY	ZIPCODE	MOBILENUMBER	EMAIL	CUSTOMERTYPE
1	12345	17-MAR-19	Paul	Adam	245 E 21 ST	Manhattan	NY	USA	10010	6463273028	abc@gmail.com	P
2	12346	17-MAR-20	Anick	Sajjad	760 Park Ave	Manhattan	NY	USA	10013	6463273029	abcd@gmail.com	C
3	12347	17-MAR-21	Sanwar	Chowdhury	300 Jay ST	Brooklyn	NY	USA	11432	6463273030	abc@yahoo.com	C
4	12348	17-MAR-22	Md	Bhuiyan	245 Roosevelt Ave	Queens	NY	USA	10010	6463273027	abcd@gmail.com	P
5	12349	17-MAR-23	Marry	Jones	265 E 79 ST	Manhattan	NY	USA	10013	6463273026	abcg@hotmail.com	P

Requirement#8A2: Here I created DDL for my Creditcard table and inserted in my SQL server. The screenshot is given bellow:



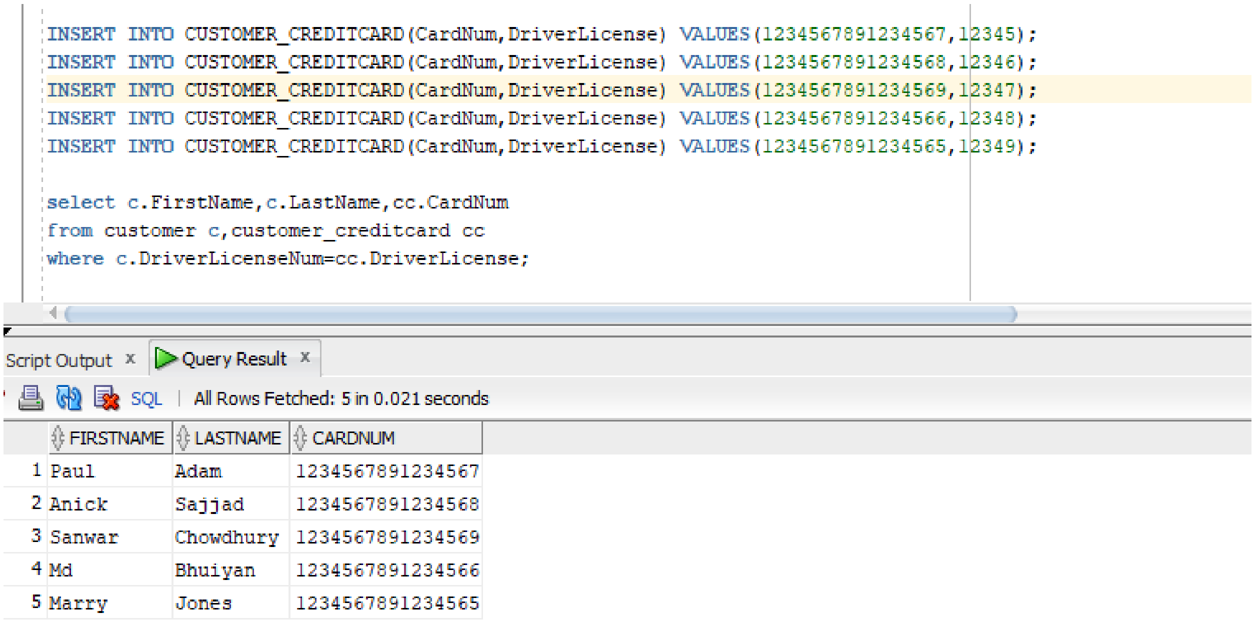
```
INSERT INTO CREDITCARD(CardNum,CardOwner,NameMerchatName,ExpDate) VALUES (1234567891234567,'Paul Adams','VISA','17-OCT-2019');
INSERT INTO CREDITCARD(CardNum,CardOwner,NameMerchatName,ExpDate) VALUES (1234567891234568,'Anick Sajjad','DISCOVER','17-OCT-2020');
INSERT INTO CREDITCARD(CardNum,CardOwner,NameMerchatName,ExpDate) VALUES (1234567891234569,'Sanwar Chowdury','VISA','17-OCT-2021');
INSERT INTO CREDITCARD(CardNum,CardOwner,NameMerchatName,ExpDate) VALUES (1234567891234566,'Md Bhuiyan','AMEX','17-OCT-2022');
INSERT INTO CREDITCARD(CardNum,CardOwner,NameMerchatName,ExpDate) VALUES (1234567891234565,'Kusal Perera','MasterCard','17-OCT-2018');

SELECT * FROM creditcard;
```

All Rows Fetched: 5 in 0.008 seconds

	CARDNUM	CARDOWNER	NAMEMERCHATNAME	EXPDATE
1	1234567891234567	Paul Adams	VISA	17-OCT-19
2	1234567891234568	Anick Sajjad	DISCOVER	17-OCT-20
3	1234567891234569	Sanwar Chowdury	VISA	17-OCT-21
4	1234567891234566	Md Bhuiyan	AMEX	17-OCT-22
5	1234567891234565	Kusal Perera	MasterCard	17-OCT-18

Requirement#8A3: Here I created DDL for my Customer_Creditcard table and inserted in my SQL server. The screenshot is given bellow:



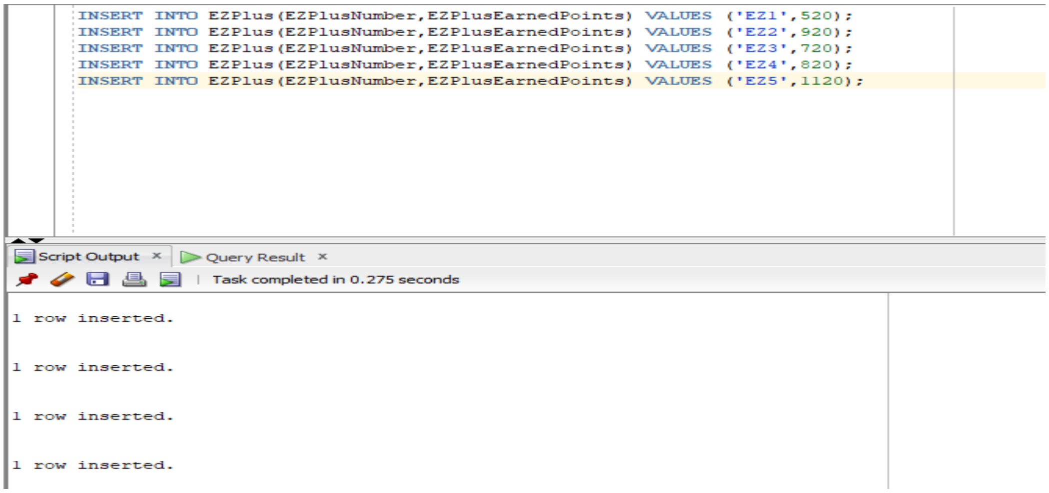
```
INSERT INTO CUSTOMER_CREDITCARD(CardNum,DriverLicense) VALUES(1234567891234567,12345);
INSERT INTO CUSTOMER_CREDITCARD(CardNum,DriverLicense) VALUES(1234567891234568,12346);
INSERT INTO CUSTOMER_CREDITCARD(CardNum,DriverLicense) VALUES(1234567891234569,12347);
INSERT INTO CUSTOMER_CREDITCARD(CardNum,DriverLicense) VALUES(1234567891234566,12348);
INSERT INTO CUSTOMER_CREDITCARD(CardNum,DriverLicense) VALUES(1234567891234565,12349);

select c.FirstName,c.LastName,cc.CardNum
from customer c,customer_creditcard cc
where c.DriverLicenseNum=cc.DriverLicense;
```

All Rows Fetched: 5 in 0.021 seconds

	FIRSTNAME	LASTNAME	CARDNUM
1	Paul	Adam	1234567891234567
2	Anick	Sajjad	1234567891234568
3	Sanwar	Chowdhury	1234567891234569
4	Md	Bhuiyan	1234567891234566
5	Marry	Jones	1234567891234565

Requirement#8A4: Here I created DDL for my EZPLUS table and inserted in my SQL server. The screenshot is given bellow:



```
INSERT INTO EZPlus(EZPlusNumber,EZPlusEarnedPoints) VALUES ('EZ1',520);
INSERT INTO EZPlus(EZPlusNumber,EZPlusEarnedPoints) VALUES ('EZ2',920);
INSERT INTO EZPlus(EZPlusNumber,EZPlusEarnedPoints) VALUES ('EZ3',720);
INSERT INTO EZPlus(EZPlusNumber,EZPlusEarnedPoints) VALUES ('EZ4',820);
INSERT INTO EZPlus(EZPlusNumber,EZPlusEarnedPoints) VALUES ('EZ5',1120);
```

Task completed in 0.275 seconds

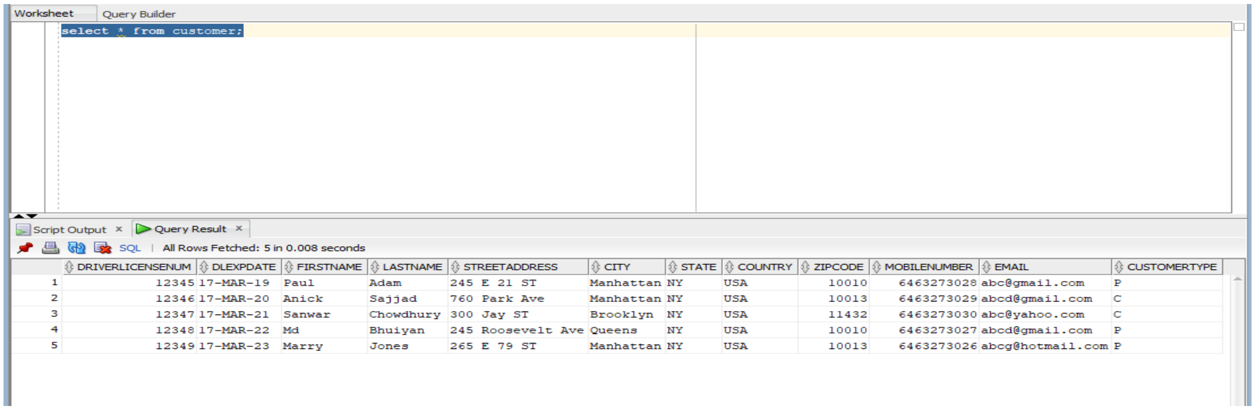
```
1 row inserted.


1 row inserted.


1 row inserted.


1 row inserted.
```

Requirement#8B1: I checked my insert statement is working or not, so I selected some queries from customer table. Here is the code bellow: select* from customer;

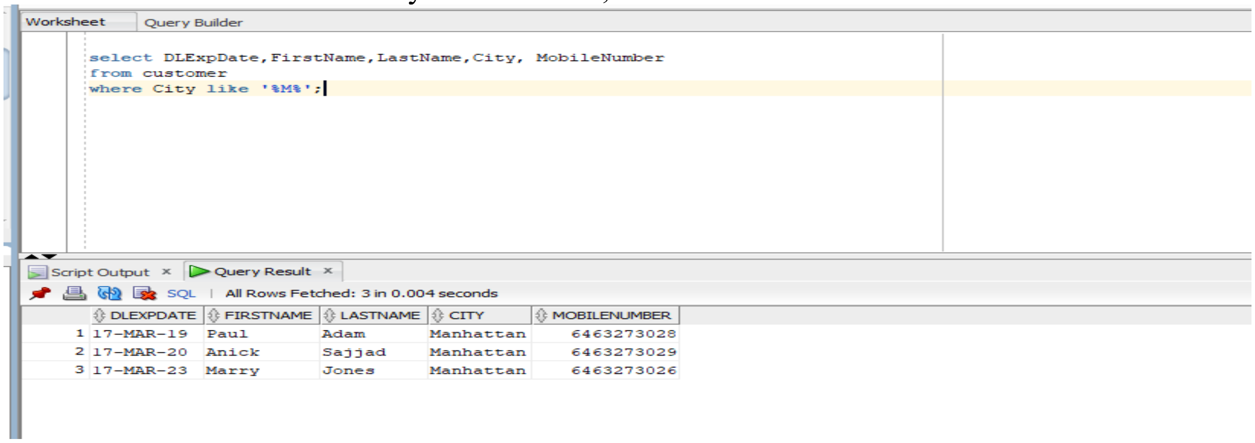


```
select * from customer;
```

All Rows Fetched: 5 in 0.008 seconds

	DRIVERLICENSENUM	DLEXPDATE	FIRSTNAME	LASTNAME	STREETADDRESS	CITY	STATE	COUNTRY	ZIPCODE	MOBILENUMBER	EMAIL	CUSTOMERTYPE
1	12345	17-MAR-19	Paul	Adam	245 E 21 ST	Manhattan	NY	USA	10010	6463273028	abc@gmail.com	P
2	12346	17-MAR-20	Anick	Sajjad	760 Park Ave	Manhattan	NY	USA	10013	6463273029	abcd@gmail.com	C
3	12347	17-MAR-21	Sanwar	Chowdhury	300 Jay ST	Brooklyn	NY	USA	11432	6463273030	abc@yahoo.com	C
4	12348	17-MAR-22	Md	Bhuiyan	245 Roosevelt Ave	Queens	NY	USA	10010	6463273027	abcd@gmail.com	P
5	12349	17-MAR-23	Marry	Jones	265 E 79 ST	Manhattan	NY	USA	10013	6463273026	abcg@hotmail.com	P

Requirement#8B2:I tried to get some record from my customer table with some condition. Here is the code bellow: select DLExpDate,FirstName,LastName,City,MobileNumber
From Customer
Where City Like ‘%M%’;



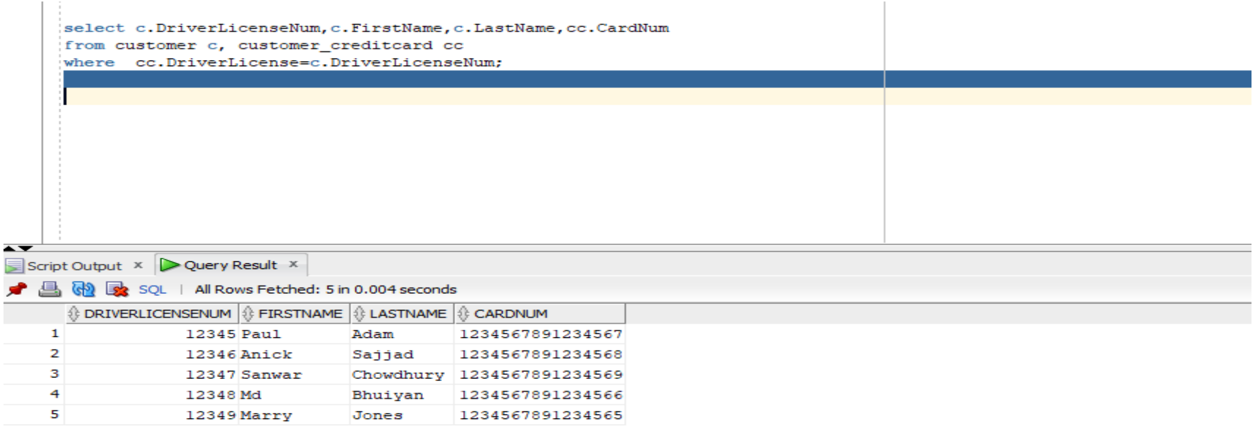
```
select DLExpDate,FirstName,LastName,City, MobileNumber
from customer
where City like '%M%';
```

All Rows Fetched: 3 in 0.004 seconds

	DLEXPDATE	FIRSTNAME	LASTNAME	CITY	MOBILENUMBER
1	17-MAR-19	Paul	Adam	Manhattan	6463273028
2	17-MAR-20	Anick	Sajjad	Manhattan	6463273029
3	17-MAR-23	Marry	Jones	Manhattan	6463273026

Requirement#8B3: I tried to get some from a table which has an associate table. Get driver license number, first name, last name and card number. Here is the code:

Select c.DriverLicenseNumber,c.FirstName,c.LastName,cc.CardNum
From customer c, customer_creditcard cc
Where cc.DriverLicense=c.DriverLicenseNum;



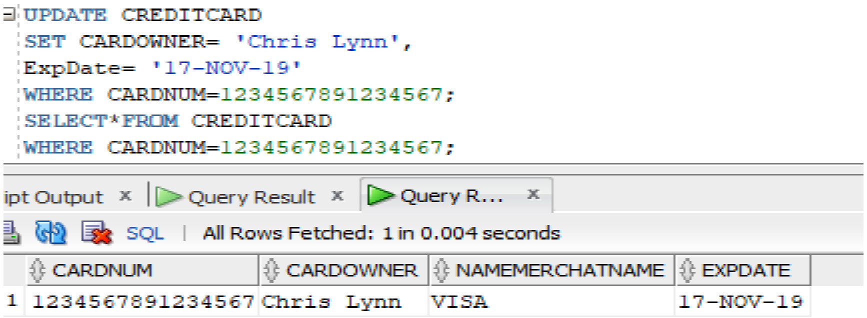
```
select c.DriverLicenseNum,c.FirstName,c.LastName,cc.CardNum
from customer c, customer_creditcard cc
where  cc.DriverLicense=c.DriverLicenseNum;
```

All Rows Fetched: 5 in 0.004 seconds

	DRIVERLICENSENUM	FIRSTNAME	LASTNAME	CARDNUM
1	12345	Paul	Adam	1234567891234567
2	12346	Anick	Sajjad	1234567891234568
3	12347	Sanwar	Chowdhury	1234567891234569
4	12348	Md	Bhuiyan	1234567891234566
5	12349	Marry	Jones	1234567891234565

Requirement#8C1: Here I tried to update a record in my Creditcard table. Code is:

UPDATE CREDITCARD
SET=CARDOWNER=’Chris Lynn’,
ExpDate=’17-NOV-19’
WHERE CARDNUM=1234567891234567;
SELECT*FROM CREDITCARD
WHERE CARDNUM=1234567891234567;



```
UPDATE CREDITCARD
SET CARDOWNER= 'Chris Lynn',
ExpDate= '17-NOV-19'
WHERE CARDNUM=1234567891234567;
SELECT*FROM CREDITCARD
WHERE CARDNUM=1234567891234567;
```

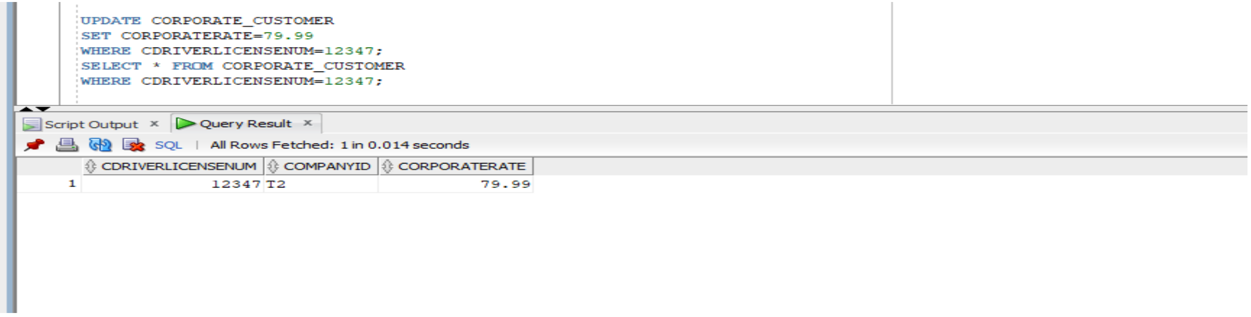
All Rows Fetched: 1 in 0.004 seconds

	CARDNUM	CARDOWNER	NAMEMERCHATNAME	EXPDATE
1	1234567891234567	Chris Lynn	VISA	17-NOV-19

Requirement#8c2: Update a record in associate table Corporate_customer where driver license is 12347. Here is the code:

UPDATE CORPORATE_CUSTOMER
SET CORPORATERATE =79.99
WHERE CDriverLicenseNum=12347;

SELECT * FROM CORPORATE CUSTOMER
WHERE CDriverLicenseNum=12347;



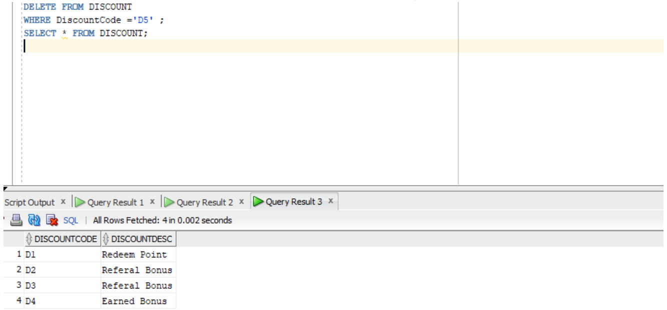
```
UPDATE CORPORATE_CUSTOMER
SET CORPORATERATE=79.99
WHERE CDRIVERLICENSENUM=12347;
SELECT * FROM CORPORATE_CUSTOMER
WHERE CDRIVERLICENSENUM=12347;
```

All Rows Fetched: 1 in 0.014 seconds

	CDRIVERLICENSENUM	COMPANYID	CORPORATERATE
1	12347	T2	79.99

Requirement#8D1: I tried to delete a record from Discount table. Delete a record from Discount table where discount code is ‘D5’. The code is given bellow:

DELECT FROM DISCOUNT
WHERE DiscountCode=’D5’;
SELECT * FROM DISCOUNT;



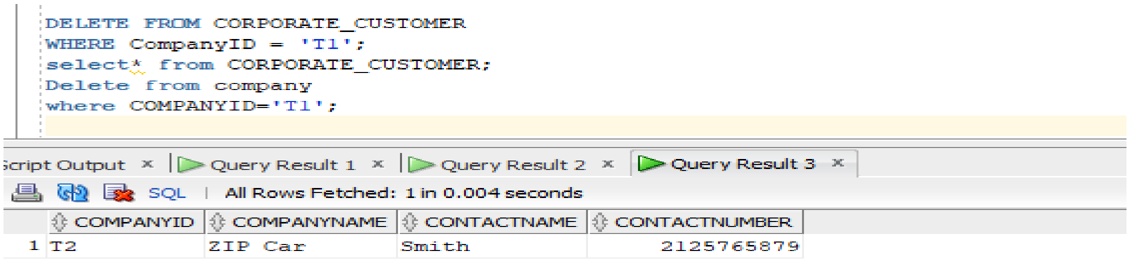
```
DELETE FROM DISCOUNT
WHERE DiscountCode ='D5' ;
SELECT * FROM DISCOUNT;
```

All Rows Fetched: 4 in 0.002 seconds

	DISCOUNTCODE	DISCOUNTDESC
1	D1	Redeem Point
2	D2	Referal Bonus
3	D3	Referal Bonus
4	D4	Earned Bonus

Requirement#8D2: Delete a record from Company table where company id is T1. First I had to delete CompanyID from its child table Corporate_Customer, then deleted from parents table.The code is given bellow:

Delete From Corporate_Customer
Where CompanyID=’T1’;
Delete From Company
Where CompanyID=’T1’;



```
DELETE FROM CORPORATE_CUSTOMER
WHERE CompanyID = 'T1';
select* from CORPORATE_CUSTOMER;
Delete from company
where COMPANYID='T1';
```

All Rows Fetched: 1 in 0.004 seconds

	COMPANYID	COMPANYNAME	CONTACTNAME	CONTACTNUMBER
1	T2	ZIP Car	Smith	2125765879