

# AA CAR DEALERSHIPS

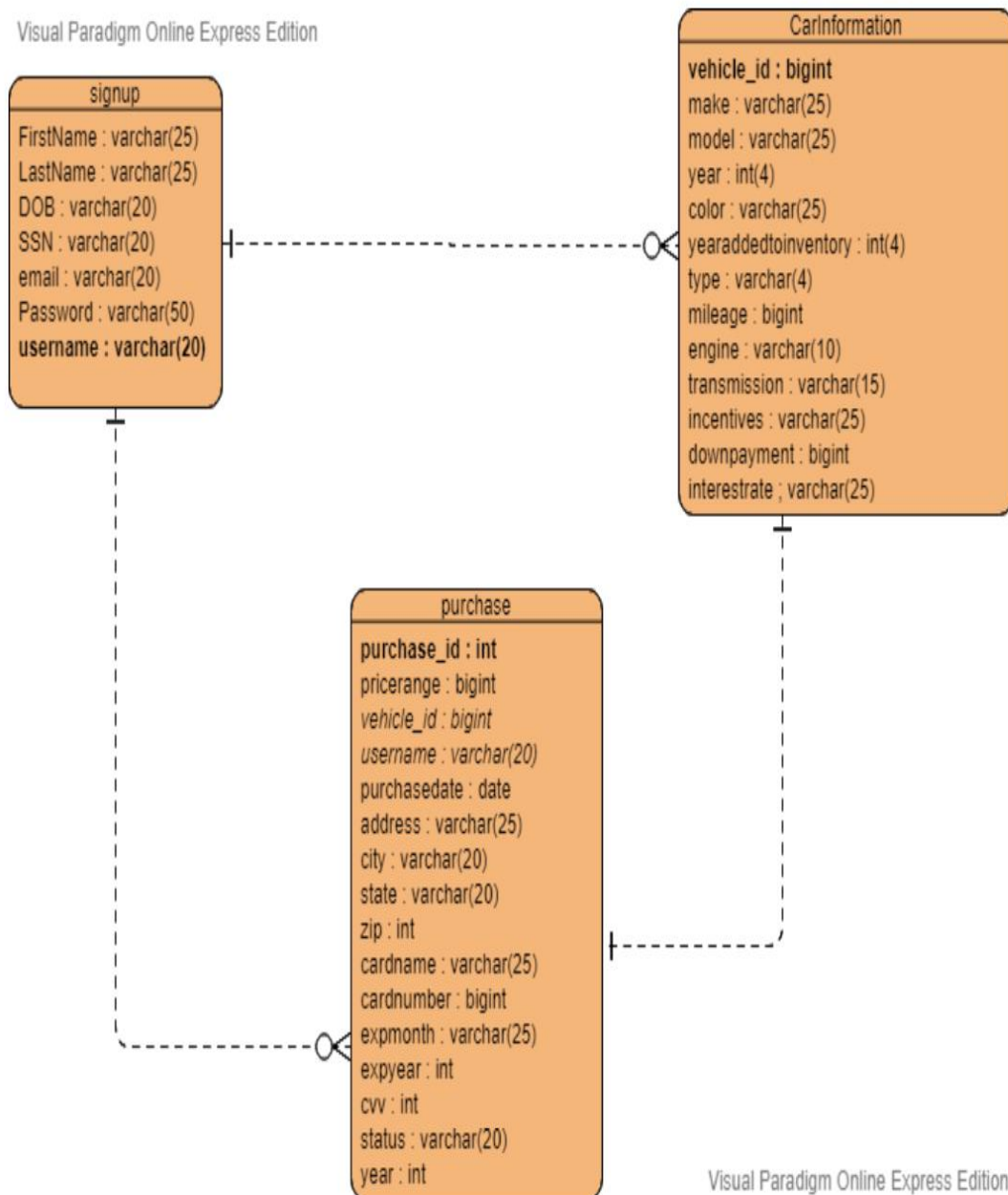
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## Entity Relationship Model (E-R Model)

Visual Paradigm Online Express Edition



Visual Paradigm Online Express Edition

## Design of Relational DB

### Signup:

#### **Relation Schema:**

Below is the relation schema for Signup table

signup = {username, FirstName, LastName, DOB, SSN, email, Password}

#### **Functional Dependencies for Signup table:**

username → FirstName, LastName, DOB, SSN, email, Password.

**BCNF:** Yes, it is in BCNF.

**Reason:** For above non-trivial FD, LHS of FD is a super key. To verify the same, calculate the closure of username. It determines all the attributes in Signup table.

$\{username\}^+ = \{username, FirstName, LastName, DOB, SSN, email, Password\}$ .

### Car Information:

#### **Relation Schema:**

Below is the relation schema for Car\_information table

CarInformation = {vehicle\_id, make, model, year, color, price, yearaddedtoinventory, type, mileage, engine, transmission, incentives, downpayment, interestrate}

#### **Functional Dependencies for Car\_information table:**

vehicle\_id → make, model, year, color, price, yearaddedtoinventory, type, mileage, engine, transmission, incentives, downpayment, interestrate.

**BCNF:** Yes, it is in BCNF.

**Reason:** For above non-trivial FD, LHS of FD is a super key. To verify the same, calculate the closure of vehicle\_id. It determines all the attributes in CarInformation table.

$\{vehicle\_id\}^+ = \{vehicle\_id, make, model, year, color, price, yearaddedtoinventory, type, mileage, engine, transmission, incentives, downpayment, interestrate\}$

### Purchase:

#### **Relation Schema:**

Below is the relation schema for Purchase table

purchase = {purchase\_id, payment, vehicle\_id, username, purchasedate, address, city, state, zip, cardname, cardnumber, expmonth, expyear, cvv, status, year}

#### **Functional Dependencies for Purchase table:**

purchase\_id -> payment, vehicle\_id, username, purchasedate, address, city , state , zip , cardname ,  
cardnumber , expmonth , expyear , cvv , status, year

**BCNF:** Yes, it is in BCNF.

**Reason:** For above non-trivial FDs, LHS of FD should be a super key. To verify the same, calculate the closure of purchase\_id. It determines all the attributes in Purchase table.

{purchase\_id}<sup>+</sup> = {purchase\_id, payment, vehicle\_id, username, purchasedate, address, city , state , zip ,  
cardname , cardnumber , expmonth , expyear , cvv , status, year}

### SQL Table Creation

```
C:\Wamp\bin\mysql\mysql5.7.24\bin\mysql.exe
mysql> create table signup(FirstName varchar(25) NOT NULL,
->                               LastName varchar(25) NOT NULL,
-> DOB varchar(20) NOT NULL,
-> SSN varchar(20) NOT NULL,
-> email varchar(20) NOT NULL,
-> Password varchar(50) NOT NULL,
->                               username varchar(20) NOT NULL,
-> primary key(username));
Query OK, 0 rows affected (0.02 sec)

mysql> _
```

```
mysql> create table CarInformation(vehicle_id bigint NOT NULL,
-> make varchar(25) NOT NULL,
-> model varchar(25) NOT NULL,
-> year int(4) NOT NULL,
-> color varchar(25) NOT NULL,
-> price bigint NOT NULL,
-> yearaddedtoinventory int(4) NOT NULL,
-> type varchar(4) NOT NULL,
-> mileage bigint NOT NULL,
-> engine varchar(10) NOT NULL,
-> transmission varchar(15) NOT NULL,
-> incentives varchar(25) NOT NULL,
-> downpayment bigint NOT NULL,
-> interestrate varchar(25) NOT NULL,
-> primary key(vehicle_id));
Query OK, 0 rows affected (0.02 sec)
```

```
mysql> create table purchase(purchase_id int NOT NULL AUTO_INCREMENT,  
-> payment bigint NOT NULL,  
-> vehicle_id bigint NOT NULL,  
-> username varchar(20) NOT NULL,  
-> purchasedate date NOT NULL,  
-> address varchar(25) NOT NULL,  
-> city varchar(20) NOT NULL,  
-> state varchar(20) NOT NULL,  
-> zip int NOT NULL,  
-> cardname varchar(25) NOT NULL,  
-> cardnumber bigint NOT NULL,  
-> expmonth varchar(25) NOT NULL,  
-> expyear int NOT NULL,  
-> cvv int NOT NULL,  
-> status varchar(20) DEFAULT 'In process',  
-> year int DEFAULT NULL,  
-> primary key(purchase_id),  
-> constraint FK_username  
-> foreign key(username) references signup(username),  
-> constraint FK_Vehicleid  
-> foreign key(vehicle_id) references CarInformation(vehicle_id));  
Query OK, 0 rows affected (0.02 sec)
```

## Data (Tables)

**Signup:**

```
mysql> select * from signup;
```

FirstName	LastName	DOB	SSN	email	Password	username
Ashutosh	Kamal	25-08-1988	123499	ashutosh@gmail.com	21232f297a57a5a743894a0e4a801fc3	admin
Anusha	Vanama	25-08-1993	123456	anusha.v@gmail.com	81dc9bdb52d04dc20036dbd8313ed055	Anusha
Aparna	Muppalla	25-09-1991	1234564	aparna@gmail.com	81dc9bdb52d04dc20036dbd8313ed055	Aparna

```
3 rows in set (0.01 sec)
```

```
mysql> █
```

**Car Information:**

```
C:\Wamp\bin\mysql\mysql5.7.24\bin\mysql.exe
rows in set (0.00 sec)

mysql> select * from carinformation;
```

vehicle_id	make	model	year	color	price	yearaddedtoinventory	type	mileage	engine	transmission	incentives	downpayment	interestrate
133	toyota	corolla	2019	red	30000	2019	new	0	3.6L	Automatic	1500 Rebate	2000	3.5 APR - 4.0 APR
123	toyota	camry	2019	blue	30000	2019	new	0	3L	Automatic	1500 Rebate	2000	3.5 APR - 4.0 APR
103	toyota	camry	2016	blue	15000	2018	used	15000	2L	Manual	0	1000	2.0 APR - 2.5 APR
113	toyota	corolla	2016	red	15000	2018	used	17000	2L	Manual	0	1000	2.0 APR - 2.5 APR
234	honda	civic	2019	white	30000	2019	new	0	2.4 L	Automatic	2000 bonus cash	2000	3.5 APR - 4.0 APR
236	honda	civic	2017	white	25000	2019	used	17000	2.0L	Automatic	0	1000	2.0 APR - 2.5 APR
235	honda	accord	2019	red	27000	2019	new	0	2.0 L	Automatic	1500 Rebate	2000	3.5 APR - 4.0 APR
237	honda	accord	2018	red	25000	2019	used	17000	1.5 L	Automatic	0	1000	2.0 APR - 2.5 APR

```
rows in set (0.00 sec)

mysql>
```

**Purchase:**

```
Select C:\Wamp\bin\mysql\mysql5.7.24\bin\mysql.exe
```

```
mysql> select * from purchase;
```

	purchase_id	payment	vehicle_id	username	purchasedate	address	city	state	zip	cardname	cardnumber	expmonth	expyear	cvv	status	year
r	1	2090	456	Ashu	2019-04-15	13432	cary	NC	27519	Ashu	1234567809876545	12	2021	1234	Shipped	2019
9	2	2030	237	Anusha	2019-04-15	13439	cary	NC	27519	Anusha	1234987876543452	12	2020	1234	In process	2019

```
--+
2 rows in set (0.00 sec)

mysql>
```


## Queries and Transactions

### Customer Queries

#### (a) Category Search

Customer can specify one or more of the following for their search: new or used, make, model, price-range, color.





Below is the interface for customers and below search is performed using price range





Home Login Contact

Enter your vehicle ID to search Search

New/Used Select Make Select Model Less than 15K Select Color Search




Results for above search, displays only the list having price Less than 15K. The system displays detailed information of the car including price, incentives, interest rate, down payment, etc..

Your Search Results		
Results:		
Vehicle id: 103 Make: toyota Model: camry Year: 2016 Color: blue Price: 15000 Year added to Inventory: 2018 Type: used Mileage: 15000 Engine: 2L Transmission: Manual Incentives: 0 Interest Rate: 2.0 APR - 2.5 APR Down Payment: 1000		Purchase
Vehicle id: 113 Make: toyota Model: corolla Year: 2016 Color: red Price: 15000 Year added to Inventory: 2018 Type: used Mileage: 17000 Engine: 2L Transmission: Manual Incentives: 0 Interest Rate: 2.0 APR - 2.5 APR Down Payment: 1000		Purchase




## (b) Search using Vehicle ID


Customer can search using Vehicle ID



[Home](#) [Login](#) [Contact](#)




Results for above search, displays the car information for above vehicle id “123”. The system displays detailed information of the car including price, incentives, interest rate, down payment, etc..



[Home](#)

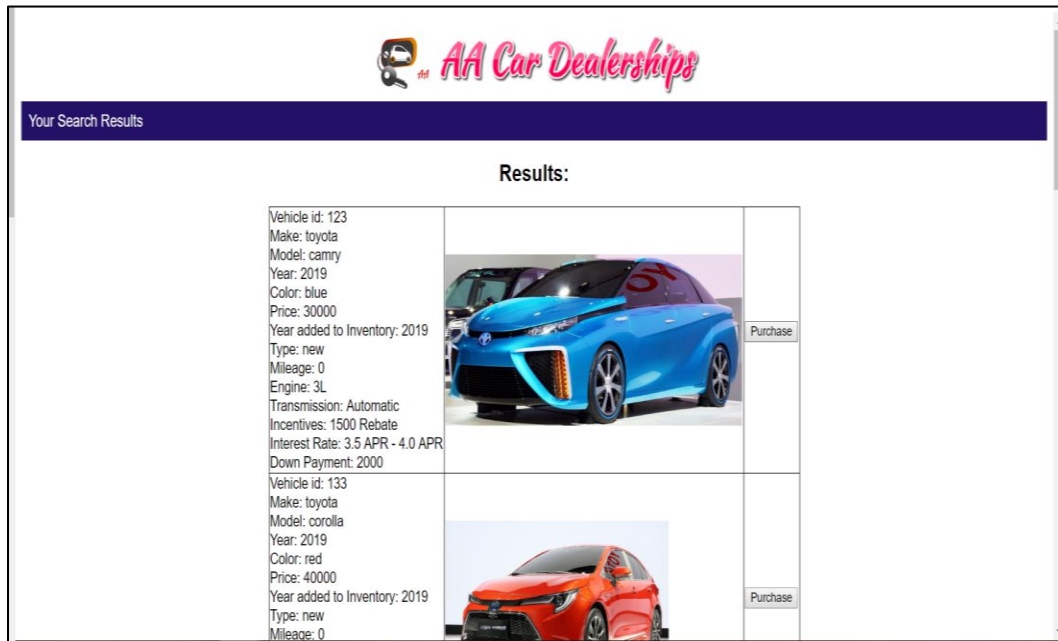
### Results for vehicle id: 123



Vehicle id: 123 Make: toyota Model: camry Year: 2019 Color: blue Price: 30000 Year added to Inventory: 2019 Type: new Mileage: 0 Engine: 3L Transmission: Automatic Incentives: 1500 Rebate Interest Rate: 3.5 APR - 4.0 APR Down Payment: 2000		<input type="button" value="Purchase"/>
--	--	---

## Customer Transactions

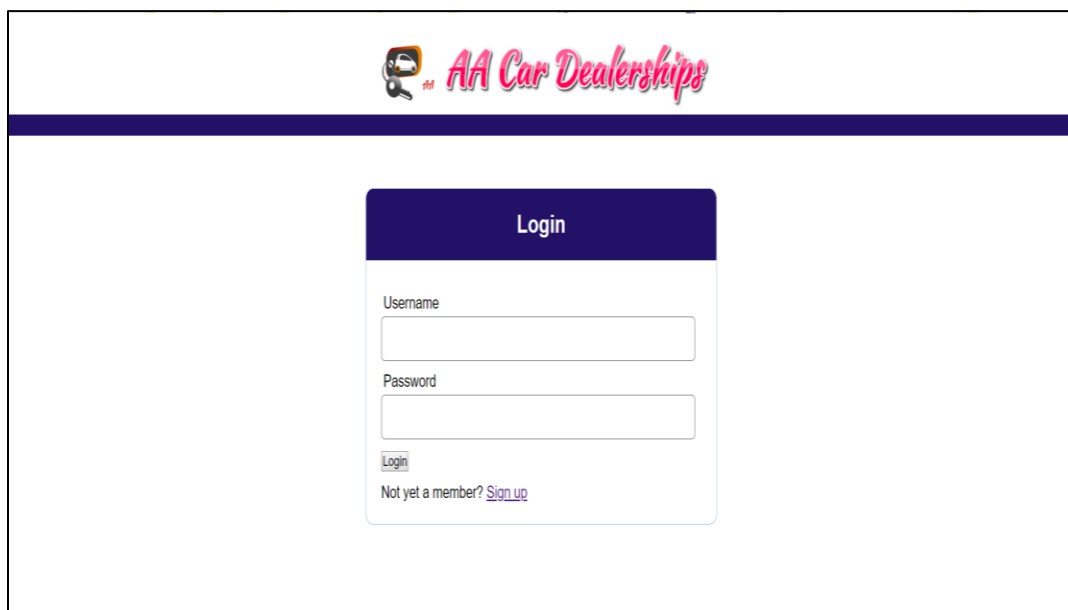
### (a) Purchase a car


Customer needs to Login first for below transactions. Customer can select purchase button in either of the search pages (category search and search using vehicle id) as performed above.



Your Search Results	
Results:	
<p>Vehicle id: 123 Make: toyota Model: camry Year: 2019 Color: blue Price: 30000 Year added to Inventory: 2019 Type: new Mileage: 0 Engine: 3L Transmission: Automatic Incentives: 1500 Rebate Interest Rate: 3.5 APR - 4.0 APR Down Payment: 2000</p>	 <a href="#">Purchase</a>
<p>Vehicle id: 133 Make: toyota Model: corolla Year: 2019 Color: red Price: 40000 Year added to Inventory: 2019 Type: new Mileage: 0</p>	 <a href="#">Purchase</a>

After clicking on purchase button for the selected car, customer is navigated to Login page.





### Login

Username

Password

[Login](#)

Not yet a member? [Sign up](#)

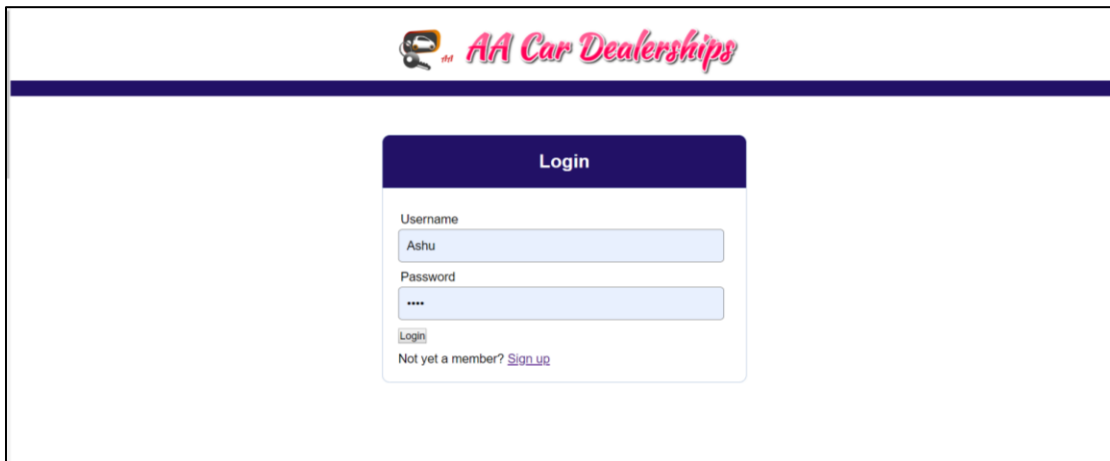
Customer can Login if he is already registered else customer is navigated to Sign up page for creating Login credentials. Below is the view for Sign up page

The screenshot displays a web browser window with a 'Register' form. The form is titled 'Register' in a dark blue header. It contains several input fields, each with a label above it: 'First Name' (filled with 'Ashu'), 'Last Name' (filled with 'Ventra'), 'Date Of Birth' (filled with '12-09-1990'), 'SSN' (filled with '123456'), 'Username' (filled with 'Ashu'), 'Email' (filled with 'ashu.v@gmail.com'), 'Password' (filled with four dots), and 'Confirm password' (filled with four dots). Below the 'Confirm password' field is a blue 'Register' button. At the bottom of the form, there is a link that says 'Already a member? Sign in'.

Username is unique and it allows only one customer to register with that username, the same thing applies for email as well. Both Password and Confirm Password should match.

The screenshot displays the same 'Register' form as above, but with validation errors. A red error message box at the top of the form contains the following text: 'The two passwords do not match', 'Username already exists', and 'email already exists'. The 'First Name' field is filled with 'Ashu', 'Last Name' with 'Ventra', 'Date Of Birth' with '12-09-1990', 'SSN' with '123456', 'Username' with 'Ashu', and 'Email' with 'ashu.v@gmail.com'. The 'Password' and 'Confirm password' fields are empty. The 'Register' button is still visible at the bottom of the form.

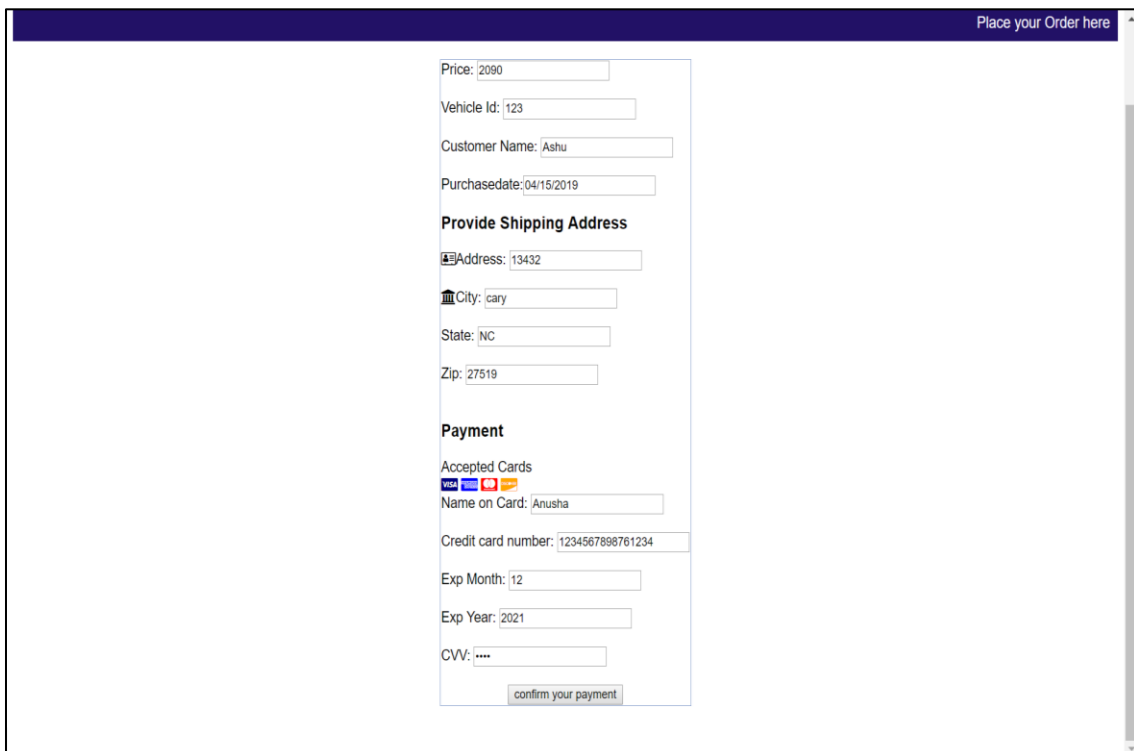
Customer is navigated to Login page once Sign-up is done.



The screenshot shows the login page for 'AA Car Dealerships'. At the top, there is a logo with a car icon and the text 'AA Car Dealerships' in a stylized font. Below the logo is a dark blue horizontal bar. The main content area is white and contains a 'Login' form. The form has a dark blue header with the word 'Login' in white. Below the header, there are two input fields: 'Username' with the value 'Ashu' and 'Password' with the value '\*\*\*\*'. Below the password field is a 'Login' button. At the bottom of the form, there is a link that says 'Not yet a member? [Sign up](#)'.

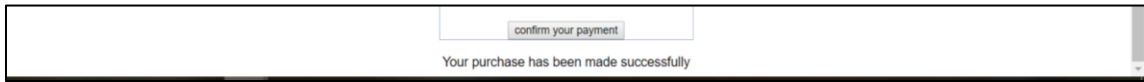
**(b) Finalize a purchase**

Customer is navigated to Purchase page once Login is done. Vehicle Id and Customer Name are prepopulated. Customer needs to enter Price, Purchasedate, Shipping address and credit card details.



The screenshot shows the purchase page. At the top right, there is a dark blue bar with the text 'Place your Order here'. The main content area is white and contains a form with several sections. The first section has input fields for 'Price' (2090), 'Vehicle Id' (123), 'Customer Name' (Ashu), and 'Purchasedate' (04/15/2019). The second section is titled 'Provide Shipping Address' and has input fields for 'Address' (13432), 'City' (cary), 'State' (NC), and 'Zip' (27519). The third section is titled 'Payment' and has a sub-section 'Accepted Cards' with logos for Visa, Mastercard, and American Express. Below this are input fields for 'Name on Card' (Anusha), 'Credit card number' (12345678901234), 'Exp Month' (12), 'Exp Year' (2021), and 'CVV' (\*\*\*\*). At the bottom of the form is a 'confirm your payment' button.

After clicking on Confirm your payment button, data is inserted into purchase table and below success message is displayed.



Status is updated as "In Process" in Database for the above transaction under purchase table

5	2090	123	Ashu	2019-04-15	13432	cary	NC	27519	Anusha	1234567898761234	12	2021	1234	In process	NUL
---	------	-----	------	------------	-------	------	----	-------	--------	------------------	----	------	------	------------	-----

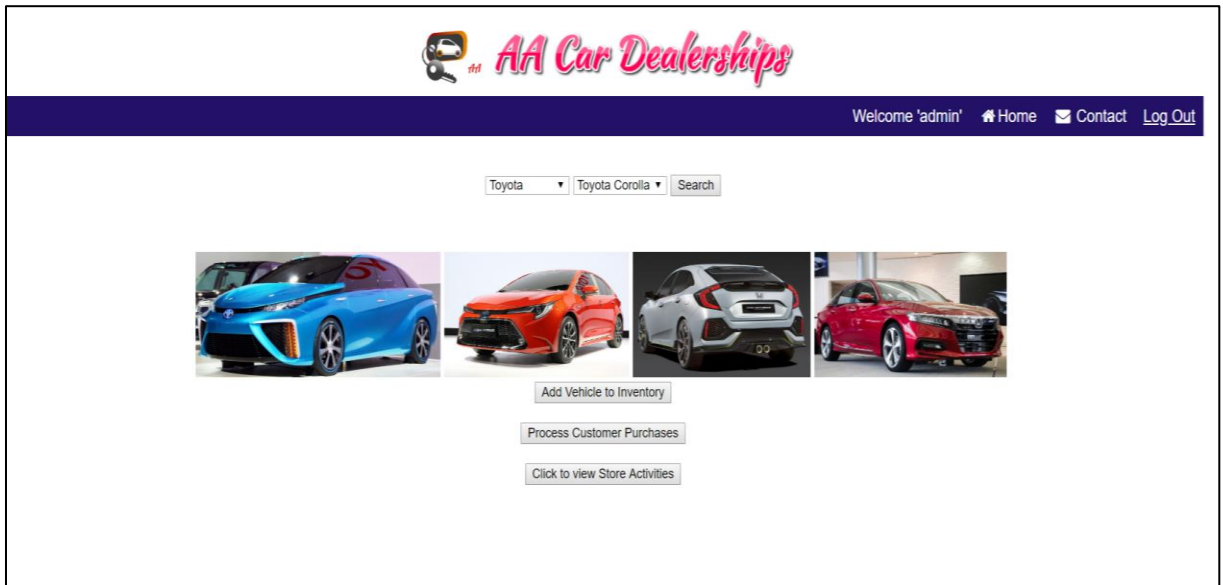
## Administration Queries

### (a) Stock details based on make and model selection


Below operations can be performed only using admin credentials.

Admin can find the information of vehicles by selecting make and model. It also displays the status details including the number of new and used vehicles in stock.

Below is the interface for manager(admin) and search is performed based on make and model.



Results for above search, displays status details including the number of new and used vehicles in stock for make Toyota and model Toyota Corolla.




### Your Search Results


Results for make: toyota and model: corolla

Total number of vehicles in stock	2
Number of new cars in stock	1
Number of used cars in stock	1

Vehicle id: 133  
Make: toyota  
Model: corolla  
Year: 2019  
Color: red  
Price: 40000  
Year added to Inventory: 2019  
Type: new  
Mileage: 0  
Engine: 3.6L  
Transmission: Automatic  
Incentives: 1500 Rebate  
Interest Rate: 3.5 APR - 4.0 APR  
Down Payment: 2000




Vehicle id: 113  
Make: toyota  
Model: corolla  
Year: 2016  
Color: red  
Price: 15000  
Year added to Inventory: 2018  
Type: used  
Mileage: 17000  
Engine: 2L  
Transmission: Manual  
Incentives: 0  
Interest Rate: 2.0 APR - 2.5 APR  
Down Payment: 1000







## (b) Statistics


Admin can view the report of store activities for a given period. Admin clicks on button Click to view Store Activities to view the statistics report and selects the from and to year.




Welcome 'admin' [Home](#) [Contact](#) [Log Out](#)

Select Make ▼ Select Model ▼





Results for above search, displays report of store activities for the selected period



From\_Year:

To\_Year:


search

Number of cars in the inventory for the selected period	8
Number of cars shipped for the selected period	2
Number of cars yet to be shipped for the selected period	1

## Administration Transactions





### (a) Add Vehicle Information to Inventory

Admin can enter the information about a car into the inventory. Add Vehicle to Inventory button is clicked to add new car into inventory.



Welcome 'admin' [Home](#) [Contact](#) [Log Out](#)


Select Make ▼ Select Model ▼ Search



Add Vehicle to Inventory

Process Customer Purchases

Click to view Store Activities



[Home](#)

Vehicle\_id:

Make:

Model:

Year:

Color:

Price:

Year Added To Inventory:

Type:

Mileage:

Engine:

Transmission:

Incentives:

DownPayment:

InterestRate:

Car Information is updated in Database once admin clicks on Add to Inventory button.  
Details of vehicle ID 456 is updated in carinformation table.

```

C:\Wamp\bin\mysql\mysql5.7.24\bin\mysql.exe
mysql> select * from carinformation;

```

vehicle_id	make	model	year	color	price	yearaddedtoinventory	type	mileage	engine	transmission	incentives	downpayment	interestrate
133	toyota	corolla	2019	red	30000	2019	new	0	3.6L	Automatic	1500 Rebate	2000	3.5 APR - 4.0 APR
123	toyota	camry	2019	blue	30000	2019	new	0	3L	Automatic	1500 Rebate	2000	3.5 APR - 4.0 APR
103	toyota	camry	2016	blue	15000	2018	used	15000	2L	Manual	0	1000	2.0 APR - 2.5 APR
113	toyota	corolla	2016	red	15000	2018	used	17000	2L	Manual	0	1000	2.0 APR - 2.5 APR
234	honda	civic	2019	white	30000	2019	new	0	2.4 L	Automatic	2000 bonus cash	2000	3.5 APR - 4.0 APR
236	honda	civic	2017	white	25000	2019	used	17000	2.0L	Automatic	0	1000	2.0 APR - 2.5 APR
235	honda	accord	2019	red	27000	2019	new	0	2.0 L	Automatic	1500 Rebate	2000	3.5 APR - 4.0 APR
237	honda	accord	2018	red	25000	2019	used	17000	1.5 L	Automatic	0	1000	2.0 APR - 2.5 APR
456	toyota	camry	2019	blue	30000	2019	new	0	3L	Automatic	1500 Rebate	2000	3.5 APR - 4.0 APR




```

mysql>

```

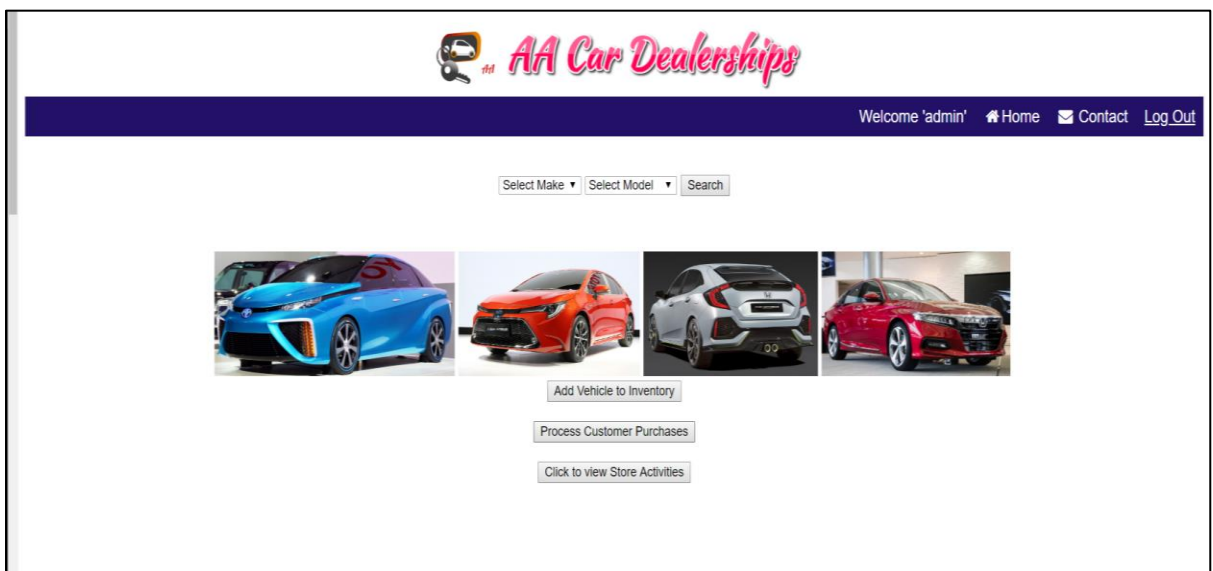



Same information can be viewed in customer user interface as well after clicking on search button as below.

Engine: 2.0 L Transmission: Automatic Incentives: 1500 Rebate Interest Rate: 3.5 APR - 4.0 APR Down Payment: 2000		
Vehicle id: 237 Make: honda Model: accord Year: 2018 Color: red Price: 25000 Year added to Inventory: 2019 Type: used Mileage: 17000 Engine: 1.5 L Transmission: Automatic Incentives: 0 Interest Rate: 2.0 APR - 2.5 APR Down Payment: 1000		Purchase
Vehicle id: 456 Make: toyota Model: camry Year: 2019 Color: blue Price: 30000 Year added to Inventory: 2019 Type: new Mileage: 0 Engine: 3L Transmission: Automatic Incentives: 1500 Rebate Interest Rate: 3.5 APR - 4.0 APR Down Payment: 2000		Purchase

#### (b) Process customer purchase

Admin will process all the customer purchases after clicking on Process Customer Purchases button. Order is shipped to the customer and corresponding information is removed from the inventory once admin confirms all the purchases.





Purchase id: 2	Vehicle id: 123	Customer Name: Ashu
Purchase id: 3	Vehicle id: 133	Customer Name: Ashu

Confirm all purchases

Below updations are done in Database once admin clicks on Confirm all purchases button.  
Below success message is displayed in UI.



All the purchased cars are shipped

Both the car details(vehicle\_id: 123 and 133) are deleted from CarInformation table

```
mysql> select * from carinformation;
```

vehicle_id	make	model	year	color	price	yearaddedtoinventory	type	mileage	engine	transmission	incentives	downpayment	interestrate
103	toyota	camry	2016	blue	15000	2018	used	15000	2L	Manual	0	1000	2.0 APR - 2.5 APR
113	toyota	corolla	2016	red	15000	2018	used	17000	2L	Manual	0	1000	2.0 APR - 2.5 APR
234	honda	civic	2019	white	30000	2019	new	0	2.4 L	Automatic	2000 bonus cash	2000	3.5 APR - 4.0 APR
236	honda	civic	2017	white	25000	2019	used	17000	2.0L	Automatic	0	1000	2.0 APR - 2.5 APR
235	honda	accord	2019	red	27000	2019	new	0	2.0 L	Automatic	1500 Rebate	2000	3.5 APR - 4.0 APR
237	honda	accord	2018	red	25000	2019	used	17000	1.5 L	Automatic	0	1000	2.0 APR - 2.5 APR

```
6 rows in set (0.01 sec)

mysql>
```

Status is updated as shipped for both purchase id's ( 2 and 3) in purchase table.

```
mysql> select * from purchase;
```

purchase_id	payment	vehicle_id	username	purchasedate	address	city	state	zip	cardname	cardnumber	expmonth	expyear	cvv	status
2	2090	123	Ashu	2019-04-15	13432	cary	NC	27519	Anusha	1234567898761234	12	2021	1234	Shipped
3	2090	133	Ashu	2019-04-15	13432	cary	NC	27519	Anusha	2345678909876545	12	2022	1256	Shipped

```
2 rows in set (0.00 sec)
```