

CS-GY 6083 - B, FALL 2020
Principles of Database Systems
Project Part 2:

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1. Summary

a) Backgrounds:

WOW (World On Wheels) is a car rental company. WOW has many locations at various airports, towns, and cities in the United States. With growth of the business and to efficiently manage its business, WOW intends to convert its file system base data management to sophisticated centralized database system.

1. Each office location of WOW maintains various classes of rental vehicles. Each vehicle is identified by Make, Model, Year, VIN (Vehicle Identification Number), and License Plate number.
2. Each location has various classes of vehicle such as small car, mid-size car, luxury car, SUV, Premium SUV, Mini Van, Station Wagon etc. Each class has its own rental rate per day of the rental service and fees for over mileage (if rental service exceeds odometer limits/day). For example, a rental car service of a mid-size car has daily rate of service as \$40/day and over mileage fees as \$2/mile. If a customer has rental service for 2 days, and odometer limit of 500 miles/day. So rental service has a limitation of total 1000 miles. If this rental service has used 1050 miles, then customer will be charged as $2 \text{days} * \$40 + \$2 * 50$ extra miles, totaling to \$180.
3. WOW has customers of types Individual or Corporate. WOW maintains list of their customers with Customer's Full Address, Email address, and Phone number. WOW keeps only one address of each customer.
4. For Individual customer WOW stores Customer Full Name, Driver License Number, Insurance Company Name and Insurance Policy Number. At present, WOW does not provide vehicle insurance to their customers for car rental service and customers need to bring his/her own insurance.
5. For Corporate customers, WOW maintains details of Name and Registration number of the corporation, and Employee ID of the customer who rents the car on a corporate account.
6. WOW occasionally mails discount coupons to their customers and also mails such discount coupons to neighborhood residents. WOW provides discounts to their individual customers who bring in such a coupon at the time of renting a vehicle. Such discount coupons carry validity dates and percentage of discount offered, for example 5% discount valid from 10/01/2020 to 10/31/2020.
7. WOW provides discount to corporate customers on fixed corporate discount set for affiliated corporate companies and that discounts differs from corporation to corporation. Such discount is offered to corporate customers irrespective of date of rental service.

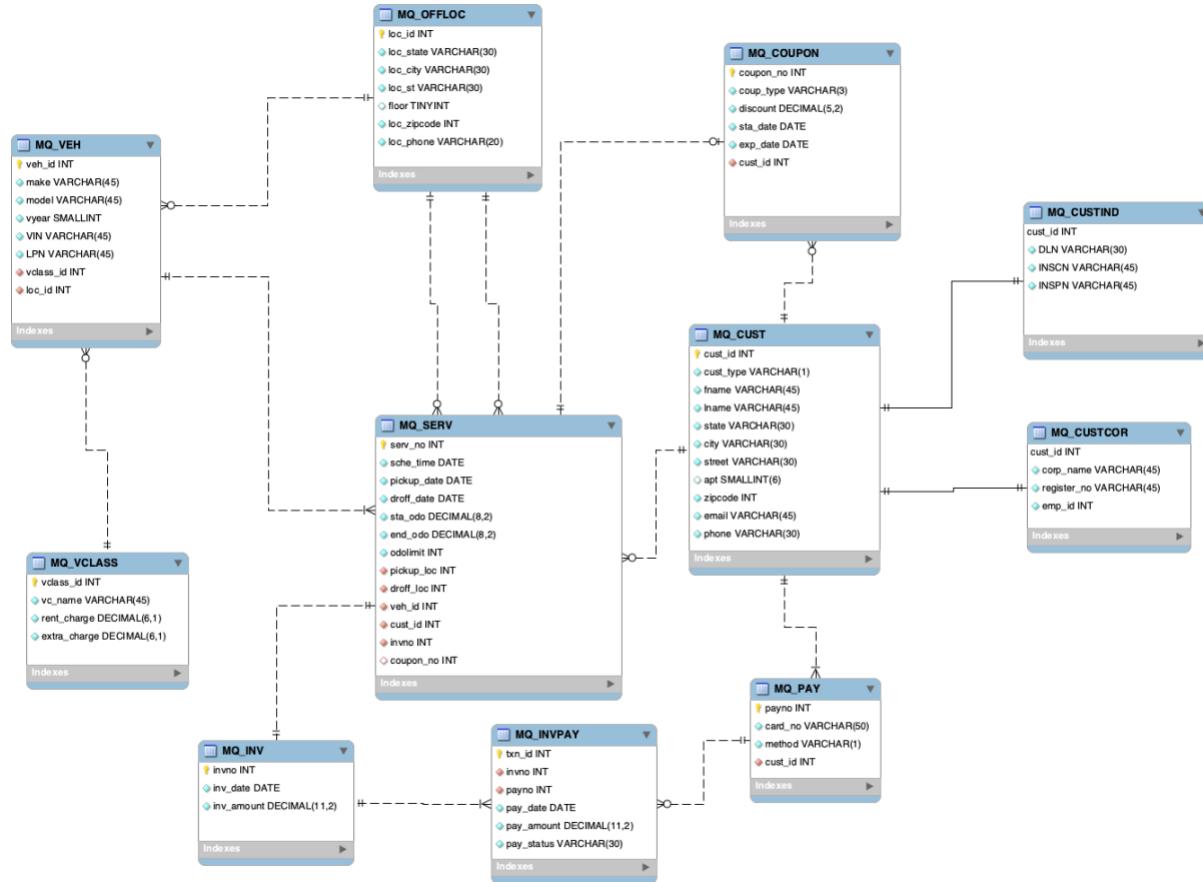
8. WOW provides only one type of the discount (individual discount coupon or corporate discount) at a time for the rental service and does not allow both discounts for the same rental service.
9. For each rental service, WOW records Pickup Location, Drop off Location, Pickup Date, Drop off Date, Start Odometer, End Odometer, Daily Odometer Limit for the rental service. Some rental services are with unlimited mileage.
10. For each rental service provided, WOW raises an invoice with Invoice Date, and Invoice Amount
11. WOW allows customers to pay an invoice using multiple methods (credit/debit/gift card) and stores multiple records for each payment made against an invoice, WOW stores Payment Date, Payment Method, and Card Number for each payment.
12. For each rental office location, WOW keeps records of its Full Address, and Phone Number.

b) Other Business Assumptions:

1. For each rental service provided WOW will raise an invoice (with unique invno). A customer can use multiple methods to pay for an invoice but each method can only be used once for an invoice payment. Besides, an invoice may not be paid.
2. A customer may have several coupons but can only use 1 coupon at a time for a rental service. A coupon can only be used once and can't be repeated used. Also a coupon may not be used in a rental service.
3. A rental service is provided by one rental office and can't be provided by many offices at the same time. Each rental office may provide more than one rental services or no service.
4. A vehicle can only be classified into one class.
5. Each rental office must have at least one available vehicle in store while a vehicle may not be assigned to any rental office.
6. A customer may order several rental services but a rental service can only be scheduled by one customer. For each service the pickup and dropoff location cannot be the same.
7. WOW doesn't provide driver for rental service. Therefore, each customer must get a valid driver license and drive themselves.
8. A customer can be either an individual customer or a corporation customer. Similar with coupon types: either "individual" or "corporation" type.

c) Possible Solution

A relational database model based on MySQL for WOW company is illustrated as below. A WOW customer can be either an individual customer or a corporation representative. A customer must have at least one payment method but may not have a coupon. He or she may order a service with a coupon used or not. There is a one-to-one relationship between a service and an invoice so each service number should be consistent with invoice number. For each rental vehicle it must be assigned a unique vehicle type for computing rental charge. At the same time each WOW office may or may not own their vehicles and rental services.



Essentially in this project we need to build a webpage that interact with real users based on the above relational database. Which means that the users can only do CURD operations via the web interface instead of touching the raw data stored in backend database that is not open to the users but open to DBA etc. The users could be either customers or employees of WOW, and they have different authorization on data. Therefore, the web development can be divided into two main parts: employee web interface development and customer web interface development. Generally, users should be able to register, login and can perform business activities (basically CURD operations or other sql queries). But specifically employee users have full authorities to CURD operations on all database tables while customer users only have limited CURD authorities on certain tables. In most cases data provided to customer web interface is read-only and other operations are not allowed. For example, a customer user can read all the services he or she has ordered via customer

web-page, or create a new service. However, there is no choice like “edit” or “delete” shown on webpage so it’s impossible for any customer user to arbitrarily edit or delete his or her services information. Such operations can only be achieved on employee side via employee web interface.

2. Software, language and database used

There are mainly two parts for this project. First is the backend database where all original necessary business data stored. In my project, phpMyAdmin, which is a popular MySQL management tool based on web server, is used to store and manage the WOW relational database. However, the users don't have access to the database directly, they are only allowed to perform business operations via a web interface which is connected to backend database. Therefore, we need to build a frontend framework that interacts with all users directly and provides limited CURD authorities to different types of users. In this project, PHP framework is used as a strong and flexible tool to construct a web interface.

3. List of tables and corresponding records

All tables below are illustrated via phpMyAdmin:

Server: localhost > Database: wowdb

Structure	SQL	Search	Query	Export	Import	Operations	Privileges	Routines	Events	Triggers	More	
Filters												
Containing the word: <input type="text"/>												
Table	Action				Rows	Type	Collation	Size	Overhead			
<input type="checkbox"/> cust_admins								4	InnoDB	utf8mb4_general_ci	32.0 Kib	-
<input type="checkbox"/> MQ_COUPON								10	InnoDB	utf8mb4_general_ci	32.0 Kib	-
<input type="checkbox"/> MQ_CUST								10	InnoDB	utf8mb4_general_ci	16.0 Kib	-
<input type="checkbox"/> MQ_CUSTCOR								2	InnoDB	utf8mb4_general_ci	16.0 Kib	-
<input type="checkbox"/> MQ_CUSTIND								8	InnoDB	utf8_general_ci	16.0 Kib	-
<input type="checkbox"/> MQ_INV								10	InnoDB	utf8_general_ci	16.0 Kib	-
<input type="checkbox"/> MQ_INVPAY								10	InnoDB	utf8_general_ci	48.0 Kib	-
<input type="checkbox"/> MQ_OFFLOC								10	InnoDB	utf8mb4_general_ci	16.0 Kib	-
<input type="checkbox"/> MQ_PAY								10	InnoDB	utf8_general_ci	32.0 Kib	-
<input type="checkbox"/> MQ_SERV								14	InnoDB	utf8mb4_general_ci	112.0 Kib	-
<input type="checkbox"/> MQ_VCLASS								13	InnoDB	utf8mb4_general_ci	16.0 Kib	-
<input type="checkbox"/> MQ_VEH								13	InnoDB	utf8_general_ci	48.0 Kib	-
<input type="checkbox"/> staff_admins								2	InnoDB	utf8mb4_general_ci	32.0 Kib	-
13 tables	Sum				116	InnoDB	utf8mb4_general_ci	432.0 Kib	0 B			

- a) Independent tables (2 tables: staff admins, cust admins)

Administrators on employee side:

Showing rows 0 - 1 (2 total, Query took 0.0005 seconds.)

```
SELECT * FROM `staff_admins`
```

Profiling [Edit inline] [Edit] [Explain SQL]

Show all | Number of rows: 25 ▾ Filter rows: Search this table Sort by key: None ▾

+ Options

	id	first_name	last_name	email	username	hashed_password
<input type="checkbox"/>	1	John	Raven	JohnR@123.com	Admin01	\$2y\$10\$Fyiddgx4WBeuye.9DTIG7eDc00.tQDKKH.DXbcSYD2k...
<input type="checkbox"/>	2	Jane	White	JWhite@nyu.edu	Student	\$2y\$10\$hew6bU/LeZkimpFT2kZ96.vGPN3z2.0ZFTVhCW7a4Ab...

Administrators on customer side:

Showing rows 0 - 3 (4 total, Query took 0.0006 seconds.)

```
SELECT * FROM `cust_admins`
```

Profiling [Edit inline] [Edit] [Explain SQL] [Create PHP code]

Show all | Number of rows: 25 ▾ Filter rows: Search this table Sort by key: None ▾

+ Options

	id	first_name	last_name	email	username	hashed_password
<input type="checkbox"/>	1	MIKE	GREEN	MIKE01@gmail.com	customer0001	\$2y\$10\$B9UdBUGyHayw5ykrfOBWOFCLRvPQVWJpB1CX1N5y9F...
<input type="checkbox"/>	2	SMITH	WHITE	SMITH03@gmail.com	customer0003	\$2y\$10\$cMnmWWK8t37UCTvusN3WYeT.CGu7MSG/RnUVEqEkql...
<input type="checkbox"/>	3	Marvin	Ave	ALLEN02@gmail.com	customer0002	\$2y\$10\$hS6a9rrRcFv.tAfnqCoVnO/u2C5XQKjcovZsoMJ3A8h...
<input type="checkbox"/>	4	Ward	WOOD	WARD04@gmail.com	customer0004	\$2y\$10\$NPQPC3o3i0wTAJSwkJAiMeSiHbv2jo3ps6Hptrde2dh...

b) Parent tables (4 tables: MQ_CUST, MQ_INV, MQ_OFFLOC, MQ_VCLASS):

Customer table:

Showing rows 0 - 9 (10 total, Query took 0.0006 seconds.)

```
SELECT * FROM `MQ_CUST`
```

Show all | Number of rows: 25 ▾ Filter rows: Search this table Sort by key: None ▾

+ Options

	cust_id	cust_type	fname	lname	state	city	st_addr	apt	zipcode	email	phone
<input type="checkbox"/>	1	I	MIKE	GREEN	NEW YORK	NEW YORK	57th WEST	305	10019	MIKE01@gmail.com	212-348-1161
<input type="checkbox"/>	2	C	Marvin	Ave	NEW YORK	NEW YORK	68th AVE	NULL	10020	ALLEN02@gmail.com	212-673-0028
<input type="checkbox"/>	3	I	SMITH	WHITE	TEXAS	HOUSTON	101th NORTH	124	77009	SMITH03@gmail.com	281-984-1345
<input type="checkbox"/>	4	I	WARD	WOOD	NEW YORK	NEW YORK	43th SOUTH	305	10019	WARD04@gmail.com	212-348-1161
<input type="checkbox"/>	5	I	JONES	HADE	CALIFORNIA	LOS ANGELES	15th NORTHEAST	112	92025	JONES123@gmail.com	213-052-3730
<input type="checkbox"/>	6	I	MARY	WONDER	NEW YORK	NEW YORK	72th NORTHWEST	305	10019	MARY06@gmail.com	212-963-5034
<input type="checkbox"/>	7	C	W.	T.	CALIFORNIA	LOS ANGELES	125th SOUTHEAST	NULL	90036	BLACK07@gmail.com	213-752-1356
<input type="checkbox"/>	8	I	BECKY	WHITE	NEW YORK	NEW YORK	9th SOUTHWEST	101	10019	BECKY08@gmail.com	212-245-7308
<input type="checkbox"/>	9	I	TOM	SHEFFIELD	MASSACHUSETTS	BOSTON	45th SOUTHWEST	37	2196	TOM09@gmail.com	212-583-0097
<input type="checkbox"/>	10	I	JERRY	COOK	NEW YORK	NEW YORK	9th SOUTHWEST	54	10019	JERRY10@gmail.com	212-132-4811

↑ Check all With selected: Edit Copy Delete Export

Invoice table:

Showing rows 0 - 9 (10 total, Query took 0.0004 seconds.)

```
SELECT * FROM `MQ_INV`
```

Show all | Number of rows: 25 Filter rows: Search this table

+ Options

	invno	inv_date	inv_amount
<input type="checkbox"/>	1	2019-03-18	105.60
<input type="checkbox"/>	2	2019-04-09	95.20
<input type="checkbox"/>	3	2019-04-21	110.20
<input type="checkbox"/>	4	2019-05-05	93.40
<input type="checkbox"/>	5	2019-07-01	220.60
<input type="checkbox"/>	6	2019-07-12	150.00
<input type="checkbox"/>	7	2019-07-30	180.50
<input type="checkbox"/>	8	2019-08-20	130.92
<input type="checkbox"/>	9	2019-10-08	320.40
<input type="checkbox"/>	10	2019-12-19	280.20

Office locations' table:

Showing rows 0 - 9 (10 total, Query took 0.0006 seconds.)

```
SELECT * FROM `MQ_OFFLOC`
```

Profiling [Edit]

Show all | Number of rows: 25 Filter rows: Search this table Sort by key: None

+ Options

	loc_id	loc_state	loc_city	loc_st	floor	loc_zipcode	loc_phone
<input type="checkbox"/>	10	NEW YORK	NEW YORK	01 GOLD	5	10001	212-346-8192
<input type="checkbox"/>	11	CALIFORNIA	LOS ANGELES	02 WEST	NULL	90032	213-643-1554
<input type="checkbox"/>	12	ILLINOIS	CHICAGO	03 EAST	NULL	60628	312-278-5773
<input type="checkbox"/>	13	TEXAS	HOUSTON	04 NORTH	NULL	77009	281-952-0136
<input type="checkbox"/>	14	CALIFORNIA	SAN DIEGO	05 SOUTH	12	92025	415-745-7653
<input type="checkbox"/>	15	TEXAS	DALLAS	06 NORTHEAST	NULL	75206	214-112-3650
<input type="checkbox"/>	16	OHIO	COLUMBUS	07 SOUTHEAST	NULL	43125	614-387-5523
<input type="checkbox"/>	17	WASHINGTON	SEATTLE	08 NORTHWEST	NULL	98112	206-832-9958
<input type="checkbox"/>	18	MASSACHUSETTS	BOSTON	09 SOUTHWEST	3	2196	617-663-0525
<input type="checkbox"/>	19	MICHIGAN	DETROIT	10 CENTER	NULL	48277	313-658-1728

Vehicle type table:

Showing rows 0 - 9 (10 total, Query took 0.0005 seconds.)

```
SELECT * FROM `MQ_VCLASS`
```

Show all | Number of rows: 25 Filter rows: Search this table Sort by key:

+ Options

	<input type="button" value="Edit"/>	<input type="button" value="Copy"/>	<input type="button" value="Delete"/>	vclass_id	vc_name	rent_charge	extra_charge
<input type="checkbox"/>	<input type="button" value="Edit"/>	<input type="button" value="Copy"/>	<input type="button" value="Delete"/>	1	SMALL	35.0	2.0
<input type="checkbox"/>	<input type="button" value="Edit"/>	<input type="button" value="Copy"/>	<input type="button" value="Delete"/>	2	MID-SIZE	40.0	2.0
<input type="checkbox"/>	<input type="button" value="Edit"/>	<input type="button" value="Copy"/>	<input type="button" value="Delete"/>	3	FULL-SIZE	50.0	3.0
<input type="checkbox"/>	<input type="button" value="Edit"/>	<input type="button" value="Copy"/>	<input type="button" value="Delete"/>	4	LUXURY	150.0	10.0
<input type="checkbox"/>	<input type="button" value="Edit"/>	<input type="button" value="Copy"/>	<input type="button" value="Delete"/>	5	SUV	60.0	5.0
<input type="checkbox"/>	<input type="button" value="Edit"/>	<input type="button" value="Copy"/>	<input type="button" value="Delete"/>	6	PREMIUM SUV	80.0	6.0
<input type="checkbox"/>	<input type="button" value="Edit"/>	<input type="button" value="Copy"/>	<input type="button" value="Delete"/>	7	MINI VAN	45.0	3.0
<input type="checkbox"/>	<input type="button" value="Edit"/>	<input type="button" value="Copy"/>	<input type="button" value="Delete"/>	8	STATION WAGON	70.0	4.0
<input type="checkbox"/>	<input type="button" value="Edit"/>	<input type="button" value="Copy"/>	<input type="button" value="Delete"/>	9	BUS	90.0	6.0
<input type="checkbox"/>	<input type="button" value="Edit"/>	<input type="button" value="Copy"/>	<input type="button" value="Delete"/>	10	ELECTRIC	80.0	5.5

c) Child tables(6 tables: MQ_CUSTIND, MQ_CUSTCOR, MQ_COUPON, MQ_PAY , MQ_SERV, MQ_VEH):

Individual customer table:

Showing rows 0 - 7 (8 total, Query took 0.0004 seconds.)

```
SELECT * FROM `MQ_CUSTIND`
```

Show all | Number of rows: 25 Filter rows: Search this table

+ Options

	<input type="button" value="Edit"/>	<input type="button" value="Copy"/>	<input type="button" value="Delete"/>	cust_id	DLN	INSCN	INSPN
<input type="checkbox"/>	<input type="button" value="Edit"/>	<input type="button" value="Copy"/>	<input type="button" value="Delete"/>	1	LC001	SCN001	SPN001
<input type="checkbox"/>	<input type="button" value="Edit"/>	<input type="button" value="Copy"/>	<input type="button" value="Delete"/>	3	LC003	SCN003	SPN003
<input type="checkbox"/>	<input type="button" value="Edit"/>	<input type="button" value="Copy"/>	<input type="button" value="Delete"/>	4	LC004	SCN004	SPN004
<input type="checkbox"/>	<input type="button" value="Edit"/>	<input type="button" value="Copy"/>	<input type="button" value="Delete"/>	5	LC005	SCN005	SPN005
<input type="checkbox"/>	<input type="button" value="Edit"/>	<input type="button" value="Copy"/>	<input type="button" value="Delete"/>	6	LC006	SCN006	SPN006
<input type="checkbox"/>	<input type="button" value="Edit"/>	<input type="button" value="Copy"/>	<input type="button" value="Delete"/>	8	LC008	SCN008	SPN008
<input type="checkbox"/>	<input type="button" value="Edit"/>	<input type="button" value="Copy"/>	<input type="button" value="Delete"/>	9	LC009	SCN009	SPN009
<input type="checkbox"/>	<input type="button" value="Edit"/>	<input type="button" value="Copy"/>	<input type="button" value="Delete"/>	10	LC010	SCN010	SPN010

Corporation customer table:

Showing rows 0 - 1 (2 total, Query took 0.0004 seconds.)

```
SELECT * FROM `MQ_CUSTCOR`
```

Show all | Number of rows: 25 Filter rows: Search this table So

+ Options

	<input type="button" value="Edit"/>	<input type="button" value="Copy"/>	<input type="button" value="Delete"/>	cust_id	corp_name	register_no	emp_id
<input type="checkbox"/>	<input type="button" value="Edit"/>	<input type="button" value="Copy"/>	<input type="button" value="Delete"/>	2	APPLE	PD8895	1280
<input type="checkbox"/>	<input type="button" value="Edit"/>	<input type="button" value="Copy"/>	<input type="button" value="Delete"/>	7	AMAZON	XD3565	4552

Coupon table:

Showing rows 0 - 9 (10 total, Query took 0.0005 seconds.)

```
SELECT * FROM `MQ_COUPON`
```

Show all | Number of rows: 25 | Filter rows: Search this table | Sort by key: None

+ Options

		coupon_no	coup_type	discount	sta_date	exp_date	cust_id
<input type="checkbox"/>	Edit Copy Delete	1	IND	90.00	2018-02-12	2020-01-01	1
<input type="checkbox"/>	Edit Copy Delete	2	IND	80.00	2019-06-15	2020-12-15	3
<input type="checkbox"/>	Edit Copy Delete	3	COR	75.00	2018-06-24	2019-05-24	2
<input type="checkbox"/>	Edit Copy Delete	4	IND	80.00	2017-11-30	2018-11-29	3
<input type="checkbox"/>	Edit Copy Delete	5	COR	95.00	2015-08-21	2018-02-20	2
<input type="checkbox"/>	Edit Copy Delete	6	IND	85.00	2018-06-30	2019-06-25	1
<input type="checkbox"/>	Edit Copy Delete	7	IND	60.00	2018-08-16	2019-01-15	3
<input type="checkbox"/>	Edit Copy Delete	8	COR	70.00	2019-12-23	2021-01-01	7
<input type="checkbox"/>	Edit Copy Delete	9	IND	70.00	2019-12-23	2020-12-26	8
<input type="checkbox"/>	Edit Copy Delete	10	IND	65.00	2020-06-28	2021-06-27	9

Payment table:

Showing rows 0 - 9 (10 total, Query took 0.0005 seconds.)

```
SELECT * FROM `MQ_PAY`
```

Show all | Number of rows: 25 | Filter rows: Search this table | Sort

+ Options

		payno	card_no	method	cust_id
<input type="checkbox"/>	Edit Copy Delete	1	9205963010894630	C	1
<input type="checkbox"/>	Edit Copy Delete	2	3487051350803826	D	6
<input type="checkbox"/>	Edit Copy Delete	3	7400490238023508	C	3
<input type="checkbox"/>	Edit Copy Delete	4	5324965405	G	9
<input type="checkbox"/>	Edit Copy Delete	5	6783507208	G	7
<input type="checkbox"/>	Edit Copy Delete	6	4794364589437525	C	5
<input type="checkbox"/>	Edit Copy Delete	7	3895153408823893	D	3
<input type="checkbox"/>	Edit Copy Delete	8	3759384794548078	D	10
<input type="checkbox"/>	Edit Copy Delete	9	2504830298500504	C	2
<input type="checkbox"/>	Edit Copy Delete	10	8436054403850201	D	7

Service table:

Showing rows 0 - 9 (10 total, Query took 0.0005 seconds.)

```
SELECT * FROM `MQ_SERV`
```

Profiling [Edit inline] [Edit] [Explain SQL] [Create PHP code] [Refresh]

Show all | Number of rows: 25 | Filter rows: Search this table | Sort by key: None

+ Options

	<input type="checkbox"/>	<input type="button" value="Edit"/>	<input type="button" value="Copy"/>	<input type="button" value="Delete"/>	serv_no	sche_time	pickup_date	droff_date	sta_odo	end_odo	odolimit	pickup_loc	droff_loc	veh_id	cust_id	invno	coupon_no
	<input type="checkbox"/>	<input type="button" value="Edit"/>	<input type="button" value="Copy"/>	<input type="button" value="Delete"/>	1	2019-03-12	2019-03-18	2019-03-18	0.00	19.08	500	10	12	1	1	1	28
	<input type="checkbox"/>	<input type="button" value="Edit"/>	<input type="button" value="Copy"/>	<input type="button" value="Delete"/>	2	2019-04-08	2019-04-09	2019-04-09	0.00	220.93	500	10	18	3	6	2	NULL
	<input type="checkbox"/>	<input type="button" value="Edit"/>	<input type="button" value="Copy"/>	<input type="button" value="Delete"/>	3	2019-04-17	2019-04-21	2019-04-21	0.00	218.67	500	13	15	7	6	3	2
	<input type="checkbox"/>	<input type="button" value="Edit"/>	<input type="button" value="Copy"/>	<input type="button" value="Delete"/>	4	2019-05-03	2019-05-05	2019-05-05	0.00	216.23	500	18	10	9	8	4	7
	<input type="checkbox"/>	<input type="button" value="Edit"/>	<input type="button" value="Copy"/>	<input type="button" value="Delete"/>	5	2019-06-23	2019-06-30	2019-07-01	0.00	2781.50	2500	11	10	8	7	5	NULL
	<input type="checkbox"/>	<input type="button" value="Edit"/>	<input type="button" value="Copy"/>	<input type="button" value="Delete"/>	6	2019-07-05	2019-07-12	2019-07-12	0.00	190.50	500	11	14	5	5	6	NULL
	<input type="checkbox"/>	<input type="button" value="Edit"/>	<input type="button" value="Copy"/>	<input type="button" value="Delete"/>	7	2019-07-18	2019-07-29	2019-07-30	0.00	1766.64	2000	10	13	6	3	7	4
	<input type="checkbox"/>	<input type="button" value="Edit"/>	<input type="button" value="Copy"/>	<input type="button" value="Delete"/>	8	2019-08-14	2019-08-20	2019-08-20	0.00	618.60	500	19	10	3	10	8	NULL
	<input type="checkbox"/>	<input type="button" value="Edit"/>	<input type="button" value="Copy"/>	<input type="button" value="Delete"/>	9	2019-09-25	2019-10-07	2019-10-08	0.00	2291.50	2000	16	11	8	2	9	5
	<input type="checkbox"/>	<input type="button" value="Edit"/>	<input type="button" value="Copy"/>	<input type="button" value="Delete"/>	10	2019-11-25	2019-12-17	2019-12-19	0.00	2779.35	2500	11	10	5	7	10	NULL

Vehicle table:

Showing rows 0 - 9 (10 total, Query took 0.0004 seconds.)

```
SELECT * FROM `MQ_VEH`
```

Show all | Number of rows: 25 | Filter rows: Search this table | Sort by key: None

+ Options

	<input type="checkbox"/>	<input type="button" value="Edit"/>	<input type="button" value="Copy"/>	<input type="button" value="Delete"/>	veh_id	make	model	vyear	VIN	LPN	vclass_id	loc_id
	<input type="checkbox"/>	<input type="button" value="Edit"/>	<input type="button" value="Copy"/>	<input type="button" value="Delete"/>	1	FORD	FUSION	1995	VN001	LP001	2	10
	<input type="checkbox"/>	<input type="button" value="Edit"/>	<input type="button" value="Copy"/>	<input type="button" value="Delete"/>	2	CHEVY	TRAVERSE	2020	VN002	LP002	7	11
	<input type="checkbox"/>	<input type="button" value="Edit"/>	<input type="button" value="Copy"/>	<input type="button" value="Delete"/>	3	FORD	FIESTA	2001	VN003	LP003	1	10
	<input type="checkbox"/>	<input type="button" value="Edit"/>	<input type="button" value="Copy"/>	<input type="button" value="Delete"/>	4	HONDA	ACCORD	2012	VN004	LP004	2	14
	<input type="checkbox"/>	<input type="button" value="Edit"/>	<input type="button" value="Copy"/>	<input type="button" value="Delete"/>	5	TOYOTA	CAMRY	2009	VN005	LP005	2	13
	<input type="checkbox"/>	<input type="button" value="Edit"/>	<input type="button" value="Copy"/>	<input type="button" value="Delete"/>	6	CHEVY	VOLT	2018	VN006	LP006	10	19
	<input type="checkbox"/>	<input type="button" value="Edit"/>	<input type="button" value="Copy"/>	<input type="button" value="Delete"/>	7	BMW	5-SERIES	2016	VN007	LP007	2	12
	<input type="checkbox"/>	<input type="button" value="Edit"/>	<input type="button" value="Copy"/>	<input type="button" value="Delete"/>	8	TOYOTA	AVALON	2018	VN008	LP008	3	15
	<input type="checkbox"/>	<input type="button" value="Edit"/>	<input type="button" value="Copy"/>	<input type="button" value="Delete"/>	9	NISSAN	ALTIMA	2005	VN009	LP009	2	11
	<input type="checkbox"/>	<input type="button" value="Edit"/>	<input type="button" value="Copy"/>	<input type="button" value="Delete"/>	10	LINCOLN	NAVIGATOR	2016	VN010	LP010	4	16

d) Intersect table (1 table: MQ_INVPAY):

Showing rows 0 - 9 (10 total, Query took 0.0004 seconds.)

```
SELECT * FROM `MQ_INVPAY`
```

Show all | Number of rows: 25 | Filter rows: Search this table | Sort by key: None

+ Options

	<input type="checkbox"/>	<input type="button" value="Edit"/>	<input type="button" value="Copy"/>	<input type="button" value="Delete"/>	txn_id	invno	payno	pay_date	pay_amount	pay_status
	<input type="checkbox"/>	<input type="button" value="Edit"/>	<input type="button" value="Copy"/>	<input type="button" value="Delete"/>	1	1	1	2019-03-18	105.60	CLEARED
	<input type="checkbox"/>	<input type="button" value="Edit"/>	<input type="button" value="Copy"/>	<input type="button" value="Delete"/>	2	2	6	2019-04-09	95.20	CLEARED
	<input type="checkbox"/>	<input type="button" value="Edit"/>	<input type="button" value="Copy"/>	<input type="button" value="Delete"/>	3	3	3	2019-04-21	110.20	CLEARED
	<input type="checkbox"/>	<input type="button" value="Edit"/>	<input type="button" value="Copy"/>	<input type="button" value="Delete"/>	4	4	9	2019-05-05	93.40	CLEARED
	<input type="checkbox"/>	<input type="button" value="Edit"/>	<input type="button" value="Copy"/>	<input type="button" value="Delete"/>	5	5	7	2019-07-01	220.60	CLEARED
	<input type="checkbox"/>	<input type="button" value="Edit"/>	<input type="button" value="Copy"/>	<input type="button" value="Delete"/>	6	6	5	2019-07-12	150.00	CLEARED
	<input type="checkbox"/>	<input type="button" value="Edit"/>	<input type="button" value="Copy"/>	<input type="button" value="Delete"/>	7	7	3	2019-07-30	180.50	CLEARED
	<input type="checkbox"/>	<input type="button" value="Edit"/>	<input type="button" value="Copy"/>	<input type="button" value="Delete"/>	8	8	10	2019-08-20	130.92	CLEARED
	<input type="checkbox"/>	<input type="button" value="Edit"/>	<input type="button" value="Copy"/>	<input type="button" value="Delete"/>	9	9	2	2019-10-09	320.40	CLEARED
	<input type="checkbox"/>	<input type="button" value="Edit"/>	<input type="button" value="Copy"/>	<input type="button" value="Delete"/>	10	10	5	2019-12-19	280.20	CLEARED

4. Web Interface

The webpage system can be divided into two based on user types – a employee interface and a customer interface where different types of users have different authorities to access data stored in backend database.

4.1 Employee web interface

a) Login

An employee has to log in with a valid username and password to enter the main menu page.

WOW Staff Area

Staff User: First Name: Last Name:
[Main Menu](#) [Logout](#)

Log in

Username:
Password:

[Register New Admin](#)

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b) Main Menu

WOW Staff Area

Staff User: Admin01 First Name: Joey Last Name: Sheffield
[Main Menu](#) [Logout](#)

Main Menu

- [Admin Management](#)
 - [Staff Admins](#)
 - [Customer Admins](#)
- [WOW Offices](#)
 - [Office Locations](#)
 - [Vehicle Types](#)
- [Customers](#)
 - [Profiles](#)
 - [Individual](#)
 - [Corporation](#)
 - [Coupon](#)
 - [Payment](#)
- [WOW Services](#)
 - [Service](#)
 - [Invoice](#)
 - [InvoicePayStatus](#)

Search by Customer

FirstName:
LastName:

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The main page lists all the tables that connected to the backend database and a WOW employee has full authorities to create, update, read, delete all necessary business data via this web interface.

The “Staff Admins” page is where administrators on employee side could manage all employee admins for WOW employee interface.

WOW Staff Area

Staff User: Admin01 First Name: Joey Last Name: Sheffield
[Main Menu](#) [Logout](#)

[« Back to Main Menu](#)

Staff Admins

[Create New Admin](#)

ID	First Name	Last Name	Email	Username	View	Edit	Delete
6	Jerry	Golf	JerryG@yahoo.com	Jerry1234	View	Edit	Delete
1	Joey	Sheffield	JoeySh@123.com	Admin01	View	Edit	Delete
2	Jane	White	JWhite@nyu.edu	Student	View	Edit	Delete

In the “Customer Admins” page a WOW employee administrator will have full authorities to manage all WOW customer login usernames and passwords, while on the customer interface a customer can only read, edit or create once when sign up. You see later.

WOW Staff Area

Staff User: Admin01 First Name: Joey Last Name: Sheffield
[Main Menu](#) [Logout](#)

[« Back to Main Menu](#)

Customer Admins

[Create New Admin](#)

ID	First	Last	Email	Username	View	Edit	Delete
3	Marvin	Ave	ALLEN02@gmail.com	customer0002	View	Edit	Delete
12	MIKE	GREEN	MIKE01@gmail.com	customer0001	View	Edit	Delete
2	SMITH	WHITE	SMITH03@gmail.com	customer0003	View	Edit	Delete
4	Ward	WOOD	WARD04@gmail.com	customer0004	View	Edit	Delete

For example, an employee has full CURD authorities for all customer data, click into “Profiles” in the main menu.

WOW Staff Area

Staff User: Admin01 First Name: Joey Last Name: Sheffield
[Main Menu](#) [Logout](#)

[« Back to Main Menu](#)

Customers

[Create New Customer](#)

ID	CustType	First Name	Last Name	State	City	Street	Apartment	Zipcode	Email	Phone			
1	Individual	MIKE	GREEN	NEW YORK	NEW YORK	57th WEST	305	10019	MIKE01@gmail.com	212-348-1161	View	Edit	Delete
2	Corporation	Marvin	AVE	NEW YORK	NEW YORK	68th AVE	NULL	10020	ALLEN02@gmail.com	212-673-0028	View	Edit	Delete
3	Individual	SMITH	WHITE	TEXAS	HOUSTON	101th NORTH	124	77009	SMITH03@gmail.com	281-984-1345	View	Edit	Delete
4	Individual	WARD	WOOD	NEW YORK	NEW YORK	43th SOUTH	305	10019	WARD04@gmail.com	212-348-1161	View	Edit	Delete
5	Individual	JONES	HADE	CALIFORNIA	LOS ANGELES	15th NORTHEAST	112	92025	JONES123@gmail.com	213-052-3730	View	Edit	Delete
6	Individual	MARY	WONDER	NEW YORK	NEW YORK	72th NORTHWEST	305	10019	MARY06@gmail.com	212-963-5034	View	Edit	Delete
7	Corporation	W.	T.	CALIFORNIA	LOS ANGELES	125th SOUTHEAST	NULL	90036	BLACK07@gmail.com	213-752-1356	View	Edit	Delete
8	Individual	BECKY	WHITE	NEW YORK	NEW YORK	9th SOUTHWEST	101	10019	BECKY08@gmail.com	212-245-7308	View	Edit	Delete

CREATE:

WOW Staff Area

Staff User: Admin01 First Name: Joey Last Name: Sheffield
[Main Menu](#) [Logout](#)

[« Back to List](#)

Create Customer

CustType	<input type="radio"/> Individual <input type="radio"/> Corporation
First Name:	<input type="text"/>
Last Name:	<input type="text"/>
State:	<input type="text"/>
City:	<input type="text"/>
Street:	<input type="text"/>
Apartment:	<input type="text"/> (Optional)
Zipcode:	<input type="text"/>
Email:	<input type="text"/>
Phone:	<input type="text"/>

[Create Customer](#)

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Note that data validations have been added for every “create” and “update” operations for all tables to assure the integrity and correctness of all input data.

WOW Staff Area

Staff User: Admin01 First Name: Joey Last Name: Sheffield
[Main Menu](#) [Logout](#)

[« Back to List](#)

Create Customer

Please fix the following errors:

- Please select one customer type.
- First Name cannot be blank.
- Last Name cannot be blank.
- State cannot be blank.
- City cannot be blank.
- Street cannot be blank.
- Zipcode cannot be blank.
- Email cannot be blank.
- Phone cannot be blank.

CustType	<input type="radio"/> Individual <input type="radio"/> Corporation
First Name:	<input type="text"/>
Last Name	<input type="text"/>
State	<input type="text"/>
City	<input type="text"/>
Street	<input type="text"/>
Apartment	<input type="text"/> (Optional)
Zipcode	<input type="text"/>
Email	<input type="text"/>
Phone	<input type="text"/>

UPDATE:

WOW Staff Area

Staff User: Admin01 First Name: Joey Last Name: Sheffield
[Main Menu](#) [Logout](#)

[« Back to List](#)

Edit Customer

CustType	<input checked="" type="radio"/> Individual <input type="radio"/> Corporation
First Name:	<input type="text" value="MIKE"/>
Last Name	<input type="text" value="GREEN"/>
State	<input type="text" value="NEW YORK"/>
City	<input type="text" value="NEW YORK"/>
Street	<input type="text" value="57th WEST"/>
Apartment	<input type="text" value="305"/> (Optional)
Zipcode	<input type="text" value="10019"/>
Email	<input type="text" value="MIKE01@gmail.com"/>
Phone	<input type="text" value="212-348-1161"/>

READ:

WOW Staff Area

Staff User: Admin01 First Name: Joey Last Name: Sheffield
[Main Menu](#) [Logout](#)

[« Back to List](#)

Customer ID: 1

General Infomation:

CustType	Individual
First Name:	MIKE
Last Name	GREEN
State	NEW YORK
City	NEW YORK
Street	57th WEST
Apartment	305
Zipcode	10019
Email	MIKE01@gmail.com
Phone	212-348-1161

More Individual Details:

Driver License Number	LC001
Insurance Company Name	SCN001
Insurance Policy Number	SPN001

DELETE:

WOW Staff Area

Staff User: Admin01 First Name: Joey Last Name: Sheffield
[Main Menu](#) [Logout](#)

[« Back to List](#)

Delete Customer

Are you sure you want to delete this customer?

Form parameters:

Customer ID: 1
Customer Type: Individual
First Name: MIKE
Last Name: GREEN
State: NEW YORK
City: NEW YORK
Street: 57th WEST
Apartment: 305
Zipcode: 10019
Email: MIKE01@gmail.com
Phone: 212-348-1161

An employee can also implement business operations on other entities, such as adding a new coupon or editing existing customer coupons.

WOW Staff Area

Staff User: Admin01 First Name: Joey Last Name: Sheffield
[Main Menu](#) [Logout](#)

[« Back to Main Menu](#)

Coupons

[Create New Coupon](#)

Coupon No	Coupon Type	Discount in %	Start Date	Expiration Date	Customer	View	Edit	Delete
1	Individual	90.00	2018-02-12	2020-01-01	MIKE GREEN	View	Edit	Delete
2	Individual	80.00	2019-06-15	2020-12-15	SMITH WHITE	View	Edit	Delete
3	Corporation	75.00	2018-06-24	2019-05-24	Marvin AVE	View	Edit	Delete
4	Individual	80.00	2017-11-30	2018-11-29	SMITH WHITE	View	Edit	Delete
5	Corporation	95.00	2015-08-21	2018-02-20	Marvin AVE	View	Edit	Delete
6	Individual	85.00	2018-06-30	2019-06-25	MIKE GREEN	View	Edit	Delete
7	Individual	60.00	2018-08-16	2019-01-15	SMITH WHITE	View	Edit	Delete
8	Corporation	70.00	2019-12-23	2021-01-01	W. T.	View	Edit	Delete
9	Individual	70.00	2019-12-23	2020-12-26	BECKY WHITE	View	Edit	Delete
10	Individual	65.00	2020-06-28	2021-06-27	TOM SHEFFIELD	View	Edit	Delete

WOW Staff Area

Staff User: Admin01 First Name: Joey Last Name: Sheffield
[Main Menu](#) [Logout](#)

[« Back to List](#)

Create Coupon

Customer	<input type="text" value="1-MIKE GREEN"/>
Coupon Type	<input type="radio"/> Individual <input type="radio"/> Corporation
Discount	<input type="text" value=""/>
Start Date	<input type="text" value="mm/dd/yyyy"/> <input type="button" value=""/>
Expiration Date	<input type="text" value="mm/dd/yyyy"/> <input type="button" value=""/>

[Create New Coupon](#)

WOW Staff Area

Staff User: Admin01 First Name: Joey Last Name: Sheffield
[Main Menu](#) [Logout](#)

[« Back to List](#)

Edit Coupon

Customer	<input type="text" value="8-BECKY WHITE"/>
Coupon Type	<input checked="" type="radio"/> Individual <input type="radio"/> Corporation
Discount	<input type="text" value="70.00"/>
Start Date	<input type="text" value="12/23/2019"/> <input type="button" value=""/>
Expiration Date	<input type="text" value="12/26/2020"/> <input type="button" value=""/>

[Edit Coupon](#)

An employee can check all WOW office locations and note that there is a column named “Vehicle Stored” which indicates the total number of rental vehicles this office has.

WOW Staff Area

Staff User: Admin01 First Name: Joey Last Name: Sheffield
[Main Menu](#) [Logout](#)

[« Back to Main Menu](#)

Office Locations

[Create New Office](#)

ID	State	City	Street	Floor	Zipcode	Phone	Vehicles Stored			
10	NEW YORK	NEW YORK	01 GOLD	5	10001	+1 212-346-8192	2	View	Edit	Delete
11	CALIFORNIA	LOS ANGELES	02 WEST	NULL	90032	+1 213-643-1554	2	View	Edit	Delete
12	ILLINOIS	CHICAGO	03 EAST	NULL	60628	+1 312-278-5773	1	View	Edit	Delete
13	TEXAS	HOUSTON	04 NORTH	NULL	77009	+1 281-952-0136	1	View	Edit	Delete
14	CALIFORNIA	SAN DIEGO	05 SOUTH	12	92025	+1 415-745-7653	1	View	Edit	Delete
15	TEXAS	DALLAS	06 NORTHEAST	NULL	75206	+1 214-112-3650	1	View	Edit	Delete
16	OHIO	COLUMBUS	07 SOUTHEAST	NULL	43125	+1 614-387-5523	1	View	Edit	Delete
17	WASHINGTON	SEATTLE	08 NORTHWEST	NULL	98112	+1 206-832-9958	0	View	Edit	Delete
18	MASSACHUSETTS	BOSTON	09 SOUTHWEST	3	2196	+1 617-663-0525	0	View	Edit	Delete
19	MICHIGAN	DETROIT	10 CENTER	NULL	48277	+1 313-658-1728	1	View	Edit	Delete

Click into “View” and an employee can obtain more details about this office and all its rental vehicles.

WOW Staff Area

Staff User: Admin01 First Name: Joey Last Name: Sheffield
[Main Menu](#) [Logout](#)

[« Back to List](#)

Office ID: 10

State	NEW YORK
City	NEW YORK
Street	01 GOLD
Floor	5
Zipcode	10001
Phone	+1 212-346-8192

Vehicles

[Create New Vehicle](#)

Vehicle ID	Make	Model	Year	Vehicle Identification Number	License Plate number	Vehicle Class	Office ID			
1	FORD	FUSION	1995	VN001	LP001	MID-SIZE	10	View	Edit	Delete
3	FORD	FIESTA	2001	VN003	LP003	SMALL	10	View	Edit	Delete

If an employee needs to add a new rental vehicle for this office, click “Create New Vehicle” to enter the correct data then click “Create Vehicle”.

WOW Staff Area

Staff User: Admin01 First Name: Joey Last Name: Sheffield
[Main Menu](#) [Logout](#)

[« Back to Office](#)

Create Vehicle

Vehicle Class	<input type="text" value="9-BUS"/>
Make	<input type="text" value="BUS"/>
Model	<input type="text" value="BUS"/>
Year	<input type="text" value="2020"/>
VIN	<input type="text" value="VIN00111"/>
LPN	<input type="text" value="LPN00111"/>
Office ID	<input type="text" value="10--NEW YORK--NEW YORK"/>

The show page would come out as a notice of “Create Successfully”, then click “Back to Office” to go back to the office show page.

WOW Staff Area	
----------------	--

Staff User: Admin01 First Name: Joey Last Name: Sheffield
[Main Menu](#) [Logout](#)

[« Back to Office](#)

Vehicle ID: 19

Vehicle Type	BUS
Vehicle Make	BUS
Vehicle Model	BUS
Year of Production	2020
Vehicle Identification Number	VIN00111
License Plate number	LPN00111
Office ID	10

A new vehicle with id=19 has been successfully added to this office with id=10.

WOW Staff Area	
----------------	--

Staff User: Admin01 First Name: Joey Last Name: Sheffield
[Main Menu](#) [Logout](#)

[« Back to List](#)

Office ID: 10

State	NEW YORK
City	NEW YORK
Street	01 GOLD
Floor	5
Zipcode	10001
Phone	+1 212-346-8192

Vehicles

[Create New Vehicle](#)

Vehicle ID	Make	Model	Year	Vehicle Identification Number	License Plate number	Vehicle Class	Office ID	View	Edit	Delete
1	FORD	FUSION	1995	VN001	LP001	MID-SIZE	10	View	Edit	Delete
3	FORD	FIESTA	2001	VN003	LP003	SMALL	10	View	Edit	Delete
19	BUS	BUS	2020	VIN00111	LPN00111	BUS	10	View	Edit	Delete

Then click “Back to List”, note that the total vehicle number of the office with id=10 has raised from 2 to 3.

WOW Staff Area	
----------------	--

Staff User: Admin01 First Name: Joey Last Name: Sheffield
[Main Menu](#) [Logout](#)

[« Back to Main Menu](#)

Office Locations

[Create New Office](#)

ID	State	City	Street	Floor	Zipcode	Phone	Vehicles Stored	View	Edit	Delete
10	NEW YORK	NEW YORK	01 GOLD	5	10001	+1 212-346-8192	3	View	Edit	Delete
11	CALIFORNIA	LOS ANGELES	02 WEST	NULL	90032	+1 213-643-1554	2	View	Edit	Delete
12	ILLINOIS	CHICAGO	03 EAST	NULL	60628	+1 312-278-5773	1	View	Edit	Delete
13	TEXAS	HOUSTON	04 NORTH	NULL	77009	+1 281-952-0136	1	View	Edit	Delete
14	CALIFORNIA	SAN DIEGO	05 SOUTH	12	92025	+1 415-745-7653	1	View	Edit	Delete
15	TEXAS	DALLAS	06 NORTHEAST	NULL	75206	+1 214-112-3650	1	View	Edit	Delete
16	OHIO	COLUMBUS	07 SOUTHEAST	NULL	43125	+1 614-387-5523	1	View	Edit	Delete
17	WASHINGTON	SEATTLE	08 NORTHWEST	NULL	98112	+1 206-832-9958	0	View	Edit	Delete
18	MASSACHUSETTS	BOSTON	09 SOUTHWEST	3	2196	+1 617-663-0525	0	View	Edit	Delete
19	MICHIGAN	DETROIT	10 CENTER	NULL	48277	+1 313-658-1728	1	View	Edit	Delete

Similar with “Vehicle Type” page.

WOW Staff Area

Staff User: Admin01 First Name: Joey Last Name: Sheffield
[Main Menu](#) [Logout](#)

[« Back to List](#)

Vehicle Class Name: MID-SIZE

Vehicle Class ID	2
Rental Charge Rate	40.0 \$/day
Over Mileage Fees	2.0 \$/mile

Vehicles

[Create New Vehicle](#)

Vehicle ID	Make	Model	Year	Vehicle Identification Number	License Plate number	Vehicle Class	Office ID			
1	FORD	FUSION	1995	VN001	LP001	MID-SIZE	10	View	Edit	Delete
4	HONDA	ACCORD	2012	VN004	LP004	MID-SIZE	14	View	Edit	Delete
5	TOYOTA	CAMRY	2009	VN005	LP005	MID-SIZE	13	View	Edit	Delete
7	BMW	5-SERIES	2016	VN007	LP007	MID-SIZE	12	View	Edit	Delete
9	NISSAN	ALTIMA	2005	VN009	LP009	MID-SIZE	11	View	Edit	Delete

c) Search by customer names

At the bottom the system also provides a function where an employee can search all the related data of a specific customer by entering the correct customer name. If an employee enters a wrong first name or last name, the system will give an error notice “First Name does not exist!”

Search by Customer

Please fix the following errors:

- First Name does not exist.
- Last Name does not exist.

FirstName:	<input type="text" value="jfdgfk"/>
LastName:	<input type="text" value="alfkf"/>

If an employee enters the correct customer name, system will show a search list that contains all data about a specific customer. Therefore, it's more convenient for customer management.

WOW Staff Area

Staff User: Admin01 First Name: Joey Last Name: Sheffield
[Main Menu](#) [Logout](#)

[« Back to Main Menu](#)

Customer Info

Customer ID: 4
Customer Name: Ward Wood
Customer Type: Individual

- [Admin](#)
- [Profile](#)
- [Individual](#)
- [Coupon](#)
- [Payment](#)
- [Service](#)
- [Invoice](#)
- [InvoicePayStatus](#)

WOW Staff Area

Staff User: Admin01 First Name: Joey Last Name: Sheffield
[Main Menu](#) [Logout](#)

[« Back to Search Index](#)

Ward Wood's Profile

ID	CustType	First Name	Last Name	State	City	Street	Apartment	Zipcode	Email	Phone			
4	Individual	WARD	WOOD	NEW YORK	NEW YORK	43th SOUTH	305	10019	WARD04@gmail.com	212-348-1161	View	Edit	Delete

WOW Staff Area

Staff User: Admin01 First Name: Joey Last Name: Sheffield
[Main Menu](#) [Logout](#)

[« Back to Search Index](#)

Individual Details

Customer ID	Individual Name	Driver License Number	Insurance Company Name	Insurance Policy Number			
4	WARD WOOD	LC004	SCN004	SPN004	View	Edit	Delete

Note that if there is no data found for this customer, the system will give a notification, for example, “No coupon found.” to the screen. To add a new coupon, click “Create New Coupon”.

WOW Staff Area

Staff User: Admin01 First Name: Joey Last Name: Sheffield
[Main Menu](#) [Logout](#)

[« Back to Search Index](#)

Ward Wood's Coupons

[Create New Coupon](#) =>

Notice: No coupon found.

WOW Staff Area

Staff User: Admin01 First Name: Joey Last Name: Sheffield
[Main Menu](#) [Logout](#)

[« Back to Index](#)

Create Coupon

Customer	<input type="text" value="4--WARD WOOD"/>
Coupon Type	<input checked="" type="radio"/> Individual
Discount	<input type="text" value="80"/> %
Start Date	<input type="text" value="05 / 16 / 2020"/> <input type="button" value="Calendar"/>
Expiration Date	<input type="text" value="11 / 15 / 2020"/> <input type="button" value="Calendar"/>

[Create New Coupon](#)

Note that the coupon type must be consistent with customer type when creating new coupon, so there is no “Corporation” radio for an individual customer. (Same for the edit operation) Then click “Create New Coupon”, a show page will pop out that notifies “Coupon created successfully.”

WOW Staff Area

Staff User: Admin01 First Name: Joey Last Name: Sheffield
[Main Menu](#) [Logout](#)

[« Back to Index](#)

Coupon No: 15

Customer Name WARD WOOD
Coupon Type Individual
Discount 80.00 %
Start Date 2020-05-16
Expiration Date 2020-11-15

See we just create a new coupon with coupon id = 15 for this customer.

WOW Staff Area

Staff User: Admin01 First Name: Joey Last Name: Sheffield
[Main Menu](#) [Logout](#)

[« Back to Search Index](#)

Ward Wood's Coupons

[Create New Coupon](#) [»](#)

Coupon No	Coupon Type	Discount in %	Start Date	Expiration Date	Customer	View	Edit	Delete
15	Individual	80.00	2020-05-16	2020-11-15	WARD WOOD	View	Edit	Delete

An employee can keep doing very similar CURD queries on the rest of customer data entities like “Payment”, “Service”, “Invoice”, “InvoicePayStatus” for this customer.

Also some trivial differences between an individual and a corporation customer search list:

WOW Staff Area

Staff User: Admin01 First Name: Joey Last Name: Sheffield
[Main Menu](#) [Logout](#)

[« Back to Main Menu](#)

Customer Info

Customer ID: 2
Customer Name: Marvin Ave
Customer Type: Corporation

- [Admin](#)
- [Profile](#)
- **Corporation**
- [Coupon](#)
- [Payment](#)
- [Service](#)
- [Invoice](#)
- [InvoicePayStatus](#)

WOW Staff Area

Staff User: Admin01 First Name: Joey Last Name: Sheffield
[Main Menu](#) [Logout](#)

[« Back to Main Menu](#)

Customer Info

Customer ID: 4
Customer Name: Ward Wood
Customer Type: Individual

- [Admin](#)
- [Profile](#)
- [Individual](#)
- [Coupon](#)
- [Payment](#)
- [Service](#)
- [Invoice](#)
- [InvoicePayStatus](#)

WOW Staff Area

Staff User: Admin01 First Name: Joey Last Name: Sheffield
[Main Menu](#) [Logout](#)

[« Back to Search Index](#)

Corporation Details

Customer ID	Name	Corporation	Register Number	Employee ID			
2	Marvin AVE	APPLE	PD8895	1280	View	Edit	Delete

WOW Staff Area

Staff User: Admin01 First Name: Joey Last Name: Sheffield
[Main Menu](#) [Logout](#)

[« Back to Index](#)

Edit Coupon

Customer

Coupon Type Corporation

Discount %

Start Date

Expiration Date

4.2 Customer web interface

a) Login

WOW Customer Area

Customer User: fruit0001 First Name: Last Name:
[Login Page](#)

Log in

Username:

Password:

[Sign up as a new customer! =>](#)

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If a customer had a WOW username and password already he or she could sign in directly. New customer registration will demonstrate later.

b) Customer homepage

WOW Customer Area

Customer User: customer0001 First Name: Mike Last Name: Green
[Home Page](#) [Logout](#)

Hello Mike Green! Welcome to your home page!

Main Menu

- [Personal Info](#)
- [MyAdmin](#)
- [Coupon](#)
- [PaymentMethods](#)
- [Available vehicles](#)
- [Vehicles Info Overview](#)
- [WOW Offices](#)
- [Vehicle Types](#)
- [Services](#)
- [Ordered Services](#)
- [Invoices Info](#)

Customer Profile

ID	CustType	First Name	Last Name	State	City	Street	Apartment	Zipcode	Email	Phone
1	Individual	Mike	Green	NEW YORK	NEW YORK	57th WEST	305	10019	MIKE01@gmail.com	+1 212-348-1161

Quick Operations:

[Create New Pay Method](#) ➔

[Create New Service](#) ➔

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This is the WOW home page for customer with username customer0001. Basically a customer has very limited authorizations on all business data. In this case most of data is read-only via customer web interface, besides a customer is allowed to edit username, password, add new payment methods and order new services. Other business activities like UPDATE, CREATE, DELETE operations on other data entities should be implemented via employee interface and carefully managed by WOW employee administrators.

Personal Profile:

WOW Customer Area

Customer User: customer0001 First Name: Mike Last Name:
[Login Page](#)

Notice: If you find any information mismatch or need to update your personal info, please contact our customer services at 777-888-9999 in time. We are glad to help!

[« Back to Homepage](#)

Customer ID: 1

General Infomation:

CustType	Individual
First Name:	Mike
Last Name	Green
State	NEW YORK
City	NEW YORK
Street	57th WEST
Apartment	305
Zipcode	10019
Email	MIKE01@gmail.com
Phone	+1 212-348-1161

More Individual Details:

Driver License Number	LC001
Insurance Company Name	SCN001
Insurance Policy Number	SPN001

A customer can only edit his or her username or password in the “Edit My Admin” page. Other “First name”, “Last name” and “Email” field should be consistent with customer profile.

WOW Customer Area

Customer User: customer0001 First Name: Mike Last Name: Green
[Home Page](#) [Logout](#)

[« Back to Homepage](#)

MyLoginAdmin

ID	First Name	Last Name	Email	Username	View	Edit Password
12	MIKE	GREEN	MIKE01@gmail.com	customer0001	View	Edit Password

WOW Customer Area

Customer User: customer0001 First Name: Mike Last Name: Green
[Home Page](#) [Logout](#)

Notice: If you have any trouble with your WOW Admin or have any questions, please contact our staff at +1 777-888-9999 in time. We are 24hrs online and glad to help!

[« Back to MyLoginAdmin](#)

Edit Password

First name	<input type="text" value="MIKE"/>
Last name	<input type="text" value="GREEN"/>
Username	<input type="text" value="customer0001"/>
Email	<input type="text" value="MIKE01@gmail.com"/>
Password	<input type="password"/>
Confirm Password	<input type="password"/>

Passwords should be at least 8 characters and include at least one uppercase letter, lowercase letter and number.

[Edit Admin](#)

Customer User: customer0001 First Name: Mike Last Name: Green
[Home Page](#) [Logout](#)

Your Admin Updated.

Notice: If you have any trouble with your WOW Admin or have any questions, please contact our staff at +1 777-888-9999 in time. We are 24hrs online and glad to help!

[« Back to MyLoginAdmin](#)

Username: customer0001

[Edit](#)

First name Mike
Last name Green
Email MIKE01@gmail.com
Username customer0001

Ordered coupons:

WOW Customer Area

Customer User: customer0001 First Name: Mike Last Name: Green
[Home Page](#) [Logout](#)

[« Back to Homepage](#)

MyCoupons

Coupon No	Coupon Type	Discount in %	Start Date	Expiration Date	
1	Individual	90.00	2018-02-12	2020-01-01	View More =>
6	Individual	85.00	2018-06-30	2019-06-25	View More =>

A customer can check rental vehicles data for each WOW office and for each vehicle type:

WOW Customer Area

Customer User: customer0001 First Name: Mike Last Name: Green
[Home Page](#) [Logout](#)

[« Back to Homepage](#)

Office Locations

ID	State	City	Street	Floor	Zipcode	Phone	Vehicles Stored	
10	NEW YORK	NEW YORK	01 GOLD	5	10001	+1 212-346-8192	3	View More =>
11	CALIFORNIA	LOS ANGELES	02 WEST	NULL	90032	+1 213-643-1554	2	View More =>
12	ILLINOIS	CHICAGO	03 EAST	NULL	60628	+1 312-278-5773	1	View More =>
13	TEXAS	HOUSTON	04 NORTH	NULL	77009	+1 281-952-0136	1	View More =>
14	CALIFORNIA	SAN DIEGO	05 SOUTH	12	92025	+1 415-745-7653	1	View More =>
15	TEXAS	DALLAS	06 NORTHEAST	NULL	75206	+1 214-112-3650	1	View More =>
16	OHIO	COLUMBUS	07 SOUTHEAST	NULL	43125	+1 614-387-5523	1	View More =>
17	WASHINGTON	SEATTLE	08 NORTHWEST	NULL	98112	+1 206-832-9958	0	View More =>
18	MASSACHUSETTS	BOSTON	09 SOUTHWEST	3	2196	+1 617-663-0525	0	View More =>
19	MICHIGAN	DETROIT	10 CENTER	NULL	48277	+1 313-658-1728	1	View More =>

WOW Customer Area

Customer User: customer0001 First Name: Mike Last Name: Green

[Home Page](#) [Logout](#)

[« Back to Office Locations](#)

Office ID: 11

State CALIFORNIA
City LOS ANGELES
Street 02 WEST
Floor NULL
Zipcode 90032
Phone +1 213-643-1554

Vehicles

Vehicle ID	Make	Model	Year	Vehicle Identification Number	License Plate number	Vehicle Type	Rent Charge (\$/day)	Extra Charge (\$/mile)	
2	CHEVY	TRAVERSE	2020	VN002	LP002	MINI VAN	45.0	3.0	View Vehicle Info
9	NISSAN	ALTIMA	2005	VN009	LP009	MID-SIZE	40.0	2.0	View Vehicle Info

WOW Customer Area

Customer User: customer0001 First Name: Mike Last Name: Green

[Home Page](#) [Logout](#)

[« Back to office info](#)

Vehicle Type: MINI VAN

Vehicle ID 2
Vehicle Make CHEVY
Vehicle Model TRAVERSE
Year of Production 2020
Vehicle Identification Number VN002
License Plate number LP002
Rent Charge 45.0 \$/day
Extra Charge 3.0 \$/mile
Office ID 11
Office Full Address CALIFORNIA, LOS ANGELES, 02 WEST St.

If there is no vehicle for rental in this office, the system will give a notice:

WOW Customer Area

Customer User: customer0001 First Name: Mike Last Name: Green

[Home Page](#) [Logout](#)

[« Back to Office Locations](#)

Office ID: 17

State WASHINGTON
City SEATTLE
Street 08 NORTHWEST
Floor NULL
Zipcode 98112
Phone +1 206-832-9958

Notice: Sorry we haven't had vehicles in this office yet. Coming Soon...

WOW Customer Area

Customer User: customer0001 First Name: Mike Last Name: Green

[Home Page](#) [Logout](#)

[« Back to Homepage](#)

Vehicle Types

Vehicle Type ID	Vehicle Type Name	Rental Charge Rate (\$/day)	Over Mileage Fees (\$/mile)	Vehicles	
1	SMALL	35.0	2.0	1	View More =>
2	MID-SIZE	40.0	2.0	5	View More =>
3	FULL-SIZE	50.0	3.0	1	View More =>
4	LUXURY	150.0	10.0	1	View More =>
5	SUV	60.0	5.0	0	View More =>
6	PREMIUM SUV	80.0	6.0	0	View More =>
7	MINI VAN	45.0	3.0	1	View More =>
8	STATION WAGON	70.0	4.0	0	View More =>
9	BUS	90.0	6.0	1	View More =>
10	ELECTRIC	80.0	5.5	1	View More =>

WOW Customer Area

Customer User: customer0001 First Name: Mike Last Name: Green

[Home Page](#) [Logout](#)

[« Back to Vehicle Type List](#)

Vehicle Type: MINI VAN

Vehicle Class ID	7
Rental Charge Rate	45.0 \$/day
Over Mileage Fees	3.0 \$/mile

Vehicles

Vehicle ID	Make	Model	Year	Vehicle Identification Number	License Plate number	Office ID	Office State	Office City	
2	CHEVY	TRAVERSE	2020	VN002	LP002	11	CALIFORNIA	LOS ANGELES	View More Vehicle Info =>

If no vehicle found of this type:

WOW Customer Area

Customer User: customer0001 First Name: Mike Last Name: Green

[Home Page](#) [Logout](#)

[« Back to Vehicle Type List](#)

Vehicle Type: STATION WAGON

Vehicle Class ID	8
Rental Charge Rate	70.0 \$/day
Over Mileage Fees	4.0 \$/mile

Notice: Sorry we haven't had vehicles of this type yet. Coming Soon...

Previous invoices raised:

WOW Customer Area

Customer User: customer0001 First Name: Mike Last Name: Green
[Home Page](#) [Logout](#)

[« Back to Homepage](#)

Invoices Info

Invoice No.	Invoice Date	Invoice Amount(\$)	Payment Date	Payment Amount(\$)	Card Number	Method	Payment Status	
1	2019-03-18	105.60	2019-03-18	105.60	9205963010894630	Credit	Cleared	View More =>

WOW Customer Area

Customer User: customer0001 First Name: Mike Last Name: Green
[Home Page](#) [Logout](#)

[« Back to Invoices Info](#)

Invoice No: 1

Invoice No	1
Transaction ID	1
Invoice Date	2019-03-18
Invoice Amount	105.60 \$
Payment No	1
Transaction Date	2019-03-18
Payment Amount	105.60 \$
Status	Cleared

Customers are allowed to add new payment methods or order new services via customer interface for business transaction activities.

WOW Customer Area

Customer User: customer0001 First Name: Mike Last Name: Green
[Home Page](#) [Logout](#)

[« Back to Homepage](#)

Payments

[Create New Pay Method =>](#)

Payment No	Card Number	Method	Customer ID	
1	9205963010894630	Credit	1	View =>

WOW Customer Area

Customer User: customer0001 First Name: Mike Last Name: Green
[Home Page](#) [Logout](#)

[« Back to Payments index](#)

Payment No: 1

Customer ID	1
Full Name	Mike Green
Card Number	9205963010894630
Method	Credit

WOW Customer Area

Customer User: customer0001 First Name: Mike Last Name: Green

[Home Page](#) [Logout](#)

[« Back to Payments Index](#)

Create Payment

Customer Name:

Card Number:

Method:

Credit Card
 Debit Card
 Gift Card

[Create New Payment](#)

WOW Customer Area

Customer User: customer0001 First Name: Mike Last Name: Green
[Home Page](#) [Logout](#)

[« Back to Homepage](#)

Services

[Create New Service =>](#)

Service No	Scheduled Time	Pickup Date	Droff Date	Start Odometer	End Odometer	Daily Odolimit	Pickup Location	Dropoff Location	Vehicle ID	Customer ID	Invoice No	Coupon No	View
1	2019-03-12	2019-03-18	2019-03-18	0.00	19.08	500	10	12	1	1	1	NULL	View

WOW Customer Area

Customer User: customer0001 First Name: Mike Last Name: Green
[Home Page](#) [Logout](#)

[« Back to Services Index](#)

Service No: 1

Customer Name Mike Green
Scheduled Time 2019-03-12
Pickup Date 2019-03-18
Dropoff Date 2019-03-18
Start Odometer 0.00 miles
End Odometer 19.08 miles
Daily limit 500 miles/day
Pickup Location 10
Dropoff Location 12
Vehicle FORD-- FUSION
Vehicle Type MID-SIZE
License Plate Number LP001
Rent Charge Rate 40.0 \$/day
Extra Charge Rate 2.0 \$/mile
Invoice No 1
Coupon No NULL

WOW Customer Area

Customer User: customer0001 First Name: Mike Last Name: Green
[Home Page](#) [Logout](#)

[« Back to Services Index](#)

Create Service

Customer Name	<input type="text" value="Mike Green"/>
Scheduled Time	<input type="text" value="mm/dd/yyyy"/> <input type="button" value="Calendar"/>
Pickup Date	<input type="text" value="mm/dd/yyyy"/> <input type="button" value="Calendar"/>
Dropoff Date	<input type="text" value="mm/dd/yyyy"/> <input type="button" value="Calendar"/>
Start Odometer	<input type="text" value="0"/> miles(default)
End Odometer	<input type="text" value="0"/> miles(default)
Daily Odolimit	<input type="text" value="500"/> mile/day(default)
Pickup Location	<input type="text" value="10-NEW YORK-NEW YORK"/>
Dropoff Location	<input type="text" value="10-NEW YORK-NEW YORK"/>
Vehicle ID	<input type="text" value="1-FORD-FUSION"/>
Invoice No	<input type="text" value="21"/>
Coupon No	<input type="text" value="No coupon used (Optional)"/>

[Create New Service](#)

c) New customer register

A new customer should click “Sign up as a new customer!” on the login page to start login:

WOW Customer Area

Customer User: First Name: Last Name:
[Login Page](#)

[« Back to Login Page](#)

Create Your Login Admin

First name	Student	(Please enter your real name!)
Last name	Nyu	(Please enter your real name!)
Username	customer0023	
Email	Studentnyu123@gmail.c	
Password	*****	
Confirm Password	*****	

Note: Passwords should be at least 8 characters and include at least one uppercase letter, lowercase letter and number.

WOW Customer Area

Customer User: First Name: Last Name:
[Login Page](#)

Your Admin Created.

Your New Admin:

Notice: Your admin created successfully! Now you can login with your username and password. Go back to the login page and manage your WOW homepage!

Username: customer0023

First name Student
Last name Nyu
Email Studentnyu123@gmail.com
Username customer0023

[Start Log In =>](#)

Note that an employee user can also supervise all customer login account via employee interface.

WOW Staff Area

Staff User: Admin01 First Name: Joey Last Name: Sheffield
[Main Menu](#) [Logout](#)

[« Back to Main Menu](#)

Customer Admins

[Create New Admin](#)

ID	First	Last	Email	Username	View	Edit	Delete
3	Marvin	Ave	ALLEN02@gmail.com	customer0002	View	Edit	Delete
12	MIKE	GREEN	MIKE01@gmail.com	customer0001	View	Edit	Delete
13	Student	Nyu	Studentnyu123@gmail.com	customer0023	View	Edit	Delete
2	SMITH	WHITE	SMITH03@gmail.com	customer0003	View	Edit	Delete
4	Ward	WOOD	WARD04@gmail.com	customer0004	View	Edit	Delete

Then a new customer can sign in with username and password. As a new customer, the system will notify the customer to complete personal profile before any web operations:

WOW Customer Area

Customer User: customer0023 First Name: Student Last Name: Nyu
[Home Page](#) [Logout](#)

Hello new visitor!
Welcome to your home page!

Notice: Please complete your personal profile first before any operations!

[Add new profile =>](#)

WOW Customer Area

Customer User: customer0023 First Name: Last Name:
[Login Page](#)

[=> Back to Homepage](#)

Create Profile

CustType	<input type="radio"/> Login as an individual customer <input type="radio"/> Login as a corporation representative
First Name:	<input type="text" value="Student"/>
Last Name	<input type="text" value="Nyu"/>
State	<input type="text"/>
City	<input type="text"/>
Street	<input type="text"/>
Apartment	<input type="text"/> (Optional)
Zipcode	<input type="text"/>
Email	<input type="text" value="Studentnyu123@gmail.c"/>
Phone	<input type="text"/>

[Submit My Profile](#)

WOW Customer Area

Customer User: customer0023 First Name: Student Last Name: Nyu
[Home Page](#) [Logout](#)

Notice: If you find any information mismatch or need to update your personal info, please contact our customer services at 777-888-9999 in time. We are glad to help!

Customer ID: 23

General Information:

CustType	Individual
First Name:	Student
Last Name	Nyu
State	New York
City	New York
Street	River 7
Apartment	NULL
Zipcode	10101
Email	Studentnyu123@gmail.com
Phone	+1 112-212-2223

[Next Step =>](#)

WOW Customer Area

Customer User: customer0023 First Name: Last Name:
[Login Page](#)

[« Back to General Info](#)

Individual Info

Customer Name	<input type="text" value="23-Student Nyu"/>
Driver License Number	<input type="text" value="DLN0023"/>
Insurance Company Name	<input type="text" value="ICN00023"/>
Insurance Policy Number	<input type="text" value="IPN00023"/>

This page will show once a customer creates full profile successfully and then go back to homepage the customer can see the full homepage.

WOW Customer Area

Customer User: customer0023 First Name: Last Name:
[Login Page](#)

Notice: You have completed your profile. Go to your WOW homepage and start a new service!

Customer ID: 23

General Infomation:

CustType	Individual
First Name:	Student
Last Name	Nyu
State	NewYork
City	NewYork
Street	River 7
Apartment	NULL
Zipcode	10101
Email	Studentnyu123@gmail.com
Phone	+1 112-212-2223

More Individual Details:

Driver License Number	DLN0023
Insurance Company Name	ICN00023
Insurance Policy Number	IPN00023

[Forward to Homepage ➔](#)

WOW Customer Area

Customer User: customer0023 First Name: Student Last Name: Nyu
[Home Page](#) [Logout](#)

Hello Student Nyu! Welcome to your home page!

Main Menu

- [Personal Info](#)
- [MyAdmin](#)
- [Coupon](#)
- [PaymentMethods](#)

- [Available vehicles](#)
- [Vehicles Info Overview](#)
- [WOW Offices](#)
- [Vehicle Types](#)

- [Services](#)
- [Ordered Services](#)
- [Invoices Info](#)

Customer Profile

ID	CustType	First Name	Last Name	State	City	Street	Apartment	Zipcode	Email	Phone
23	Individual	Student	Nyu	NewYork	NewYork	River	7	NULL	Studentnyu123@gmail.com	+1 112-212-2223

Quick Operations:

[Create New Pay Method](#) =>

[Create New Service](#) =>

WOW Customer Area

Customer User: customer0023 First Name: Student Last Name: Nyu
[Home Page](#) [Logout](#)

[« Back to Homepage](#)

MyLoginAdmin

ID	First Name	Last Name	Email	Username		
13	Student	Nyu	Studentnyu123@gmail.com	customer0023	View =>	Edit My Admin =>

Since this is a homepage for new web visitor, all “Coupon”, “Payment Methods”, “Ordered Services”, “Invoices Info” contents will be empty.

WOW Customer Area

Customer User: customer0023 First Name: Student Last Name: Nyu
[Home Page](#) [Logout](#)

[« Back to Homepage](#)

MyCoupons

Notice: Seems that you haven't ordered any coupon yet! We have prepared a lot of promotion for both new and regular customers! For more details, please check our official website www.worldonwheels.com. If you have any questions, please contact us at +1 777-888-9999.

WOW Customer Area

Customer User: customer0023 First Name: Student Last Name: Nyu
[Home Page](#) [Logout](#)

[« Back to Homepage](#)

Payments

[Create New Pay Method](#) =>

Notice: Looks like you haven't added any payment method yet! We accept credit card, debit card or a gift card as valid payment methods. Please make sure you have any valid payment method available before you order any service. If you have any questions, please contact us at +1 777-888-9999.

WOW Customer Area

Customer User: customer0023 First Name: Student Last Name: Nyu
[Home Page](#) [Logout](#)

[« Back to Homepage](#)

Invoices Info

Notice: No invoices found. You haven't ordered any service yet. Go back to your homepage and start a WOW service! If you have any questions, please contact us at +1 777-888-9999.

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WOW Customer Area

Customer User: customer0023 First Name: Student Last Name: Nyu
[Home Page](#) [Logout](#)

[« Back to Homepage](#)

Services

[Create New Service =>](#)

Notice: Oops... NO service was found. You haven't ordered any service yet! Start a WOW service right now! If you have any questions, please contact us at +1 777-888-9999.

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To add a new WOW service, a customer will click “Create New Service”. Then the system will tell the customer to add a valid payment method first before any purchase.

WOW Customer Area

Customer User: customer0023 First Name: Student Last Name: Nyu
[Home Page](#) [Logout](#)

[« Back to Services Index](#)

Create Service

Notice: Please add AT LEAST ONE VALID payment method before create a new service!!!

WOW Customer Area

Customer User: customer0023 First Name: Student Last Name: Nyu
[Home Page](#) [Logout](#)

[« Back to Payments Index](#)

Create Payment Methods

Customer Name	Student Nyu ▾
Card Number	4527987453489373
Method	<input checked="" type="radio"/> Credit Card <input type="radio"/> Debit Card <input type="radio"/> Gift Card

[Create New Method](#)

WOW Customer Area

Customer User: customer0023 First Name: Student Last Name: Nyu
[Home Page](#) [Logout](#)

[« Back to Payments Index](#)

Create Payment Methods

Notice: Successfully create a new payment method.

Customer Name	Student Nyu ▾
Card Number	<input type="text"/>
Method	<input type="radio"/> Credit Card <input type="radio"/> Debit Card <input type="radio"/> Gift Card

[Create New Method](#)

WOW Customer Area

Customer User: customer0023 First Name: Student Last Name: Nyu
[Home Page](#) [Logout](#)

[« Back to Homepage](#)

Payments

[Create New Pay Method ➔](#)

Payment No	Card Number	Method	Customer ID	
22	4527987453489373	Credit	23	View ➔

WOW Customer Area

Customer User: customer0023 First Name: Student Last Name: Nyu
[Home Page](#) [Logout](#)

[« Back to Payments index](#)

Payment No: 22

Customer ID	23
Full Name	Student Nyu
Card Number	4527987453489373
Method	Credit

After adding a credit card the customer will be allowed to order new WOW services.

WOW Customer Area

Customer User: customer0023 First Name: Student Last Name: Nyu
[Home Page](#) [Logout](#)

[« Back to Services Index](#)

Create Service

Customer Name	<input type="text" value="Student Nyu"/>
Scheduled Time	<input type="text" value="11/02/2020"/> <input type="button" value="..."/>
Pickup Date	<input type="text" value="11/26/2020"/> <input type="button" value="..."/>
Dropoff Date	<input type="text" value="12/26/2020"/> <input type="button" value="..."/>
Start Odometer	<input type="text" value="0"/> miles(default)
End Odometer	<input type="text" value="0"/> miles(default)
Daily Odolimit	<input type="text" value="500"/> mile/day(default)
Pickup Location	<input type="text" value="11--CALIFORNIA--LOS ANGELES"/>
Dropoff Location	<input type="text" value="14--CALIFORNIA--SAN DIEGO"/>
Vehicle ID	<input type="text" value="5--TOYOTA--CAMRY"/>
Invoice No	<input type="text" value="21"/>
Coupon No	<input type="text" value="No coupon used (Optional)"/>

WOW Customer Area

Customer User: customer0023 First Name: Student Last Name: Nyu
[Home Page](#) [Logout](#)

New Service Created Successfully.

[« Back to Services Index](#)

Service No: 21

Customer Name	Student Nyu
Scheduled Time	2020-11-02
Pickup Date	2020-11-26
Dropoff Date	2020-12-26
Start Odometer	0.00 miles
End Odometer	0.00 miles
Daily limit	500 miles/day
Pickup Location	11
Dropoff Location	14
Vehicle	TOYOTA-- CAMRY
Vehicle Type	MID-SIZE
License Plate Number	LP005
Rent Charge Rate	40.0 \$/day
Extra Charge Rate	2.0 \$/mile
Invoice No	21
Coupon No	NULL

A new service created successfully.

WOW Customer Area

Customer User: customer0023 First Name: Student Last Name: Nyu
[Home Page](#) [Logout](#)

[« Back to Homepage](#)

Services

[Create New Service =>](#)

Service No	Scheduled Time	Pickup Date	Dropoff Date	Start Odometer	End Odometer	Daily Odolimit	Pickup Location	Dropoff Location	Vehicle ID	Customer ID	Invoice No	Coupon No	View
21	2020-11-02	2020-11-26	2020-12-26	0.00	0.00	500	11	14	5	23	21	NULL	View

WOW Customer Area

Customer User: customer0023 First Name: Student Last Name: Nyu
[Home Page](#) [Logout](#)

[« Back to Homepage](#)

Services

[Create New Service =>](#)

Service No	Scheduled Time	Pickup Date	Droff Date	Start Odometer	End Odometer	Daily Odolimit	Pickup Location	Dropoff Location	Vehicle ID	Customer ID	Invoice No	Coupon No	View	=>
21	2020-11-02	2020-11-26	2020-12-26	0.00	0.00	500	11	14	5	23	21	NULL	View	=>

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One more step, we just create a new service for this new customer but there is no record on the invoice page. This operation should be done on the employee interface.

WOW Customer Area

Customer User: customer0023 First Name: Student Last Name: Nyu
[Home Page](#) [Logout](#)

[« Back to Homepage](#)

Invoices Info

Notice: No invoices found. You haven't ordered any service yet. Go back to your homepage and start a WOW service! If you have any questions, please contact us at +1 777-888-9999.

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Go to the employee interface and create a new invoice for this new customer:

WOW Staff Area

Staff User: Admin01 First Name: Joey Last Name: Sheffield
[Main Menu](#) [Logout](#)

[« Back to Search Index](#)

Student Nyu's Invoices

[Create New Invoice =>](#)

Notice: No invoice found.

WOW Staff Area

Staff User: Admin01 First Name: Joey Last Name: Sheffield
[Main Menu](#) [Logout](#)

[« Back to Index](#)

Create Invoice

Invoice No	21
Invoice Date	12/26/2020
Invoice Amount	100.05 \$

[Create Invoice](#)

WOW Staff Area

Staff User: Admin01 First Name: Joey Last Name: Sheffield
[Main Menu](#) [Logout](#)

[« Back to Search Index](#)

Student Nyu's Invoices

[Create New Invoice =>](#)

Invoice No.	Invoice Date	Amount	View	Edit	Delete
21	2020-12-26	100.05			

WOW Staff Area

Staff User: Admin01 First Name: Joey Last Name: Sheffield
[Main Menu](#) [Logout](#)

[« Back to Search Index](#)

Student Nyu's Invoice Pay Status

[Create New Invoice Payment =>](#)

Transaction ID	Invoice No	Payment No	Transaction Date	Amount	Status	View	Edit	Delete
15	21	22	2020-12-26	100.05	Cleared			

Check the invoice page for this new customer and we can see a new invoice added.

WOW Customer Area

Customer User: customer0023 First Name: Student Last Name: Nyu
[Home Page](#) [Logout](#)

[« Back to Homepage](#)

Invoices Info

Invoice No.	Invoice Date	Invoice Amount(\$)	Payment Date	Payment Amount(\$)	Card Number	Method	Payment Status	View More =>
21	2020-12-26	100.05	2020-12-26	100.05	4527987453489373	Credit	Cleared	View More =>

WOW Customer Area

Customer User: customer0023 First Name: Student Last Name: Nyu
[Home Page](#) [Logout](#)

[« Back to Invoices Info](#)

Invoice No: 21

Invoice No	21
Transaction ID	15
Invoice Date	2020-12-26
Invoice Amount	100.05 \$
Payment No	22
Transaction Date	2020-12-26
Payment Amount	100.05 \$
Status	Cleared

5. Security features of web development

a) Password protection

Both employee and customer interface need passwords to login. In other words, both interfaces only open to authorized users not any strangers. This is implemented using php `$_SESSION` associated array. Each time a user inputs login parameters via login page all parameters including username and password will be stored into `$_SESSION` array as session variables and released when the user log out. That means all session variables are well-defined and not empty during the time section between login and logout. Hence, only users with valid set session variables can be granted access to designated webpages during this time section. Therefore, take employee interface as example, we call `require_login()` at the top of any page which needs to require a valid login before granting access to the page. If the program inspects that login parameter `$_SESSION['staff_admin_id']` is empty or not defined, the web system will consider the current user as an unauthorized stranger that may not login successfully or never login. Such users would be blocked out from all webpages granted accesses by valid password.

```
// Performs all actions necessary to log in an admin
function log_in_staff_admin($admin) {
    // Regenerating the ID protects the admin from session fixation.
    session_regenerate_id();
    $_SESSION['staff_admin_id'] = $admin['id'];
    $_SESSION['staff_last_login'] = time();
    $_SESSION['staff_username'] = $admin['username'];
    $_SESSION['staff_first_name'] = $admin['first_name'];
    $_SESSION['staff_last_name'] = $admin['last_name'];
    return true;
}

// Performs all actions necessary to log out an admin
function log_out_staff_admin() {
    unset($_SESSION['staff_admin_id']);
    unset($_SESSION['staff_last_login']);
    unset($_SESSION['staff_username']);
    unset($_SESSION['staff_first_name']);
    unset($_SESSION['staff_last_name']);

    return true;
}

function is_staff_logged_in() {
    // Having an admin_id in the session serves a dual-purpose:
    // - Its presence indicates the admin is logged in.
    // - Its value tells which admin for looking up their record.
    return isset($_SESSION['staff_admin_id']);
}

function require_login() {
    if(!is_staff_logged_in()) {
        redirect_to(url_for('/staff/login.php'));
    } else {
        // Do nothing, let the rest of the page proceed
    }
}
```

b) Cross-Site Scripting Attacks (XSS)

In this project a great number of forms were used to “POST” input data from users. However, we can not always trust all the data a user input. Instead of normal text input, if a user entered a form with html labels like<html>text...</html> or something like <p>text...</p> and post input data via web, the web browser will be confused this data with real html labels and embedded this input To prevent this happened, php supports a very useful function PHP’s **htmlspecialchars** that converts such special html characters to html entities and returns a string.

```
<dl>
    <dt>First Name:</dt>
    <dd><?php echo h($customer['fname']); ?></dd>
</dl>
```

Note: “h” represents PHP “htmlspecialchars” function.

c) SQL injections

SQL injections happens when a hacker executed arbitrary SQL requests via web interface. They may send a carefully craft string to manipulate SQL syntax to inject their code into our original code, typically password insertion.

```
$sql = "SELECT * FROM MQ_CUST WHERE cust_id='". $cust_id . "'";
$cust_id = 2;
A hacker may use: $cust_id = '';
INSERT INTO staff_admins(username, password)
VALUES('hacker' , 'hacker1234'); SELECT * FROM MQ_CUST WHERE cust_id = '2';

➔ "SELECT * FROM MQ_CUST WHERE cust_id=''; INSERT INTO staff_admins(username, password) VALUES('hacker' , 'hacker1234'); SELECT * FROM MQ_CUST WHERE cust_id = '2';"
```

To prevent such attacks, we need to sanitized input data for SQL. One php function **mysqli_real_escape_string** which will convert any character that has significance in SQL syntax into plain data and also add a backslash before all single quotes to tell the system this is simply data.

```
function db_escape($connection, $string) {
    return mysqli_real_escape_string($connection, $string);
}

function find_customer_by_id($cust_id) {
    global $db;

    $sql = "SELECT * FROM MQ_CUST ";
    $sql .= "WHERE cust_id='". db_escape($db, $cust_id) . "'";
```

6. Lessons learned

This is a very practical database project and a good expansion to the lectures. A great significance for me is that I have gained some frontend web development experience in this process and introductory PHP and html language skills. What’s more, it gives me an overview on how the frontend and the backend frameworks coordinates and worked together for real applications.

7. Business analysis with 4 SQLs

a) Table joins

```
SELECT a.loc_id, b.veh_id, a.loc_state, a.loc_city, b.make, b.model, b.VIN,
b.LPN, c.vc_name, c.rent_charge, c.extra_charge
FROM MQ_OFFLOC a join MQ_VEH b on a.loc_id = b.loc_id join MQ_VCLASS c on
b.vclass_id = c.vclass_id
ORDER BY 1, 2;
```

Showing rows 0 - 9 (10 total, Query took 0.0031 seconds.)

`SELECT a.loc_id, b.veh_id, a.loc_state, a.loc_city, b.make, b.model, b.VIN, b.LPN, c.vc_name, c.rent_charge, c.extra_charge FROM MQ_OFFLOC a join MQ_VEH b on a.loc_id = b.loc_id join MQ_VCLASS c on b.vclass_id = c.vclass_id ORDER BY 1, 2`

Profiling [Edit inline] [Edit] [Explain SQL] [Create PHP code] [Refresh]

Show all | Number of rows: 25 Filter rows: Search this table

+ Options

loc_id	veh_id	loc_state	loc_city	make	model	VIN	LPN	vc_name	rent_charge	extra_charge
10	1	NEW YORK	NEW YORK	FORD	FUSION	VN001	LP001	MID-SIZE	40.0	2.0
10	3	NEW YORK	NEW YORK	FORD	FIESTA	VN003	LP003	SMALL	35.0	2.0
11	2	CALIFORNIA	LOS ANGELES	CHEVY	TRVERSE	VN002	LP002	MINI VAN	45.0	3.0
11	9	CALIFORNIA	LOS ANGELES	NISSAN	ALTIMA	VN009	LP009	MID-SIZE	40.0	2.0
12	7	ILLINOIS	CHICAGO	BMW	5-SERIES	VN007	LP007	MID-SIZE	40.0	2.0
13	5	TEXAS	HOUSTON	TOYOTA	CAMRY	VN005	LP005	MID-SIZE	40.0	2.0
14	4	CALIFORNIA	SAN DIEGO	HONDA	ACCORD	VN004	LP004	MID-SIZE	40.0	2.0
15	8	TEXAS	DALLAS	TOYOTA	avalon	VN008	LP008	FULL-SIZE	50.0	3.0
16	10	OHIO	COLUMBUS	LINCOLN	NAVIGATOR	VN010	LP010	LUXURY	150.0	10.0
19	6	MICHIGAN	DETROIT	CHEVY	VOLT	VN006	LP006	ELECTRIC	80.0	5.5

Note: Get full details of each rental vehicles in WOW.

```
SELECT a.*, b.pay_date, b.pay_amount, c.card_no, c.method, b.pay_status
FROM MQ_INV a join MQ_INVPAY b on a.invno=b.invno join MQ_PAY c on
b.payno=c.payno
ORDER BY a.invno;
```

Showing rows 0 - 9 (10 total, Query took 0.0023 seconds.) [invno: 1... - 10...]

`SELECT a.*, b.pay_date, b.pay_amount, c.card_no, c.method, b.pay_status FROM MQ_INV a join MQ_INVPAY b on a.invno=b.invno join MQ_PAY c on b.payno=c.payno ORDER BY a.invno`

Profiling [Edit inline] [Edit] [Explain SQL] [Create PHP code]

Show all | Number of rows: 25 Filter rows: Search this table

+ Options

invno	inv_date	inv_amount	pay_date	pay_amount	card_no	method	pay_status
1	2019-03-18	105.60	2019-03-18	105.60	9205963010894630	C	CLEARED
2	2019-04-09	95.20	2019-04-09	95.20	4794364589437525	C	CLEARED
3	2019-04-21	110.20	2019-04-21	110.20	7400490238023508	C	CLEARED
4	2019-05-05	93.40	2019-05-05	93.40	2504830298500504	C	CLEARED
5	2019-07-01	220.60	2019-07-01	220.60	3895153408823893	D	CLEARED
6	2019-07-12	150.00	2019-07-12	150.00	6783507208	G	CLEARED
7	2019-07-30	180.50	2019-07-30	180.50	7400490238023508	C	CLEARED
8	2019-08-20	130.92	2019-08-20	130.92	8436054403850201	D	CLEARED
9	2019-10-08	320.40	2019-10-09	320.40	3487051350803826	D	CLEARED
10	2019-12-19	280.20	2019-12-19	280.20	6783507208	G	CLEARED

Show all | Number of rows: 25 Filter rows: Search this table

Note: Get full details for all invoices' payment status. In this case, all invoices were cleared.

b) Sub queries

```
SELECT a.cust_id, a.fname, a.lname, b.serv_no, c.inv_amount FROM `MQ_CUST` a
join `MQ_SERV` b on a.cust_id = b.cust_id join `MQ_INV` c on b.invno = c.invno
WHERE c.inv_amount > (select avg(c.inv_amount) from `MQ_CUST` a join `MQ_SERV` b on a.cust_id = b.cust_id join `MQ_INV` c on b.invno = c.invno)
ORDER BY 1;
```

Showing rows 0 - 0 (1 total, Query took 0.0016 seconds.)

```
select avg(c.inv_amount) "Average Charge" from `MQ_CUST`a join `MQ_SERV` b on a.cust_id = b.cust_id join `MQ_INV`c on b.invno = c.invno
```

Profiling [Edit inline] []

Show all | Number of rows: 25 Filter rows: Search this table

+ Options

Average Charge

168.702000

Showing rows 0 - 9 (10 total, Query took 0.0024 seconds.)

```
SELECT a.cust_id, a.fname, a.lname, b.serv_no, c.inv_amount FROM `MQ_CUST`a join `MQ_SERV` b on a.cust_id = b.cust_id join `MQ_INV`c on b.invno = c.invno order by 1
```

Profiling [Edit inline] [Edit] [Explain SQL] [Create P]

Show all | Number of rows: 25 Filter rows: Search this table

+ Options

cust_id	fname	lname	serv_no	inv_amount
1	MIKE	GREEN	1	105.60
2	Marvin	AVE	9	320.40
3	SMITH	WHITE	7	180.50
5	JONES	HADE	6	150.00
6	MARY	WONDER	3	110.20
6	MARY	WONDER	2	95.20
7	W.	T.	5	220.60
7	W.	T.	10	280.20
8	BECKY	WHITE	4	93.40
10	JERRY	COOK	8	130.92

Showing rows 0 - 3 (4 total, Query took 0.0036 seconds.)

```
SELECT a.cust_id, a.fname, a.lname, b.serv_no, c.inv_amount FROM `MQ_CUST`a join `MQ_SERV` b on a.cust_id = b.cust_id join `MQ_INV`c on b.invno = c.invno WHERE c.inv_amount > (select avg(c.inv_amount) from `MQ_CUST`a join `MQ_SERV` b on a.cust_id = b.cust_id join `MQ_INV`c on b.invno = c.invno) ORDER BY 1
```

Profiling [Edit inline] [Edit] [Explain SQL] [Create PHP code] [Refresh]

Show all | Number of rows: 25 Filter rows: Search this table

+ Options

cust_id	fname	lname	serv_no	inv_amount
2	Marvin	AVE	9	320.40
3	SMITH	WHITE	7	180.50
7	W.	T.	5	220.60
7	W.	T.	10	280.20

Showing rows 0 - 2 (3 total, Query took 0.0031 seconds.)

```
SELECT DISTINCT a.cust_id, a.fname, a.lname FROM `MQ_CUST`a join `MQ_SERV` b on a.cust_id = b.cust_id join `MQ_INV`c on b.invno = c.invno WHERE c.inv_amount > (select avg(c.inv_amount) from `MQ_CUST`a join `MQ_SERV` b on a.cust_id = b.cust_id join `MQ_INV`c on b.invno = c.invno) ORDER BY 1
```

Profiling [Edit inline] [Edit] [Explain SQL] [Create PHP]

Show all | Number of rows: 25 Filter rows: Search this table Sort by key: None

+ Options

cust_id	fname	lname
2	Marvin	AVE
3	SMITH	WHITE
7	W.	T.

Note: Find all customers' names who paid more than average charge of all services.

c) Top-N queries

```
SELECT a.cust_id, a.fname, a.lname, b.serv_no, c.inv_amount FROM `MQ_CUST`a
join `MQ_SERV` b on a.cust_id = b.cust_id join `MQ_INV`c on b.invno = c.invno
order by c.inv_amount desc
LIMIT 5;
```

✓ Showing rows 0 - 4 (5 total, Query took 0.0025 seconds.) [inv_amount: 320.40... - 150.00...]

```
SELECT a.cust_id, a.fname, a.lname, b.serv_no, c.inv_amount FROM `MQ_CUST`a join `MQ_SERV` b on a.cust_id = b.cust_id
LIMIT 5
```

+ Options

cust_id	fname	lname	serv_no	inv_amount
2	Marvin	AVE	9	320.40
7	W.	T.	10	280.20
7	W.	T.	5	220.60
3	SMITH	WHITE	7	180.50
5	JONES	HADDE	6	150.00

Note: Find customers that were charged for the 5 highest cost services.

d) Queries with analytical functions

```
SELECT c.loc_id, c.loc_state, c.loc_city, c.vehcnt, c.vehrank
FROM(select a.loc_id, a.loc_state, a.loc_city, b.veh_id, b.make, b.model,
b.vyear,
count(distinct (b.veh_id)) vehcnt,
DENSE_RANK() OVER (ORDER BY count(distinct (b.veh_id))desc) AS vehrank
from MQ_OFFLOC a join MQ_VEH b on a.loc_id = b.loc_id
group by a.loc_id
order by 1) c
where c.vehrank=1
order by 1;
```

✓ Showing rows 0 - 1 (2 total, Query took 0.0045 seconds.)

```
SELECT c.loc_id, c.loc_state, c.loc_city, c.vehcnt, c.vehrank FROM(select a.loc_id, a.loc_state, a.loc_city, b.veh_id, b.make, b.model, b.vyear, count(distinct (b.veh_id)) vehcnt,
DENSE_RANK() OVER (ORDER BY count(distinct (b.veh_id))desc) AS vehrank from MQ_OFFLOC a join MQ_VEH b on a.loc_id = b.loc_id group by a.loc_id order by 1) c where c.vehrank=1
```

Profiling [[Edit inline](#)] [[Edit](#)] [[Explain SQL](#)] [[Create P](#)]

Show all | Number of rows: 25 Filter rows:

+ Options

loc_id	loc_state	loc_city	vehcnt	vehrank
10	NEW YORK	NEW YORK	2	1
11	CALIFORNIA	LOS ANGELES	2	1

Note: Find WOW office locations with most rental vehicles in store.