Gateway Classic Cars 2019 Report

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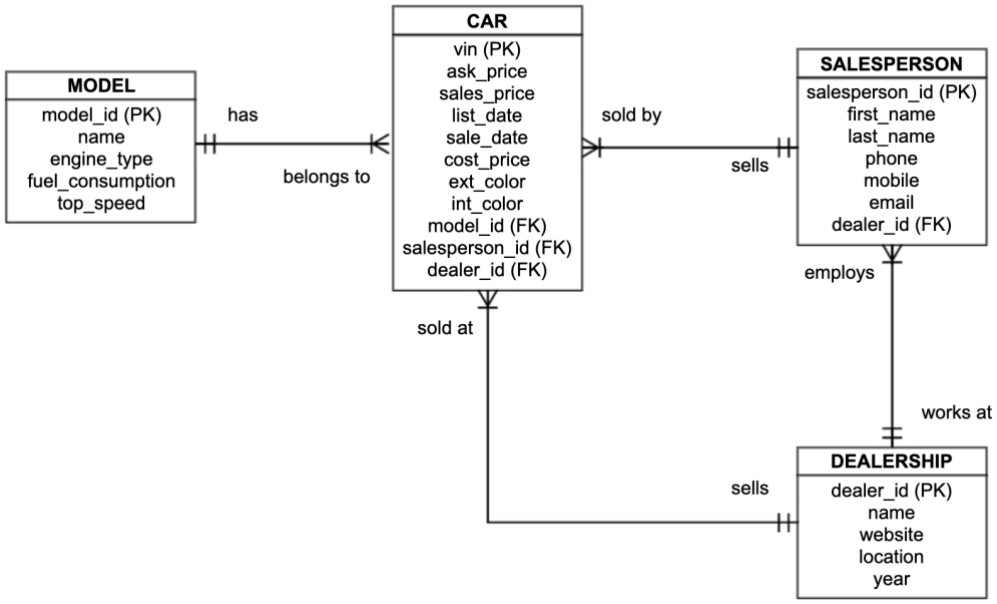
Information Systems Milieux (67-250)
Professor Quesenberry

A. Data Modeling, Creation, and Basic Queries

Entity-Relationship Diagram



Assumptions

- Car sales are stored once (no resales).
- The VIN of each car is unique.
- Only one salesperson can sell a car.
- A salesperson only works at one dealership.

Data Dictionary

MODEL			
Field	**Data Type**	**Description**	**Example Data**
model_id (PK)	INT(11)	The unique ID for model	500
name	VARCHAR(100)	Name of model	Ford Pickup Truck
engine_type	VARCHAR(100)	Type of engine used in model	355 CID V8
fuel_consumption	VARCHAR(100)	Fuel consumption in liters per 100 km	12.3 l/100 km
top_speed	VARCHAR(100)	Top speed model can r in km/h	306 km/h

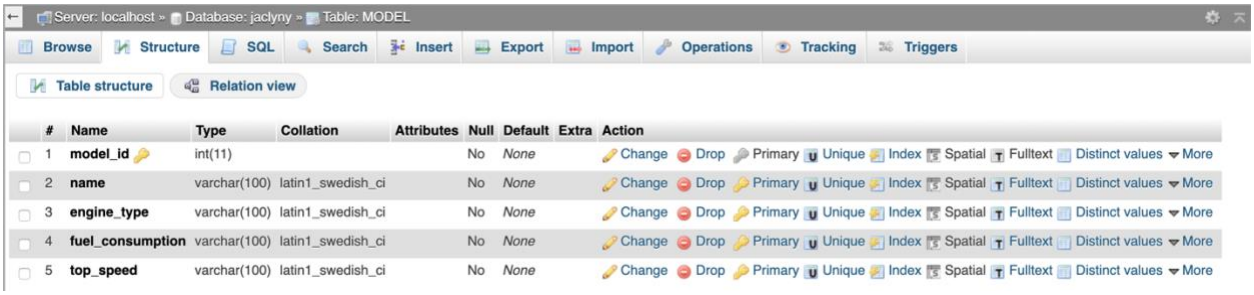
DEALERSHIP			
Field	**Data Type**	**Description**	**Example Data**
dealer_id (PK)	INT(11)	Unique ID for car dealership	100
name	VARCHAR(100)	Name of Gateway dealership	Gateway Illinois
website	VARCHAR(100)	Link to dealership website	https://gatway_illinois.com/en
location	VARCHAR(100)	Location of dealership (city and state)	Chicago IL
year	YEAR(4)	Year the dealership opened	1999

SALESPERSON			
Field	**Data Type**	**Description**	**Example Data**
salesperson_id (PK)	INT(11)	Unique ID for salesperson	1
first_name	VARCHAR(100)	First name of salesperson	Sal
last_name	VARCHAR(100)	Last name of salesperson	Akbani
phone	VARCHAR(100)	Phone number of salesperson	82 (2) 2553 7713
mobile	VARCHAR(100)	Cell phone number of salesperson	39 (0)30 8866 1254
email	VARCHAR(100)	Email address of salesperson	salakbani@gatewayclassics.com
dealer_id (FK)	INT(11)	Unique ID of salesperson's dealership	104

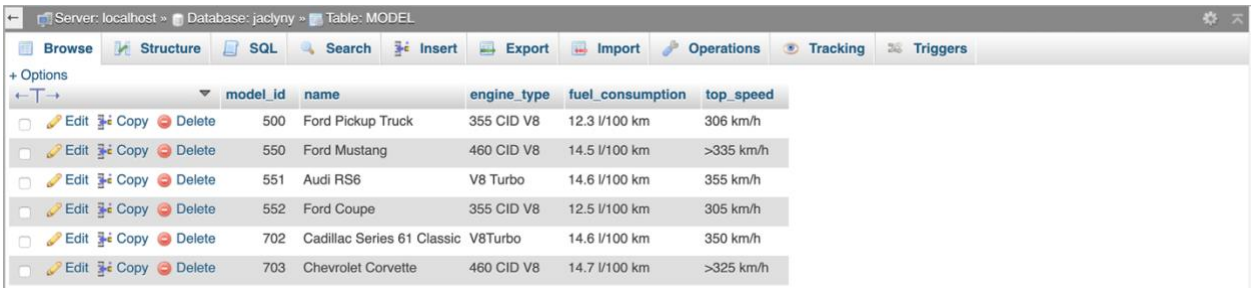
CAR			
Field	**Data Type**	**Description**	**Example Data**
vin (PK)	VARCHAR(100)	Vehicle identification number of car	SCBGE11RXBLA13261
ask_price	DECIMAL(10,2)	Asking price of car (marked-up price)	220273
sales_price	DECIMAL(10,2)	Price at which car was sold	217835
list_date	DATE	Date on which car was listed	2019-01-01
sale_date	DATE	Date on which car was sold	2019-01-01
cost_price	DECIMAL(10,2)	Price at which the dealership bought car	185496
ext_color	VARCHAR(100)	Color of car's exterior	Havana
int_color	VARCHAR(100)	Color of car's interior	Beluga
model_id (FK)	INT(11)	Unique ID for car's model	550
salesperson_id (FK)	INT(11)	Unique ID for car's salesperson	1
dealer_id (FK)	INT(11)	Unique ID for car's dealership	104

Database

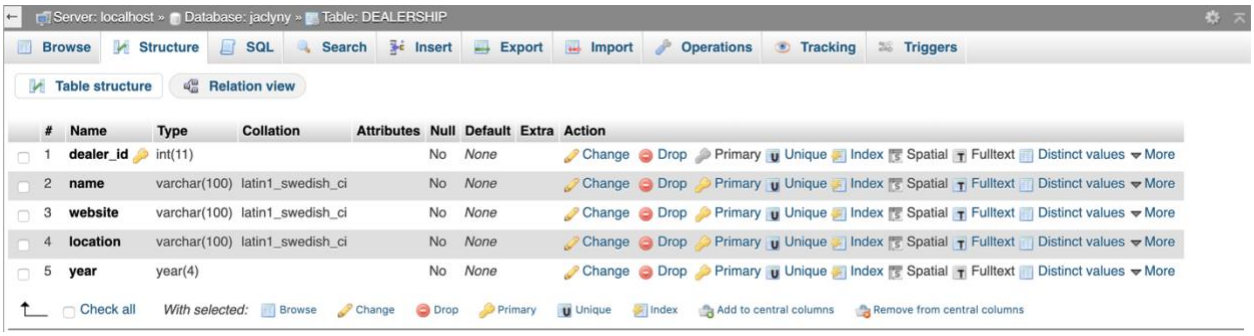
a. MODEL Table Structure



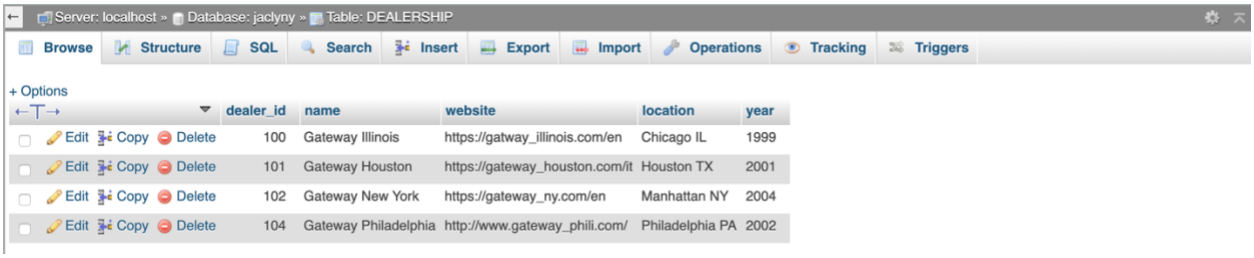
b. MODEL Data Table



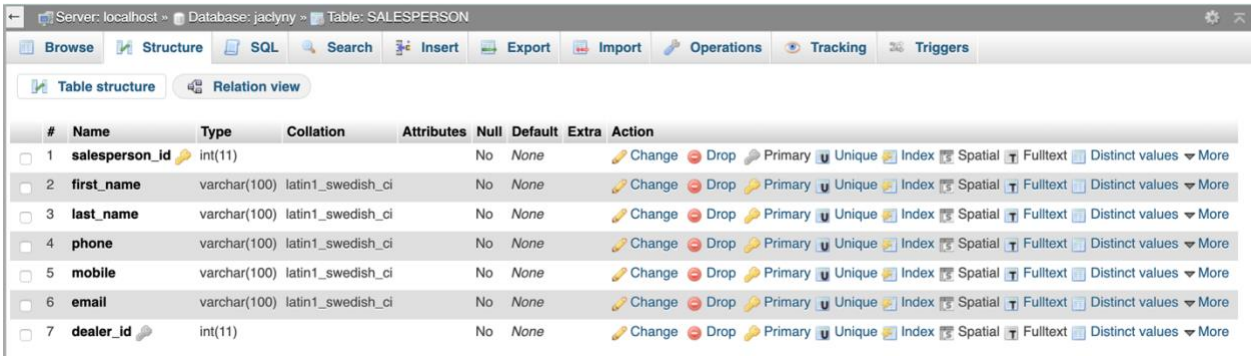
c. DEALERSHIP Table Structure



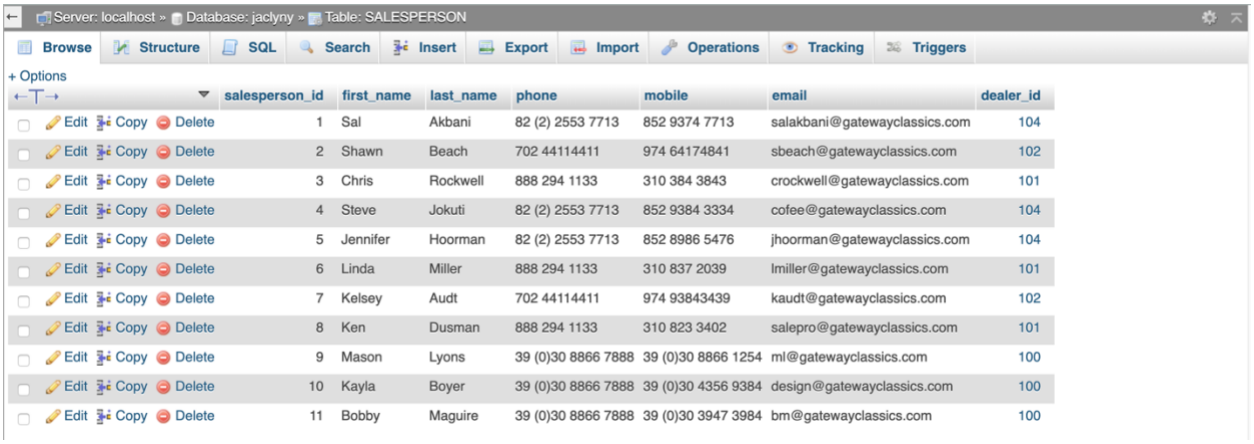
d. DEALERSHIP Data Table



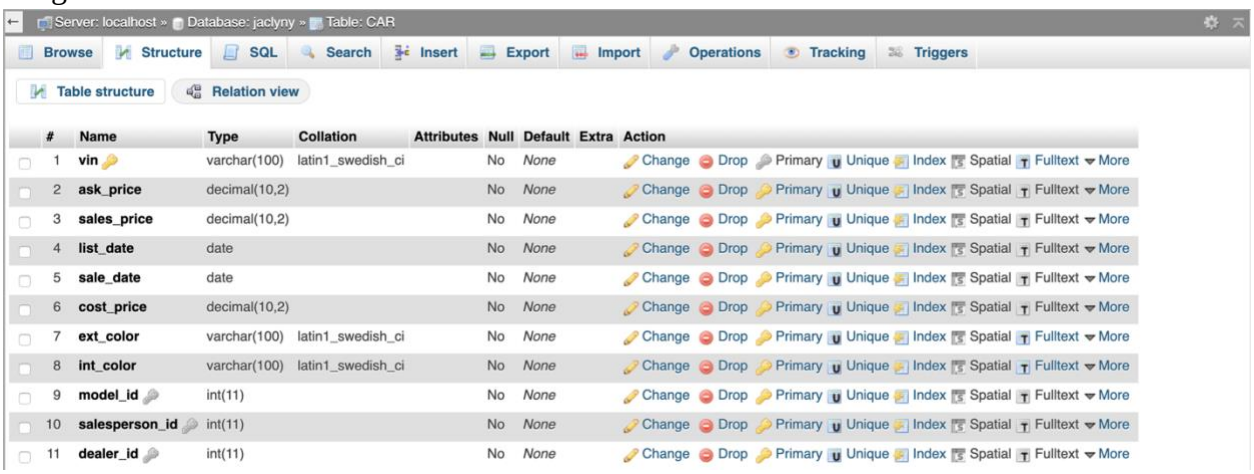
e. SALESPERSON Table Structure



f. SALESPERSON Data Table

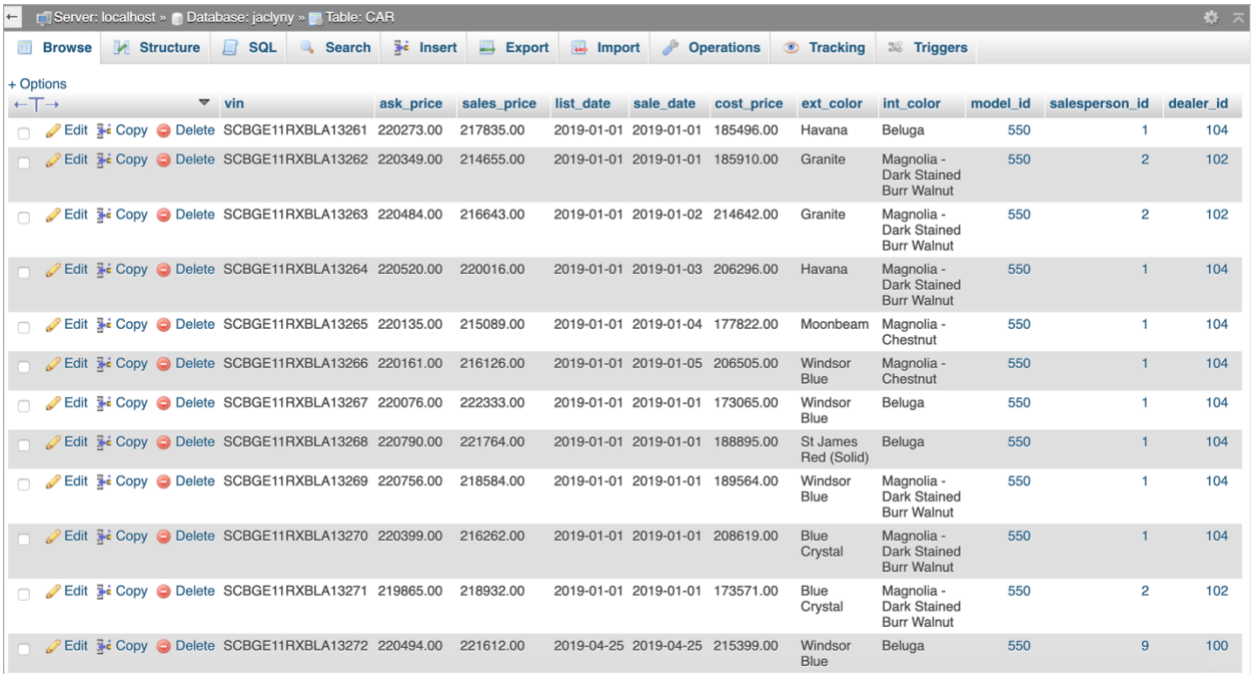


g. CAR Table Structure



#	Name	Type	Collation	Attributes	Null	Default	Extra	Action
1	vin	varchar(100)	latin1_swedish_ci		No	None		Change Drop Primary Unique Index Spatial Fulltext More
2	ask_price	decimal(10,2)			No	None		Change Drop Primary Unique Index Spatial Fulltext More
3	sales_price	decimal(10,2)			No	None		Change Drop Primary Unique Index Spatial Fulltext More
4	list_date	date			No	None		Change Drop Primary Unique Index Spatial Fulltext More
5	sale_date	date			No	None		Change Drop Primary Unique Index Spatial Fulltext More
6	cost_price	decimal(10,2)			No	None		Change Drop Primary Unique Index Spatial Fulltext More
7	ext_color	varchar(100)	latin1_swedish_ci		No	None		Change Drop Primary Unique Index Spatial Fulltext More
8	int_color	varchar(100)	latin1_swedish_ci		No	None		Change Drop Primary Unique Index Spatial Fulltext More
9	model_id	int(11)			No	None		Change Drop Primary Unique Index Spatial Fulltext More
10	salesperson_id	int(11)			No	None		Change Drop Primary Unique Index Spatial Fulltext More
11	dealer_id	int(11)			No	None		Change Drop Primary Unique Index Spatial Fulltext More

h. CAR Data Table

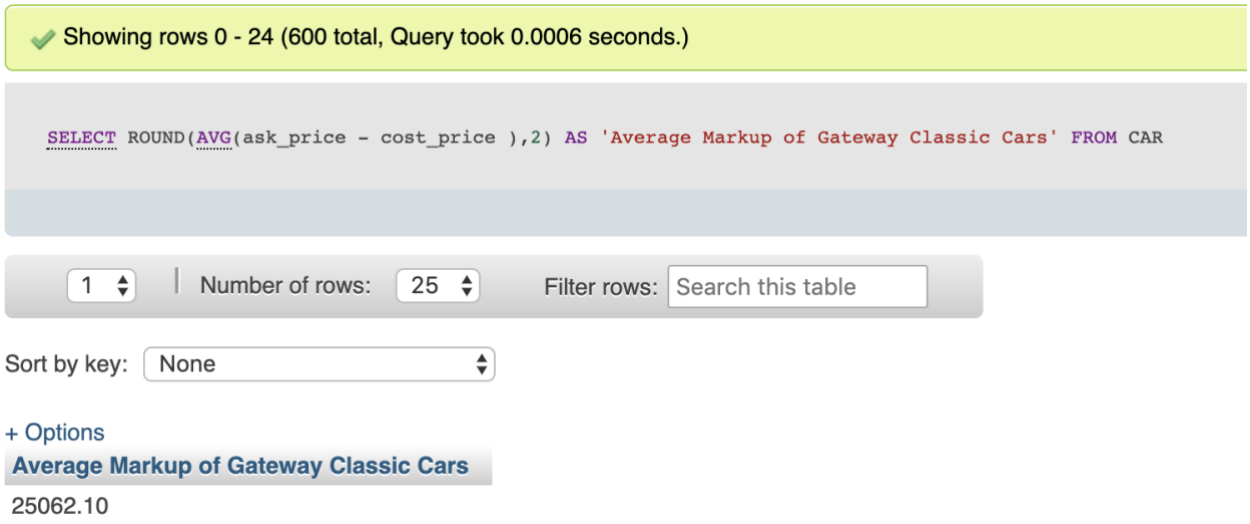


	vin	ask_price	sales_price	list_date	sale_date	cost_price	ext_color	int_color	model_id	salesperson_id	dealer_id
Edit Copy Delete	SCBGE11RXBLA13261	220273.00	217835.00	2019-01-01	2019-01-01	185496.00	Havana	Beluga	550	1	104
Edit Copy Delete	SCBGE11RXBLA13262	220349.00	214655.00	2019-01-01	2019-01-01	185910.00	Granite	Magnolia - Dark Stained Burr Walnut	550	2	102
Edit Copy Delete	SCBGE11RXBLA13263	220484.00	216643.00	2019-01-01	2019-01-02	214642.00	Granite	Magnolia - Dark Stained Burr Walnut	550	2	102
Edit Copy Delete	SCBGE11RXBLA13264	220520.00	220016.00	2019-01-01	2019-01-03	206296.00	Havana	Magnolia - Dark Stained Burr Walnut	550	1	104
Edit Copy Delete	SCBGE11RXBLA13265	220135.00	215089.00	2019-01-01	2019-01-04	177822.00	Moonbeam	Magnolia - Chestnut	550	1	104
Edit Copy Delete	SCBGE11RXBLA13266	220161.00	216126.00	2019-01-01	2019-01-05	206505.00	Windsor Blue	Magnolia - Chestnut	550	1	104
Edit Copy Delete	SCBGE11RXBLA13267	220076.00	222333.00	2019-01-01	2019-01-01	173065.00	Windsor Blue	Beluga	550	1	104
Edit Copy Delete	SCBGE11RXBLA13268	220790.00	221764.00	2019-01-01	2019-01-01	188895.00	St James Red (Solid)	Beluga	550	1	104
Edit Copy Delete	SCBGE11RXBLA13269	220756.00	218584.00	2019-01-01	2019-01-01	189564.00	Windsor Blue	Magnolia - Dark Stained Burr Walnut	550	1	104
Edit Copy Delete	SCBGE11RXBLA13270	220399.00	216262.00	2019-01-01	2019-01-01	208619.00	Blue Crystal	Magnolia - Dark Stained Burr Walnut	550	1	104
Edit Copy Delete	SCBGE11RXBLA13271	219865.00	218932.00	2019-01-01	2019-01-01	173571.00	Blue Crystal	Magnolia - Dark Stained Burr Walnut	550	2	102
Edit Copy Delete	SCBGE11RXBLA13272	220494.00	221612.00	2019-04-25	2019-04-25	215399.00	Windsor Blue	Beluga	550	9	100

B. Queries

Query A: Average Profit of Gateway Classic Car

Query B: Average Markup of Gateway Classic Car



Query C: Average Markup Per Car by Model

Showing rows 0 - 5 (6 total, Query took 0.0018 seconds.)

```
SELECT ROUND(AVG(CAR.ask_price - CAR.cost_price),2) AS 'Average Markup', MODEL.name AS 'Model' FROM CAR INNER JOIN MODEL ON CAR.model_id = MODEL.model_id GROUP BY MODEL.name
ORDER BY AVG(CAR.ask_price - CAR.cost_price)
```

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

Average Markup	Model
22711.20	Ford Pickup Truck
24345.75	Cadillac Series 61 Classic
24459.69	Ford Mustang
25807.02	Ford Coupe
25822.62	Audi RS6
26268.38	Chevrolet Corvette

Query D: Average Time on Market by Model

Showing rows 0 - 5 (6 total, Query took 0.0019 seconds.)

```
SELECT ROUND(AVG(DATEDIFF(CAR.sale_date,CAR.list_date)),2) AS 'Average Days on Market', MODEL.name AS 'Model' FROM CAR INNER JOIN MODEL ON CAR.model_id = MODEL.model_id GROUP
BY MODEL.name ORDER BY AVG(DATEDIFF(CAR.sale_date,CAR.list_date))
```

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

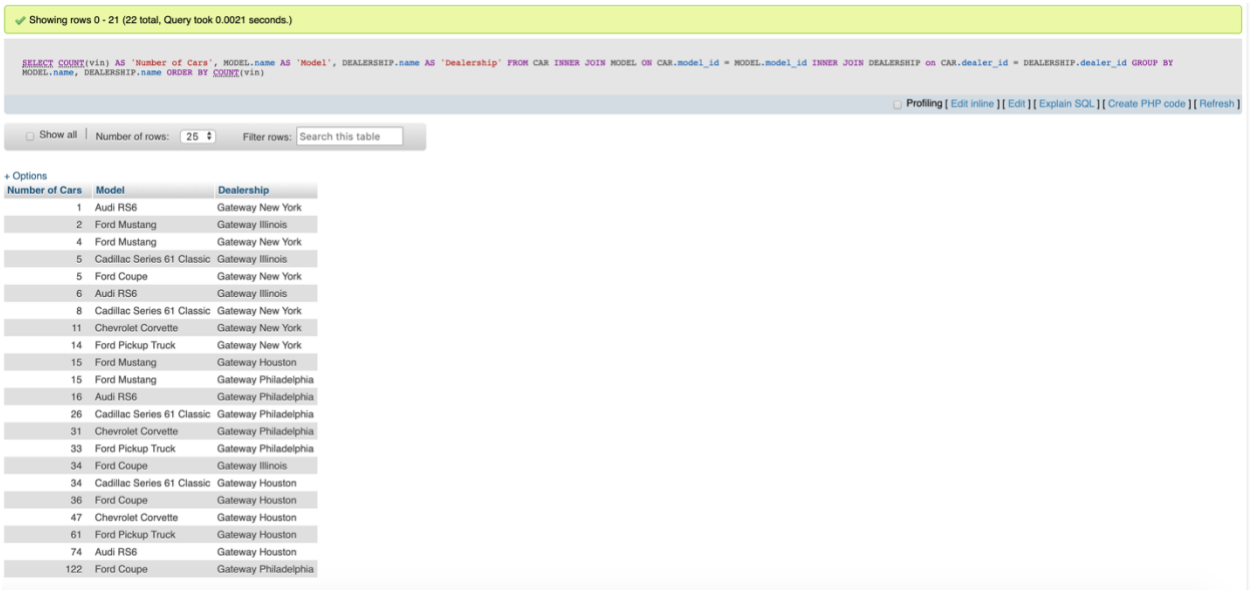
Show all | Number of rows: 25 Filter rows: Search this table

Sort by key: None

+ Options

Average Days on Market	Model
0.75	Ford Mustang
2.25	Cadillac Series 61 Classic
2.31	Chevrolet Corvette
4.70	Audi RS6
6.49	Ford Pickup Truck
14.81	Ford Coupe

Query E: Number of Cars Sold by Model for Each Dealership



Showing rows 0 - 21 (22 total, Query took 0.0021 seconds.)

```
SELECT COUNT(vin) AS 'Number of Cars', MODEL.name AS 'Model', DEALERSHIP.name AS 'Dealership' FROM CAR INNER JOIN MODEL ON CAR.model_id = MODEL.model_id INNER JOIN DEALERSHIP on CAR.dealer_id = DEALERSHIP.dealer_id GROUP BY
MODEL.name, DEALERSHIP.name ORDER BY COUNT(vin)
```

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

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

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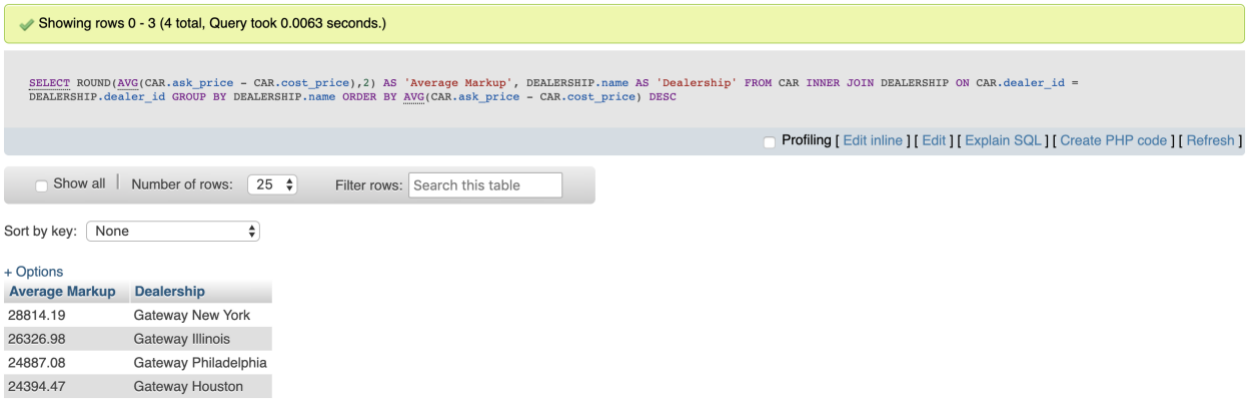
Number of Cars	Model	Dealership
1	Audi RS6	Gateway New York
2	Ford Mustang	Gateway Illinois
4	Ford Mustang	Gateway New York
5	Cadillac Series 61 Classic	Gateway Illinois
5	Ford Coupe	Gateway New York
6	Audi RS6	Gateway Illinois
8	Cadillac Series 61 Classic	Gateway New York
11	Chevrolet Corvette	Gateway New York
14	Ford Pickup Truck	Gateway New York
15	Ford Mustang	Gateway Houston
15	Ford Mustang	Gateway Philadelphia
16	Audi RS6	Gateway Philadelphia
26	Cadillac Series 61 Classic	Gateway Philadelphia
31	Chevrolet Corvette	Gateway Philadelphia
33	Ford Pickup Truck	Gateway Philadelphia
34	Ford Coupe	Gateway Illinois
34	Cadillac Series 61 Classic	Gateway Houston
36	Ford Coupe	Gateway Houston
47	Chevrolet Corvette	Gateway Houston
61	Ford Pickup Truck	Gateway Houston
74	Audi RS6	Gateway Houston
122	Ford Coupe	Gateway Philadelphia

Query F: Average Markup Per Car by Dealership



Showing rows 0 - 3 (4 total, Query took 0.0063 seconds.)

```
SELECT ROUND(AVG(CAR.ask_price - CAR.cost_price),2) AS 'Average Markup', DEALERSHIP.name AS 'Dealership' FROM CAR INNER JOIN DEALERSHIP ON CAR.dealer_id =
DEALERSHIP.dealer_id GROUP BY DEALERSHIP.name ORDER BY AVG(CAR.ask_price - CAR.cost_price) DESC
```

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

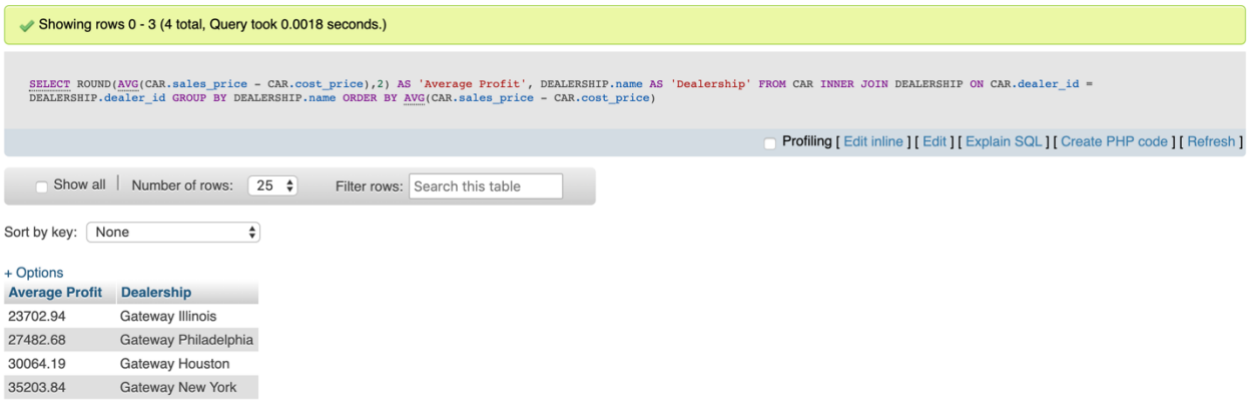
Show all | Number of rows: 25 Filter rows: Search this table

Sort by key: None

+ Options

Average Markup	Dealership
28814.19	Gateway New York
26326.98	Gateway Illinois
24887.08	Gateway Philadelphia
24394.47	Gateway Houston

Query G: Average Profit Per Car by Dealership



Average Profit	Dealership
23702.94	Gateway Illinois
27482.68	Gateway Philadelphia
30064.19	Gateway Houston
35203.84	Gateway New York

C. Business Memo

Date: April 15, 2020
To: Gateway Classic Cars Manager and Executives
From: Jackie Yang
Subject: Dealership Expansion Recommendation

After running the 2019 car sales from the Illinois, Philadelphia, Houston, and New York dealerships through multiple database queries, it appears that expanding the Houston location is the best choice. This is because the Houston dealership showed great potential in the past year for producing high sales volumes and high profits, among many other reasons.

Sales Volume

To look into the sales volume of each dealership, I queried the number of cars for each model sold at each dealership location (Query E). Figure 1 displays the sale volume results increasing from New York and Illinois to Philadelphia and Houston.

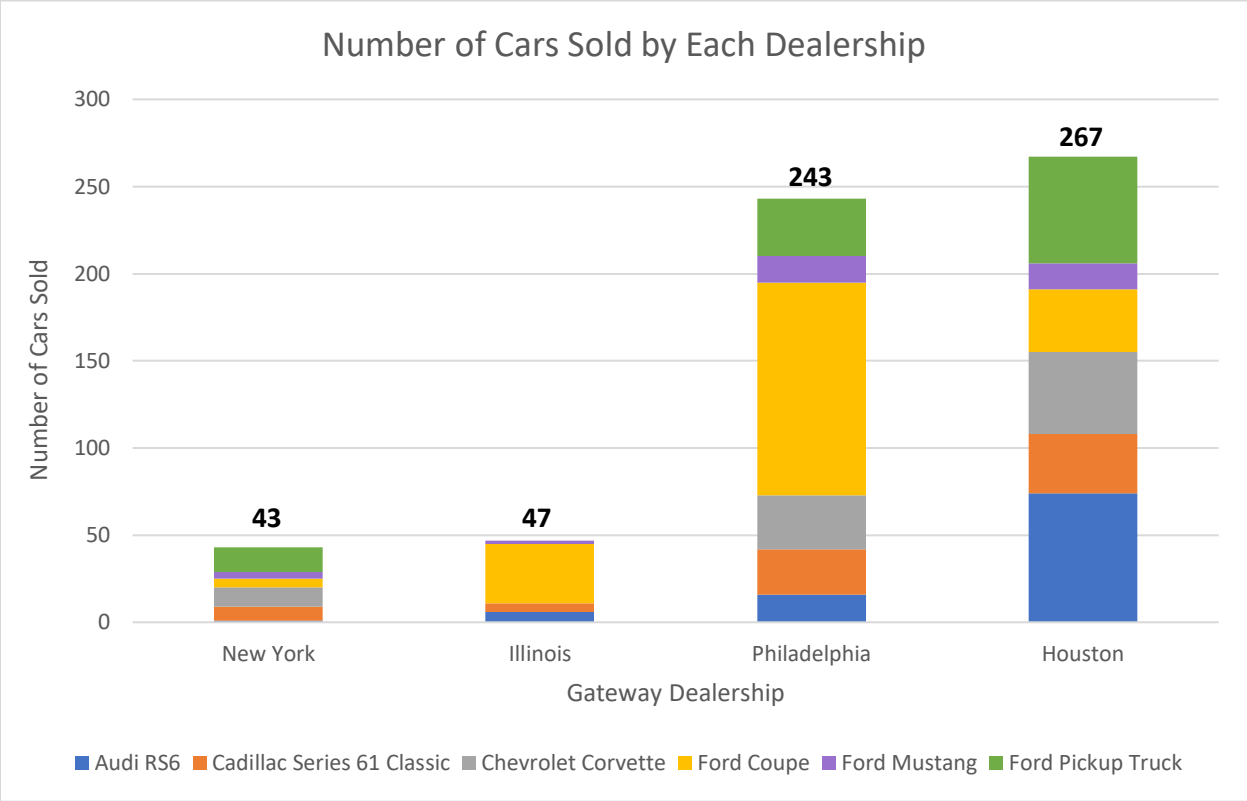


Figure 1: Number cars of sold by each Gateway dealership, further broken down by model.

Out of the four dealership locations, New York and Illinois made the least sales with 43 and 47 cars sold respectively. This indicates that these two locations show little promise in terms of sales volume. Philadelphia made significantly more sales with 243 cars sold, creating a large

difference of about 200 cars. With a total of 267 cars sold, Houston sold the most cars amongst the four locations. It is also interesting to note that Houston was able to sell largest variety of cars. This query shows that Houston is the most promising in terms of sales volume and variety. Placing second in terms of sales volume, Philadelphia is also a promising choice.

Profits Per Car

For a better understanding of the dealership profits, I queried the average profit made on a car for each dealership location (Query G). Figure 2 demonstrates that the average profit per car increased from Illinois, to Philadelphia, to Houston, and to New York.

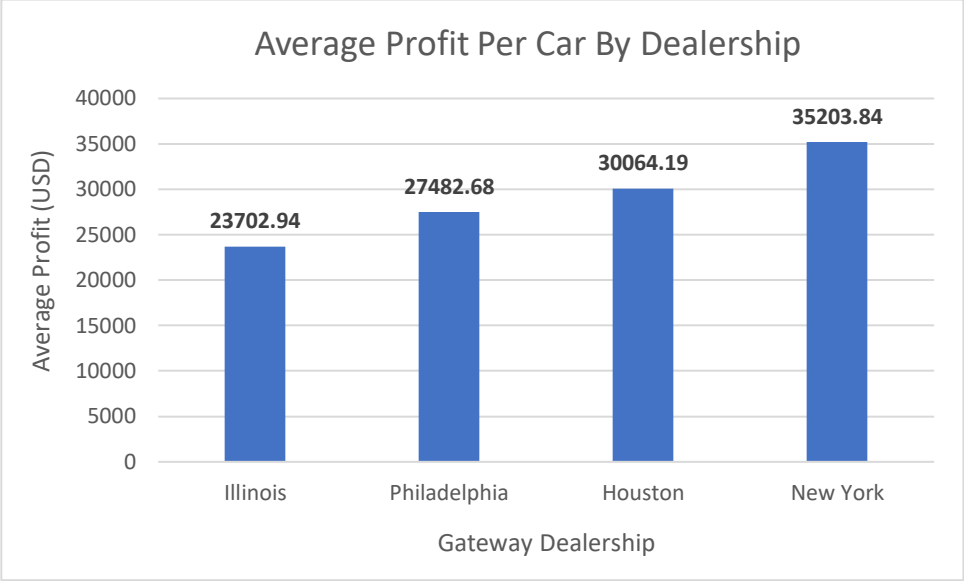


Figure 2: Average profit made from selling one car at each Gateway dealership.

Illinois made the least profit per car with an average of $23,702.94. Philadelphia and Houston respectively made around $27,482.68 and $30,064.19 per car. With an average of $35,203.84, New York had the highest average profit per car sold. The averages for Houston and New York both exceeded $28,888.72, the queried profit per car across all the Gateway cars in the four locations (Query A). Looking at just average profit per car, Houston and New York are the two most promising choices.

Estimated Total Profit

While the sales volume and average profit per car do provide good insight into the performance of the Gateway dealership locations, estimating the total profit of each location can be a more accurate indicator. Estimated total profits for each dealership location was calculated by multiplying the number of cars sold by the average profit per car. Figure 3 shows that the estimated total profits increased from Illinois and New York to Philadelphia and Houston.

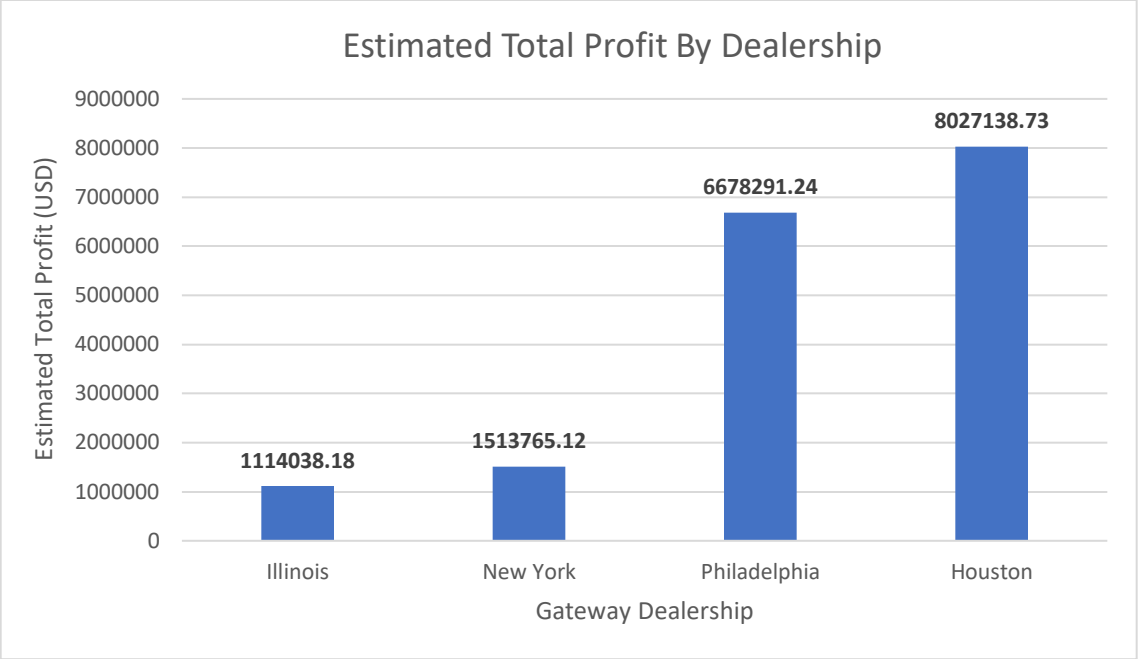


Figure 3: Estimated total profit made by each Gateway dealership.

Illinois and New York had the smallest estimated total profit with $1,114,038.18 and $1513765.12 respectively. While New York had the highest profit per car as previously mentioned, the small number for car sales resulted in it having one of the smallest total profits. Philadelphia had a much larger estimated total profit of $6,678,291.24 as seen in the graph. Out of the four locations, Houston had the highest estimated total profit with $8,027,138.73. In context, Houston represented 46% of the profit generated by all four of the locations combined.

Other Observations

From querying the average markup prices of each dealership and graphing them in Figure 4, it was discovered that the Houston location had the smallest markups with an average of $24,394.47 (Query F). This was just lower than the average markup of $25062.10 across all the Gateway cars (Query B). Although Houston had much lower markups, it still generated the most profit. This means that it received consistent purchases with a large enough profit to make up for the low markups. Unlike Philadelphia, Houston's sales also did not rely heavily on the Ford Coupe, which had the longest time on the market of about two weeks as seen in Figure 5 (Query D).

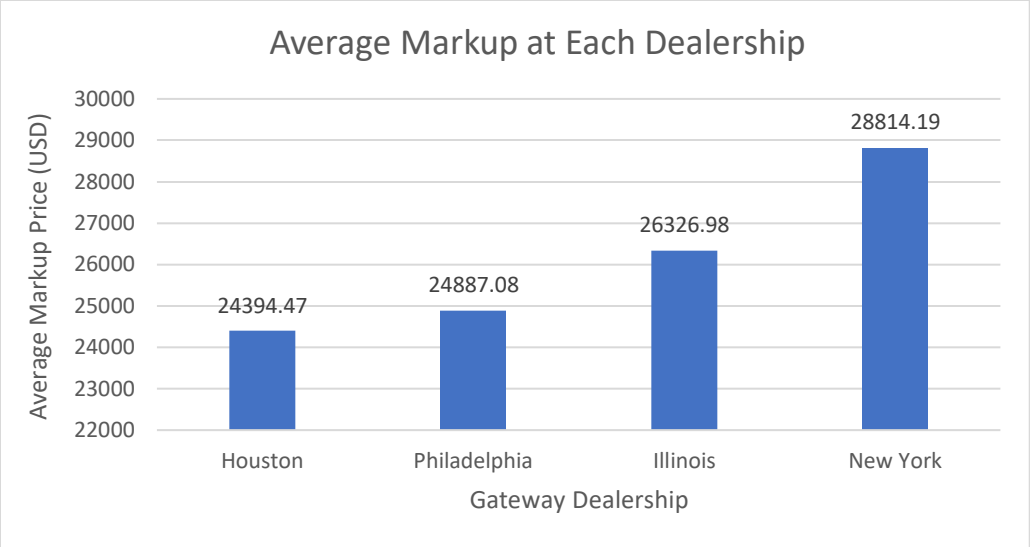


Figure 4: Average price markup at each Gateway dealership.

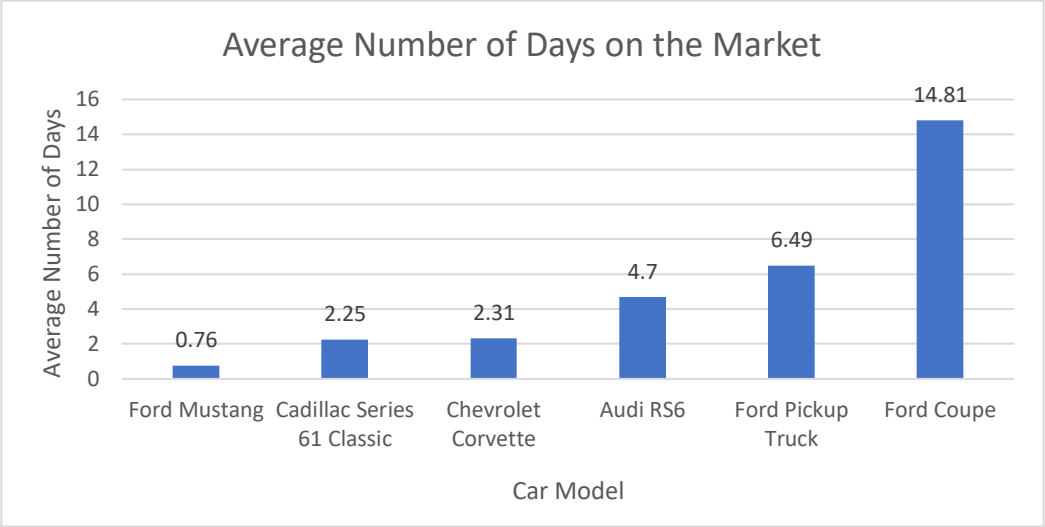


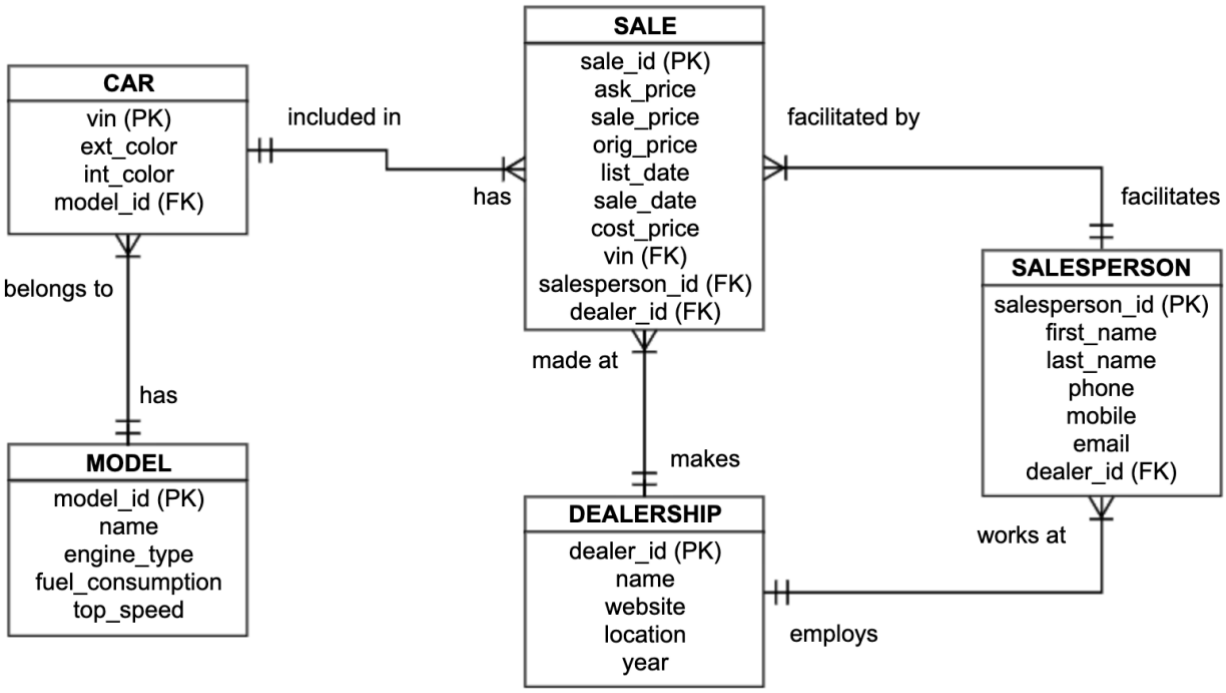
Figure 5: Average number of days spent on the market for each car model.

Conclusion

As a result of analyzing the performance and data of the four Gateway dealerships, Houston was revealed to be more promising than the rest. Its high sales volumes, high profits, consistent sales, and reasonable market times show that it can benefit our company the most if we expand it. For a more accurate analysis, it would be insightful to know the sales volume and the profit trends of each dealership over time. This would show which dealerships are on the rise or declining, providing more accurate predictions of how a dealership may perform in the future. Instead of knowing just one point in time, we would know the context surrounding each dealership's performance.

D. Additional Data Considerations

Revised Entity-Relationship Diagram



Assumptions

- Each car has been sold at least once. Resales are allowed.
- The VIN of a car is unique.
- Each sale is facilitated by only one salesperson.
- Resales of a car do not have to be facilitated by the same salesperson.

Example Analyses

1. With new knowledge of the resales at each dealership, it would be meaningful to understand how many resales each dealership accumulated over time. We would need to assume that a new entry is added to the SALE entity each time a car is resold. This information would help determine the overall customer satisfaction at each dealership, since each resale means the car was returned to the dealership. A higher percentage of resales out of all the sales made (original sales + resales) would indicate lower customer satisfaction.

2. Another query would be to analyze the average time on the market for resales of each model. This would help show which models are more promising for being resold. Shorter times on the market as a resale would show that a model is still valuable and in high

demand despite being used. It would also show which models would have faster inventory turnovers as a resale.

3. A third analysis would be calculating the average difference between the original sales price and the resale sales prices at each dealership. We would need to assume that we can locate the price of the original sale. A smaller difference would show that the dealership had greater abilities in advertising used cars and maximizing the sales on used cars. It would show which dealership is better at combatting the losses typically associated with refunding and reselling.

Query for Example Analysis 3

```
SELECT ROUND(AVG(SALE.orig_price – SALE.sales_price), 2) AS ‘Average Sales Price Difference’,
DEALERSHIP.name AS ‘Dealership’
FROM SALE
INNER JOIN DEALERSHIP ON SALE.dealer_id = DEALERSHIP.dealer_id
GROUP BY DEALERSHIP.name
ORDER BY AVG(SALE.orig_price – SALE.sales_price);
```