

Database Design and Applications

By Esteban Vázquez Cardona

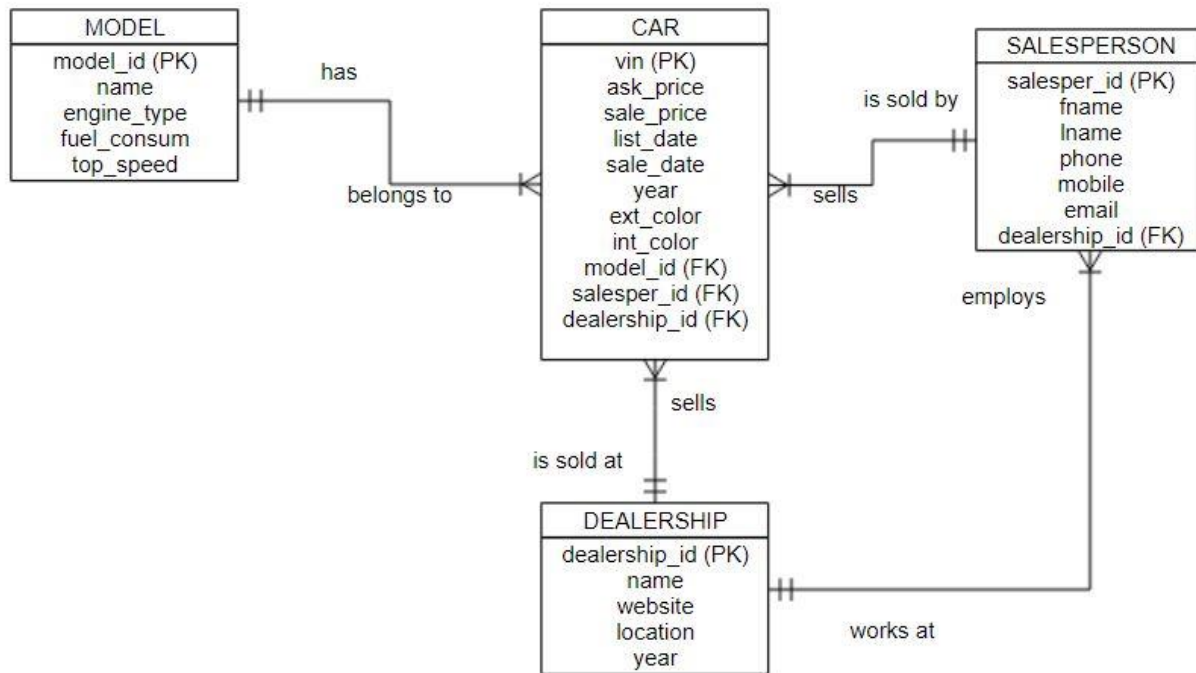


Case Study: Lamborghini

Information Systems Millieux

April 15, 2019

Part A: Data Modeling, Creation and Basic Queries

Entity Relationship Diagram (ERD):

Data Dictionary:

MODEL			
Field	Data Type	Description	Example Data
model_id (PK)	INT	The unique ID for each model (required)	500
name	VARCHAR	The name of each model	Mulsanne
engine_type	VARCHAR	Type of engine in the model	6752cc Twin-turbocharged V8
fuel_consum	VARCHAR	Average fuel consumption (urban) of the model	13 Usmpg
top_speed	VARCHAR	Top speed performance measure of the model	191mph / 308km/h

CAR			
Field	Data Type	Description	Example Data
vin (PK)	VARCHAR	Unique Vehicle Identification Number of the car	JH4KA7670NC002886
ask_price	DECIMAL	Original price of car	70000
sale_price	DECIMAL	Price car was sold	60000
list_date	DATE	Date car was put on the sales list (listed)	1/1/19
sale_date	DATE	Date car was sold	1/2/19
year	INT	Year of production	2018
ext_color	VARCHAR	Exterior color of car	Blue
int_color	VARCHAR	Interior color of car	Black
model_id (FK)	INT	ID of car model	500
salesper_id (FK)	INT	ID of salesperson who sold the car	300
dealership_id (FK)	INT	ID of dealership that sold the car	400

SALESPERSON			
Field	Data Type	Description	Example Data
salesper_id (PK)	INT	Unique ID of salesperson	300
fname	VARCHAR	First name of salesperson	Jane
lname	VARCHAR	Last name of salesperson	Doe
phone	VARCHAR	Phone number of salesperson	5555555555
mobile	VARCHAR	Mobile phone number of salesperson	7879634563
email	VARCHAR	Email of salesperson	salesperson@gmail.com
dealership_id (FK)	INT	Dealership ID of where salesperson works	400

DEALERSHIP			
Field	Data Type	Description	Example Data
dealership_id (PK)	INT	Unique ID of dealership	400
name	VARCHAR	Name of dealership	Lambo Land
website	VARCHAR	Website of dealership	lamboland.com
location	VARCHAR	Location of dealership	Las Vegas, Nevada
year	INT	Year dealership opened	2000

Database structure: CAR

SELECT * FROM "CAR"

Profiling

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SQL

Explain SQL

Create PHP code

Refresh

1

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Show all

Number of rows

25

Filter rows

Search this table

Sort by key

None

+ Options

	vin	ask_price	sale_price	list_date	sale_date	year	ext_color	int_color	model_id	salesper_id	dealership_id		
			SCBGE1H0KBLA13261	219800.00	215000.00	2018-01-01	2018-01-01	2017	Havana	Beluga	550	1	104
			SCBGE1H0KBLA13262	219800.00	211799.00	2018-01-01	2018-01-01	2017	Granite	Magnolia - Dark Stained Burr Walnut	550	2	102
			SCBGE1H0KBLA13263	219800.00	215000.00	2018-01-01	2018-01-02	2017	Granite	Magnolia - Dark Stained Burr Walnut	550	2	102
			SCBGE1H0KBLA13264	219800.00	219000.00	2018-01-01	2018-01-03	2018	Havana	Magnolia - Dark Stained Burr Walnut	550	1	104
			SCBGE1H0KBLA13265	219800.00	215000.00	2018-01-01	2018-01-04	2018	Moonteam	Magnolia - Chestnut	550	1	104
			SCBGE1H0KBLA13266	219800.00	219000.00	2018-01-01	2018-01-05	2018	Windsor Blue	Magnolia - Chestnut	550	1	104
			SCBGE1H0KBLA13267	219800.00	220567.00	2018-01-01	2018-01-01	2018	Windsor Blue	Beluga	550	1	104
			SCBGE1H0KBLA13268	219800.00	220000.00	2018-01-01	2018-01-01	2018	St James Red (Gold)	Beluga	550	1	104
			SCBGE1H0KBLA13269	219800.00	215000.00	2018-01-01	2018-01-01	2018	Windsor Blue	Magnolia - Dark Stained Burr Walnut	550	1	104
			SCBGE1H0KBLA13270	219800.00	215678.00	2018-01-01	2018-01-01	2018	Blue Crystal	Magnolia - Dark Stained Burr Walnut	550	1	104
			SCBGE1H0KBLA13271	219800.00	215999.00	2018-01-01	2018-01-01	2018	Blue Crystal	Magnolia - Dark Stained Burr Walnut	550	2	102

#	Name	Type	Collation	Attributes	Null	Default
1	vin	varchar(17)	utf8_bin		No	None
2	ask_price	decimal(10,2)			No	None
3	sale_price	decimal(10,2)			No	None
4	list_date	date			No	None
5	sale_date	date			No	None
6	year	int(11)			No	None
7	ext_color	varchar(100)	utf8_bin		No	None
8	int_color	varchar(100)	utf8_bin		No	None
9	model_id	int(11)			No	None
10	salesper_id	int(11)			No	None
11	dealership_id	int(11)			No	None

DEALERSHIP

SELECT * FROM "DEALERSHIP"

Profiling [Edit]

Show all

Number of rows25

Filter rows

Search this table

Sort by key:None

Options

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100

Lamborghini Seoul

https://lamborghini-seoul.com/en

Seoul, South Korea

2007

Edit
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101

Lamborghini Milano

https://lamborghini-milano.com/it

Milano, Italy

1962

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102

Lamborghini Miami

https://lamborghini-miami.com/en

North Miami Beach, Florida

1960

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104

Lamborghini Las Vegas

http://www.lamborghini-lasvegas.com/

Las Vegas, Nevada

2005

#	Name	Type	Collation	Attributes	Null	Default
1	dealership_id	int(11)			No	None
2	name	varchar(100)	latin1_swedish_ci		No	None
3	website	varchar(100)	latin1_swedish_ci		No	None
4	location	varchar(100)	latin1_swedish_ci		No	None
5	year	int(11)			No	None

MODEL

SELECT * FROM "MODEL"

Show all

Number of rows: 25

Filter rows: Search this table

Sort by key: None

Options

	model_id	name	engine_type	fuel_consum	top_speed
<div><div></div><div>Edit</div><div>Copy</div><div>Delete</div></div>	500	URUS	V8 bi-turbo	12.3 l/100 km	305 km/h
<div><div></div><div>Edit</div><div>Copy</div><div>Delete</div></div>	550	Huracan Coupe	V10	14.5 l/100 km	>325 km/h
<div><div></div><div>Edit</div><div>Copy</div><div>Delete</div></div>	551	Huracan Spyder	V10	14.6 l/100 km	324 km/h
<div><div></div><div>Edit</div><div>Copy</div><div>Delete</div></div>	552	Huracan Performante	V10	14.6 l/100 km	324 km/h
<div><div></div><div>Edit</div><div>Copy</div><div>Delete</div></div>	702	Aventador S Coupe	V12	16.9 l/100 km	350 km/h
<div><div></div><div>Edit</div><div>Copy</div><div>Delete</div></div>	703	Aventador S Roadster	V12	16.9 l/100 km	350 km/h

#	Name	Type	Collation	Attributes	Null	Default
1	model_id	int(11)			No	None
2	name	varchar(100)	utf8_bin		No	None
3	engine_type	varchar(100)	utf8_bin		No	None
4	fuel_consum	varchar(100)	utf8_bin		No	None
5	top_speed	varchar(100)	utf8_bin		No	None

SALESPERSON

SELECT * FROM "SALESPERSON"

Profiling [Edit inline]

Show all

Number of rows: 25

Filter rows: Search this table

Sort by key: None

Options

▼ salesper_id

fname

lname

phone

mobile

email

dealership_id

			1	Allan	Zhu	82 (2) 2553 7713	852 9374 7713	allan_zhu@lamborghini.com	104
			2	Bibin	Khal	702 44114411	974 64174841	bkhali@lamborghini.com	102
			3	Amesshi	Goel	888 294 1133	310 384 3843	lobogo@lamborghini.com	101
			4	Abbey	Mui	82 (2) 2553 7713	852 9384 3334	collee@lamborghini.com	104
			5	Mirji	Km	82 (2) 2553 7713	852 8986 5476	m_km@lamborghini.com	104
			6	Kelly	Mazur	888 294 1133	310 837 2039	kmazur@lamborghini.com	101
			7	Nadia	Howe	702 44114411	974 93843439	nhowe@lamborghini.com	102
			8	Steve	Collespy	888 294 1133	310 823 3402	salepro@lamborghini.com	101
			9	Sebastian	Craig	39 (0)30 8866 7888	39 (0)30 8866 1254	sc@lamborghini.com	100
			10	Tiffany	Chen	39 (0)30 8866 7888	39 (0)30 4356 9384	design@lamborghini.com	100
			11	Veronika	Wagner	39 (0)30 8866 7888	39 (0)30 3947 3984	vw@lamborghini.com	100

#	Name	Type	Collation	Attributes	Null	Default
1	salesper_id	int(11)			No	None
2	fname	varchar(100)	utf8_bin		No	None
3	lname	varchar(100)	utf8_bin		No	None
4	phone	varchar(100)	utf8_bin		No	None
5	mobile	varchar(100)	utf8_bin		No	None
6	email	varchar(100)	utf8_bin		No	None
7	dealership_id	int(11)			No	None

Part B: Queries

1. Average sales price of all vehicles

```
SELECT ROUND(AVG(sale_price),2) AS 'Average Sales Price' FROM CAR
```

1 | ☐ Show all | Number of rows: 25 | Filter

Sort by key: None ▼

+ Options

Average Sales Price
240330.66

2. Average difference in selling and asking price of all vehicles

```
SELECT ROUND(AVG(sale_price - ask_price),2) AS 'Avg Difference in Selling and Asking Price' FROM CAR
```

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

Sort by key: None ▼

+ Options

Avg Difference in Selling and Asking Price
1811.56

3. Average sales price of vehicles by dealership

```
SELECT ROUND(AVG(CAR.sale_price), 2) AS 'Avg Selling Price', DEALERSHIP.name AS 'Dealership Name' FROM CAR INNER JOIN DEALERSHIP ON CAR.dealership_id = DEALERSHIP.dealership_id GROUP BY CAR.dealership_id ORDER BY ROUND(AVG(CAR.sale_price), 2) DESC
```

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Sort by key: None

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Avg Selling Price	Dealership Name
266855.91	Lamborghini Miami
255729.49	Lamborghini Milano
226946.81	Lamborghini Las Vegas
204824.51	Lamborghini Seoul

4. Average difference in selling and asking price by dealership

```
SELECT ROUND(AVG(CAR.sale_price - CAR.ask_price), 2) AS 'Avg Difference in Selling and Asking Price', DEALERSHIP.name AS 'Dealership Name' FROM CAR INNER JOIN DEALERSHIP ON CAR.dealership_id = DEALERSHIP.dealership_id GROUP BY CAR.dealership_id ORDER BY ROUND(AVG(CAR.sale_price - CAR.ask_price), 2) DESC
```

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Sort by key: None

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Avg Difference in Selling and Asking Price	Dealership Name
5298.70	Lamborghini Miami
4220.95	Lamborghini Milano
-184.89	Lamborghini Las Vegas
-3554.96	Lamborghini Seoul

5. Average time on market by dealership

```
SELECT AVG(DATEDIFF(CAR.sale_date, CAR.list_date)) AS 'Avg Time on Market (Days)', DEALERSHIP.name AS 'Dealership Name' FROM CAR INNER JOIN DEALERSHIP ON CAR.dealership_id = DEALERSHIP.dealership_id GROUP BY CAR.dealership_id ORDER BY AVG(DATEDIFF(CAR.sale_date, CAR.list_date)) ASC
```

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Avg Time on Market (Days)	Dealership Name
1.4884	Lamborghini Miami
4.7129	Lamborghini Milano
10.8010	Lamborghini Las Vegas
21.4894	Lamborghini Seoul

6. Total number of cars sold by model for each dealership

```
SELECT COUNT(CAR.model_id) AS 'Total Cars Sold', 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.dealership_id = DEALERSHIP.dealership_id GROUP BY DEALERSHIP.name, MODEL.name ORDER BY CAR.model_id, COUNT(CAR.model_id) DESC
```

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Total Cars Sold	Model	Dealership
61	URUS	Lamborghini Milano
33	URUS	Lamborghini Las Vegas
14	URUS	Lamborghini Miami
15	Huracan Coupe	Lamborghini Las Vegas
4	Huracan Coupe	Lamborghini Miami
2	Huracan Coupe	Lamborghini Seoul
2	Huracan Coupe	Lamborghini Milano
52	Huracan Spyder	Lamborghini Milano
8	Huracan Spyder	Lamborghini Las Vegas
6	Huracan Spyder	Lamborghini Seoul
1	Huracan Spyder	Lamborghini Miami
116	Huracan Performante	Lamborghini Las Vegas
34	Huracan Performante	Lamborghini Seoul
32	Huracan Performante	Lamborghini Milano
5	Huracan Performante	Lamborghini Miami
33	Aventador S Coupe	Lamborghini Milano
9	Aventador S Coupe	Lamborghini Las Vegas
8	Aventador S Coupe	Lamborghini Miami
5	Aventador S Coupe	Lamborghini Seoul
29	Aventador S Roadster	Lamborghini Milano
20	Aventador S Roadster	Lamborghini Las Vegas
11	Aventador S Roadster	Lamborghini Miami

7. CUSTOM – Total revenue by dealership

```
SELECT ROUND(SUM(CAR.sale_price), 2) AS 'Total Revenue', DEALERSHIP.name AS 'Dealership' FROM CAR INNER JOIN DEALERSHIP ON CAR.dealership_id = DEALERSHIP.dealership_id GROUP BY DEALERSHIP.dealership_id ORDER BY ROUND(SUM(CAR.sale_price), 2) DESC
```

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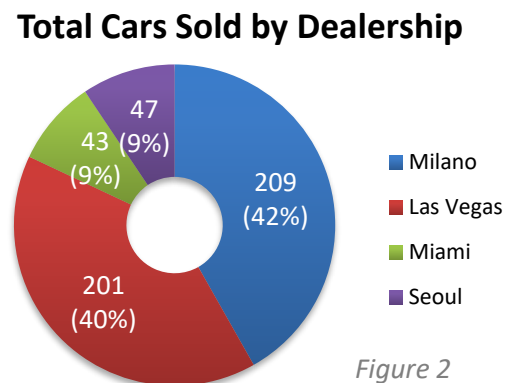
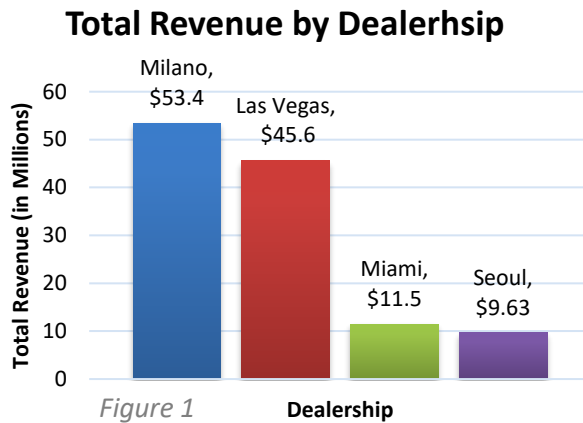
Total Revenue	Dealership
53447464.00	Lamborghini Milano
45616308.00	Lamborghini Las Vegas
11474804.00	Lamborghini Miami
9626752.00	Lamborghini Seoul

Part C: Business Memo

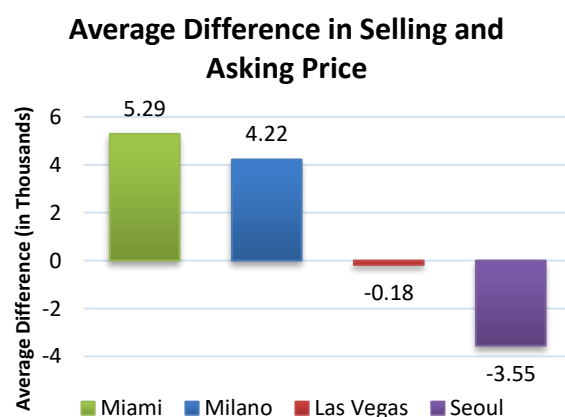
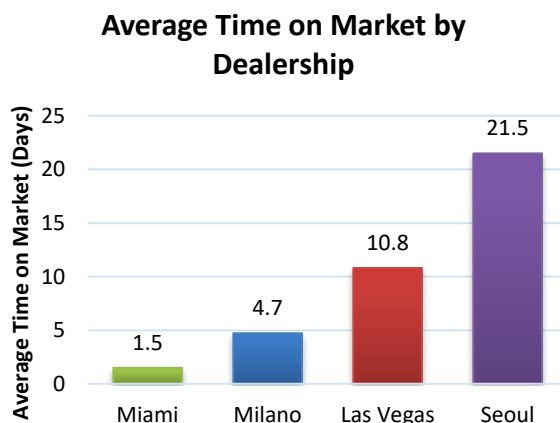
To: Lamborghini Management
 From: Esteban Vázquez Cardona
 Subject: Dealership Expansion

Dear Lamborghini executives,

After my analysis of the data for each dealership, the Milano, Italy dealership should be expanded. My decision is based on the outstanding results that the dealership has shown: most revenue, most cars sold, a high average difference between selling and asking price, and a low average time on market for their cars.



As seen in Figure 1, the total revenue of the Milano dealership surpassed that of the three other dealerships, followed by the dealership in Las Vegas. This is supported by Figure 2, which shows that Milano sold the greatest number of cars, again followed by Las Vegas. However, the average time on market (Figure 3) of the cars at Milano is less than half of that at Las Vegas. In addition, Figure 4 shows that the Milano dealership sells its vehicles at a significantly higher price than the asking price, as compared to Las Vegas which sells them under it.



Additional data that I would need to make a more informed decision is the total number of cars in inventory (including the ones that were sold) for each dealership. This information would allow me to make a better comparison between Milano and Miami since Miami has the highest average selling price, highest average difference between selling and asking price, and lowest average time on market for their cars. With this information, I can compare the ratio of cars sold and the total number of cars in inventory and say if the Milano dealership truly has better results than Miami.

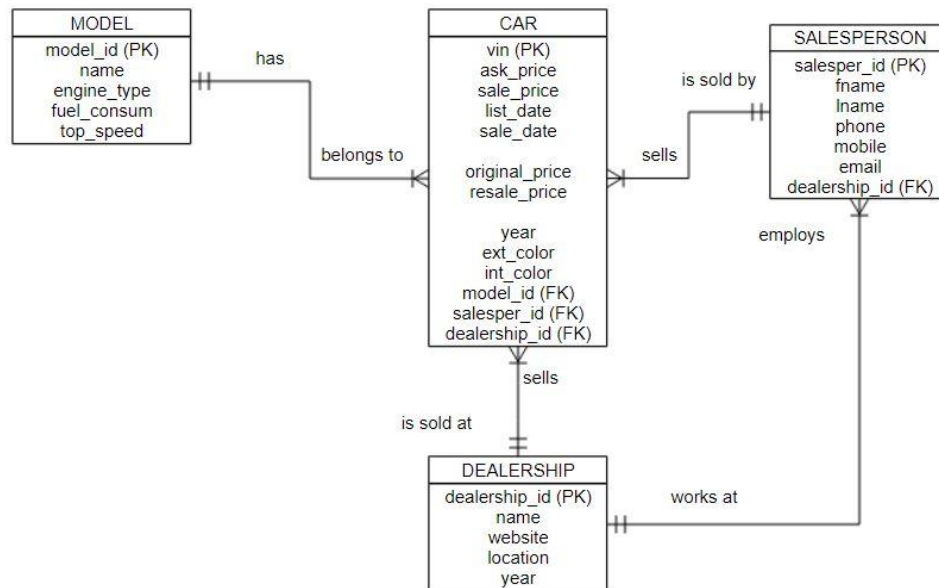
Thank you,

Esteban Vázquez Cardona

Information Systems Analyst and Consultant

Part D: Additional Data Considerations

ERD Modifications:



Example Analyses:

1. You could look at the average difference between original price and resale price by dealership to see which dealership gains more profit from used cars.
2. You could look at the average resale price of cars by dealership to look at which dealership sells pre-owned cars at the highest price.
3. You could identify which dealership sells the most pre-owned cars by looking at the number of cars with a resale price.

Example Query:

```

SELECT ROUND(AVG(CAR.resale_price - CAR.original_price), 2) AS
'Avg Difference in Resale and Original Price', DEALERSHIP.name
AS 'Dealership'
FROM CAR
INNER JOIN DEALERSHIP ON CAR.dealership_id =
DEALERSHIP.dealership_id
GROUP BY CAR.dealership_id
ORDER BY ROUND(AVG(CAR.resale_price - CAR.original_price), 2)
DESC;
  
```