Database Design and Applications

By Esteban Vázquez Cardona
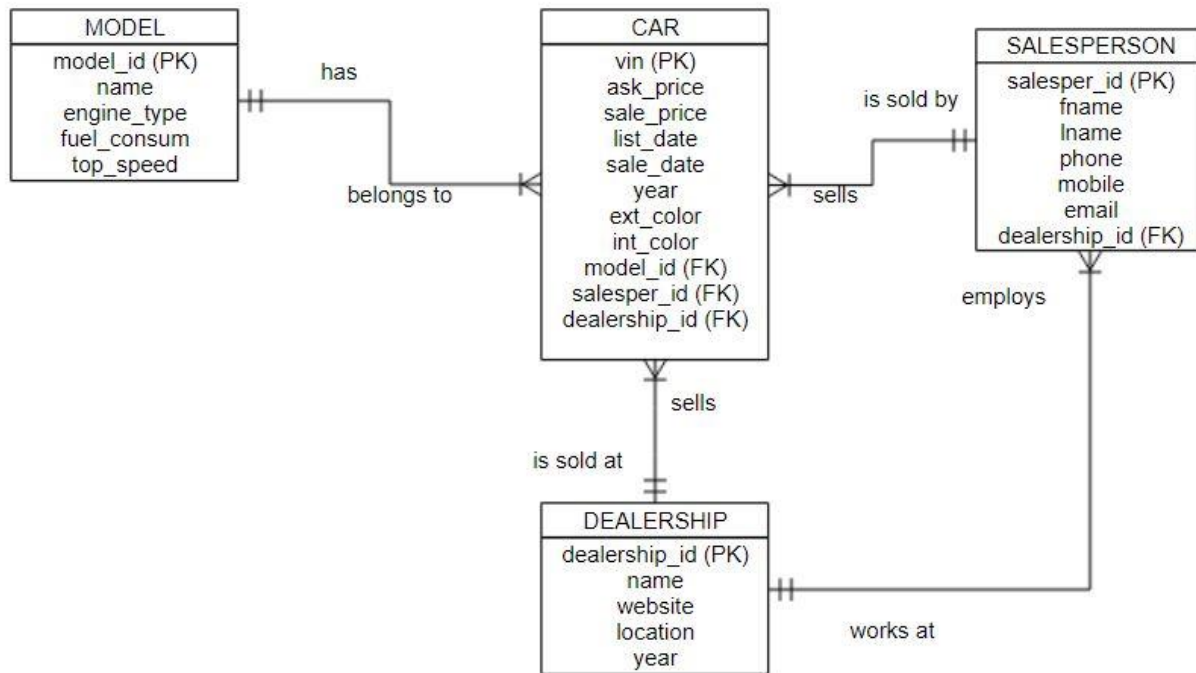

Case Study: Lamborghini

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

#	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

#	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

#	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

#	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

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

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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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.
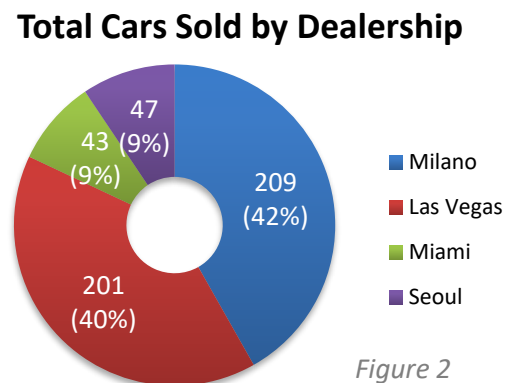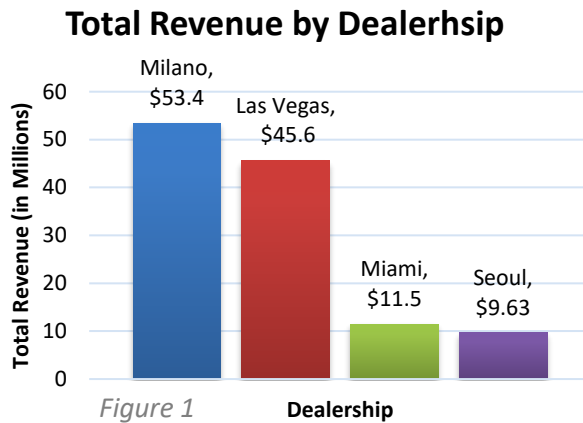
Figure 1

Figure 2

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.

Figure 3

Figure 4
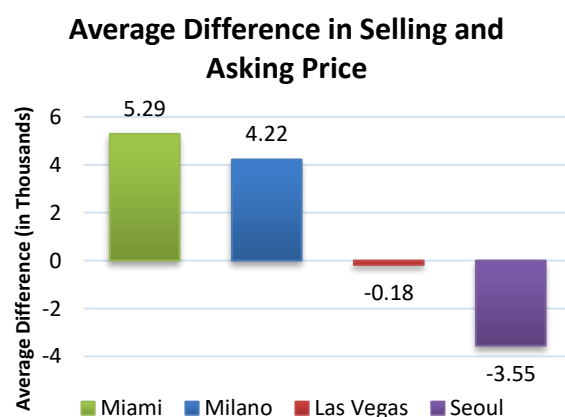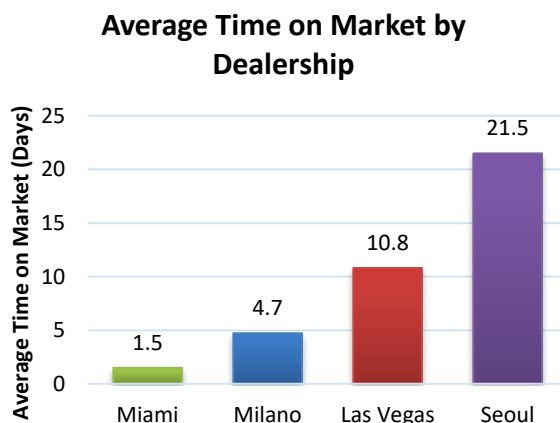
Additional data that I would need to make a more informed decision is the total number of cars in inventory (including the ones that were sold) for each dealership. This information would allow me to make a better comparison between Milano and Miami since Miami has the highest average selling price, 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.
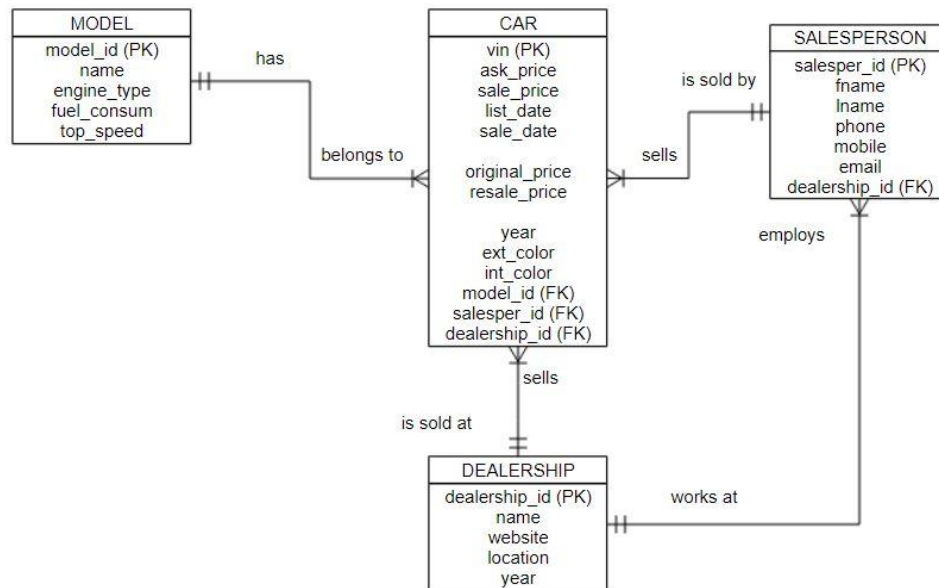
Thank you,
Esteban Vázquez Cardona
Information Systems Analyst and Consultant

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;
```