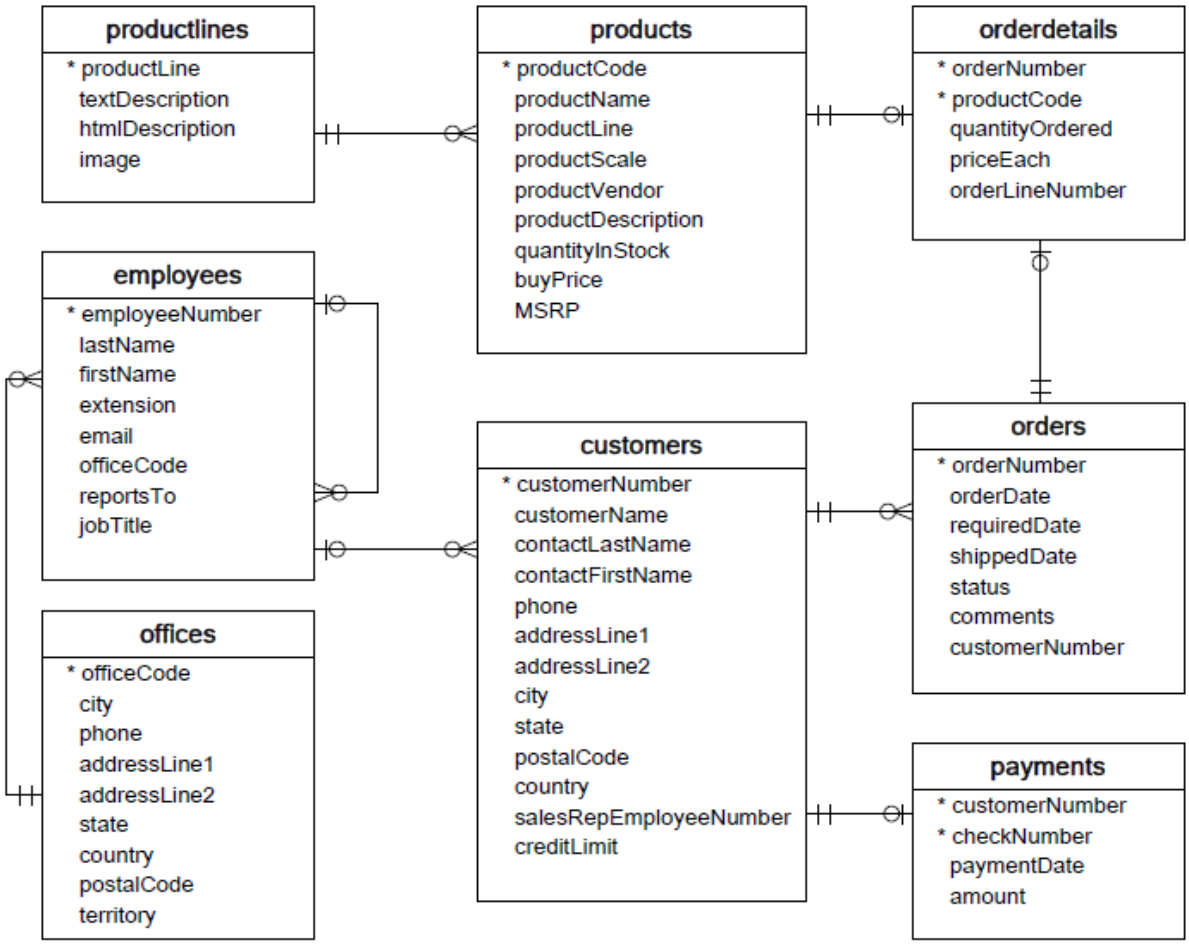
Scale Model Cars Future Expansion Opportunities

The Model Motorworks, a fictional wholesale distributor of die cast models of vehicles ranging from vintage cars to planes, operates globally with customers in over 15 countries. The company has approached us with a dataset analysis task to help them make essential decisions regarding potential future expansion. The objective of this project is to analyze its sales records database and extract data-driven answers to address their inquiries.

The provided dataset contains eight tables:

- Customers: customer data
- Employees: all employee information
- Offices: sales office information
- Orders: customers' sales orders
- OrderDetails: sales order line for each sales order
- Payments: customers' payment records
- Products: a list of scale model cars
- ProductLines: a list of product line categories

Table relationship are represented as follows:



In [5]:
```
import sqlite3
import pandas as pd
```

In [6]:
```
%load_ext sql
%sql sqlite:////Users/menglingjiang/Desktop/stores.db
```

Out[6]:
```
'Connected: @/Users/menglingjiang/Desktop/stores.db'
```

In [7]:
```
conn = sqlite3.connect('stores.db')
```

Exploring the dataset

Let's explore the dataset by observing the first 5 rows of each table.

In [8]:
```
%%sql
SELECT *
FROM Customers
LIMIT 5;
```

```
 * sqlite:////Users/menglingjiang/Desktop/stores.db
Done.
```

Out[8]:

customerNumber	customerName	contactLastName	contactFirstName	phone	addressLine1
103	Atelier graphique	Schmitt	Carine	40.32.2555	54, rue Royale
112	Signal Gift Stores	King	Jean	7025551838	8489 Strong St.
114	Australian Collectors, Co.	Ferguson	Peter	03 9520 4555	636 St Kilda Road
119	La Rochelle Gifts	Labrune	Janine	40.67.8555	67, rue des Cinquante Otages
121	Baane Mini Imports	Bergulfsen	Jonas	07-98 9555	Erling Skakkes gate 78

The Customers table contains general personal information, including customer name, contact name, phone number, address, sales representative employee number, and so on.

In [9]:
```
%%sql
SELECT *
FROM Employees
LIMIT 5;
```

```
 * sqlite:////Users/menglingjiang/Desktop/stores.db
Done.
```

Out[9]:

employeeNumber	lastName	firstName	extension	email	officeCode	re
1002	Murphy	Diane	x5800	dmurphy@classicmodelcars.com	1	
1056	Patterson	Mary	x4611	mpatterso@classicmodelcars.com	1	
1076	Firrelli	Jeff	x9273	jfirrelli@classicmodelcars.com	1	
1088	Patterson	William	x4871	wpatterson@classicmodelcars.com	6	
1102	Bondur	Gerard	x5408	gbondur@classicmodelcars.com	4	

The Employees table consists of employee information, such as employee number, name, email, job title, and so on.

In [10]:
```
%%sql
SELECT *
FROM Offices
LIMIT 5;
```

```
 * sqlite:////Users/menglingjiang/Desktop/stores.db
Done.
```

Out[10]:

officeCode	city	phone	addressLine1	addressLine2	state	country	postalCode	territory
1	San Francisco	+1 650 219 4782	100 Market Street	Suite 300	CA	USA	94080	NA
2	Boston	+1 215 837 0825	1550 Court Place	Suite 102	MA	USA	02107	NA
3	NYC	+1 212 555 3000	523 East 53rd Street	apt. 5A	NY	USA	10022	NA
4	Paris	+33 14 723 4404	43 Rue Jouffroy D'abbans	None	None	France	75017	EMEA
5	Tokyo	+81 33 224 5000	4-1 Kioicho	None	Chiyoda-Ku	Japan	102-8578	Japan

The Offices table lists the address, phone number, territory, and office code for each office.

In [11]:
```
%%sql
SELECT *
FROM orderdetails
LIMIT 5;
```

```
 * sqlite:////Users/menglingjiang/Desktop/stores.db
Done.
```

Out[11]:

orderNumber	productCode	quantityOrdered	priceEach	orderLineNumber
10100	S18_1749	30	136	3
10100	S18_2248	50	55.09	2
10100	S18_4409	22	75.46	4
10100	S24_3969	49	35.29	1
10101	S18_2325	25	108.06	4

The orderdetails table contains sales order lines for each sales order, including order number, quantity ordered, price of each item, product code, and order line number.

In [12]:
```
%%sql
SELECT *
FROM orders
LIMIT 5;
```

```
 * sqlite:////Users/menglingjiang/Desktop/stores.db
Done.
```

Out[12]:

orderNumber	orderDate	requiredDate	shippedDate	status	comments	customerNumber
10100	2003-01-06	2003-01-13	2003-01-10	Shipped	None	363
10101	2003-01-09	2003-01-18	2003-01-11	Shipped	Check on availability.	128
10102	2003-01-10	2003-01-18	2003-01-14	Shipped	None	181
10103	2003-01-29	2003-02-07	2003-02-02	Shipped	None	121
10104	2003-01-31	2003-02-09	2003-02-01	Shipped	None	141

The orders table provides detailed information on ongoing sales orders, such as order date, shipped date, status, and more.

In [13]:
```
%%sql
SELECT *
FROM payments
LIMIT 5;
```

```
 * sqlite:////Users/menglingjiang/Desktop/stores.db
Done.
```

Out[13]:

customerNumber	checkNumber	paymentDate	amount
103	HQ336336	2004-10-19	6066.78
103	JM555205	2003-06-05	14571.44
103	OM314933	2004-12-18	1676.14
112	BO864823	2004-12-17	14191.12
112	HQ55022	2003-06-06	32641.98

The payments table contains information from customers' payment records, including customer number, check number, payment date, and amount.

In [14]:
```
%%sql
SELECT *
FROM productlines
LIMIT 5;
```

```
 * sqlite:////Users/menglingjiang/Desktop/stores.db
Done.
```

Out[14]:

productLine	textDescription	htmlDescription	image
Classic Cars	Attention car enthusiasts: Make your wildest car ownership dreams come true. Whether you are looking for classic muscle cars, dream sports cars or movie-inspired miniatures, you will find great choices in this category. These replicas feature superb attention to detail and craftsmanship and offer features such as working steering system, opening forward compartment, opening rear trunk with removable spare wheel, 4-wheel independent spring suspension, and so on. The models range in size from 1:10 to 1:24 scale and include numerous limited edition and several out-of-production vehicles. All models include a certificate of authenticity from their manufacturers and come fully assembled and ready for display in the home or office.	None	None
Motorcycles	Our motorcycles are state of the art replicas of classic as well as contemporary motorcycle legends such as Harley Davidson, Ducati and Vespa. Models contain stunning details such as official logos, rotating wheels, working kickstand, front suspension, gear-shift lever, footbrake lever, and drive chain. Materials used include diecast and plastic. The models range in size from 1:10 to 1:50 scale and include numerous limited edition and several out-of-production vehicles. All models come fully assembled and ready for display in the home or office. Most include a certificate of authenticity.	None	None
Planes	Unique, diecast airplane and helicopter replicas suitable for collections, as well as home, office or classroom decorations. Models contain stunning details such as official logos and insignias, rotating jet engines and propellers, retractable wheels, and so on. Most come fully assembled and with a certificate of authenticity from their manufacturers.	None	None
Ships	The perfect holiday or anniversary gift for executives, clients, friends, and family. These handcrafted model ships are unique, stunning works of art that will be treasured for generations! They come fully assembled and ready for display in the home or office. We guarantee the highest quality, and best value.	None	None
Trains	Model trains are a rewarding hobby for enthusiasts of all ages. Whether you're looking for collectible wooden trains, electric streetcars or locomotives, you'll find a number of great choices for any budget within this category. The interactive aspect of trains makes toy trains perfect for young children. The wooden train sets are ideal for children under the age of 5.	None	None

The productlines table lists product line categories such as classic cars, motorcycles, planes, ships, and trains.

In [15]:
```
%%sql
SELECT *
FROM products
LIMIT 5;
```

```
 * sqlite:////Users/menglingjiang/Desktop/stores.db
Done.
```

Out[15]:

productCode	productName	productLine	productScale	productVendor	productDescription	quantit
S10_1678	1969 Harley Davidson Ultimate Chopper	Motorcycles	1:10	Min Lin Diecast	This replica features working kickstand, front suspension, gear-shift lever, footbrake lever, drive chain, wheels and steering. All parts are particularly delicate due to their precise scale and require special care and attention.	
S10_1949	1952 Alpine Renault 1300	Classic Cars	1:10	Classic Metal Creations	Turnable front wheels; steering function; detailed interior; detailed engine; opening hood; opening trunk; opening doors; and detailed chassis.	
S10_2016	1996 Moto Guzzi 1100i	Motorcycles	1:10	Highway 66 Mini Classics	Official Moto Guzzi logos and insignias, saddle bags located on side of motorcycle, detailed engine, working steering, working suspension, two leather seats, luggage rack, dual exhaust pipes, small saddle bag located on handle bars, two-tone paint with chrome accents, superior die-cast detail , rotating wheels , working kick stand, diecast metal with plastic parts and baked enamel finish.	

productCode	productName	productLine	productScale	productVendor	productDescription	quantit
S10_4698	2003 Harley-Davidson Eagle Drag Bike	Motorcycles	1:10	Red Start Diecast	Model features, official Harley Davidson logos and insignias, detachable rear wheelie bar, heavy diecast metal with resin parts, authentic multi-color tampo-printed graphics, separate engine drive belts, free-turning front fork, rotating tires and rear racing slick, certificate of authenticity, detailed engine, display stand\r\n, precision diecast replica, baked enamel finish, 1:10 scale model, removable fender, seat and tank cover piece for displaying the superior detail of the v-twin engine	
S10_4757	1972 Alfa Romeo GTA	Classic Cars	1:10	Motor City Art Classics	Features include: Turnable front wheels; steering function; detailed interior; detailed engine; opening hood; opening trunk; opening doors; and detailed chassis.	

The products table provides detailed information for each scale model car, including product code, product name, product description, quantity in stock, buy price, and more.

Let's summerize the number of attributes and also the number of rows in each table.

In [16]:
```
%%sql
SELECT 'customers' table_name, count(*) number_of_attributes,(SELECT cou
UNION ALL
SELECT 'products' table_name, count(*) number_of_attributes,(SELECT coun
UNION ALL
SELECT 'productlines' table_name, count(*) number_of_attributes,(SELECT 
UNION ALL
SELECT 'orders' table_name, count(*) number_of_attributes,(SELECT count(
UNION ALL
SELECT 'orderdetails' table_name, count(*) number_of_attributes,(SELECT 
UNION ALL
SELECT 'payments' table_name, count(*) number_of_attributes,(SELECT coun
UNION ALL
SELECT 'employees' table_name, count(*) number_of_attributes,(SELECT cou
UNION ALL
SELECT 'offices' table_name, count(*) number_of_attributes,(SELECT count
```

```
 * sqlite:////Users/menglingjiang/Desktop/stores.db
Done.
```

Out[16]:

table_name	number_of_attributes	number_of_rows
customers	13	122
products	9	110
productlines	4	7
orders	7	326
orderdetails	5	2996
payments	4	273
employees	8	23
offices	9	7

Analyzing the dataset

The project emphasizes the effectiveness of data analysis in sales, particularly in extracting key performance indicators (KPIs) for informed decision-making, resulting in significant time, resource, and cost savings. Focused on a sales records database for scale model cars, the objective is to showcase analytical skills by addressing challenges across various aspects such as sales, production, customer experience, and employee efficiency. The project aims to uncover actionable insights, highlighting the practical benefits of utilizing data analysis within a wholesale distributor of die-cast vehicle models.

To reach the project's objective, we'll investigate the following questions to reveal actionable insights.

- Question 1: What items should we increase or decrease our order quantities for?
- Question 2: How do we adjust marketing and communication strategies based on customer behaviors?
- Question 3: What is our budget for acquiring new customers?

- Question 4: To maximize returns, which countries should we concentrate our marketing efforts on?
- Question 5: Find the top and bottom categories for each country.
- Question 6: How did sales perform during the entire period when recorded?
- Question 7: Assess how well our present sales team is doing.
- Question 8: Are there products in our inventory that haven't sold in a while?

Question 1: What items should we increase or decrease our order quantities for?

This question is about inventory reports, covering low stock (indicating high demand) and product performance to enhance supply and user experience by avoiding stockouts of popular items. Low stock is determined by dividing the sum of each product ordered by its current stock quantity, focusing on the top ten products with the highest rates. The formula is low stock = $\frac{SUM(quantityOrdered)}{quantityInStock}$. Product performance is the total sales per product calculated as the product of quantity ordered and price each, expressed as product performance = SUM($quantityOrdered \times priceEach$). Priority for restocking is given to products with high performance that are close to running out of stock.

In [17]:
```
# Compute the top 10 low stock for each product
```

In [18]:
```
%%sql
SELECT p.productCode, p.productName, SUM(o.quantityOrdered) / p.quantity
FROM products p
JOIN orderdetails o ON p.productCode = o.productCode
GROUP BY p.productCode
ORDER BY low_stock DESC
LIMIT 10;
```

```
 * sqlite:////Users/menglingjiang/Desktop/stores.db
Done.
```

Out[18]:

productCode	productName	low_stock
S24_2000	1960 BSA Gold Star DBD34	67
S12_1099	1968 Ford Mustang	13
S32_4289	1928 Ford Phaeton Deluxe	7
S32_1374	1997 BMW F650 ST	5
S72_3212	Pont Yacht	2
S700_3167	F/A 18 Hornet 1/72	1
S700_1938	The Mayflower	1
S50_4713	2002 Yamaha YZR M1	1
S32_3522	1996 Peterbilt 379 Stake Bed with Outrigger	1
S18_2795	1928 Mercedes-Benz SSK	1

In [19]:
```
# Compute the top 10 product performance for each product
```

In [20]:
```
%%sql
SELECT productCode, SUM(quantityOrdered * priceEach) AS prod_perf
FROM orderdetails
GROUP BY productCode
ORDER BY prod_perf DESC
LIMIT 10;
```

```
 * sqlite:////Users/menglingjiang/Desktop/stores.db
Done.
```

Out[20]:

productCode	prod_perf
S18_3232	276839.98
S12_1108	190755.86
S10_1949	190017.95999999996
S10_4698	170685.99999999997
S12_1099	161531.47999999992
S12_3891	152543.02
S18_1662	144959.90999999997
S18_2238	142530.62999999998
S18_1749	140535.60000000003
S12_2823	135767.03000000003

In [21]:
```
# Combine the previous queries using a Common Table Expression (CTE) to
```

In [22]:
```
%%sql
WITH perform AS (
    SELECT productCode, SUM(quantityOrdered) * 1.0 AS qntOrdered, SUM(qu
    FROM orderdetails
    GROUP BY productCode),

low_stock AS (
    SELECT pr.productCode, pr.productName, pr.productLine, ROUND(SUM(per
    FROM products pr
    JOIN perform ON pr.productCode = perform.productCode
    GROUP BY pr.productCode
    ORDER BY low_stock
    LIMIT 10 )

SELECT low_stock.productName,low_stock.productLine
FROM low_stock
JOIN perform ON low_stock.productCode = perform.productCode
ORDER BY perform.prod_perf DESC;
```

```
 * sqlite:////Users/menglingjiang/Desktop/stores.db
Done.
```

Out[22]:

productName	productLine
2002 Suzuki XREO	Motorcycles
1976 Ford Gran Torino	Classic Cars
1995 Honda Civic	Classic Cars
1932 Model A Ford J-Coupe	Vintage Cars
1965 Aston Martin DB5	Classic Cars
1999 Indy 500 Monte Carlo SS	Classic Cars
1968 Dodge Charger	Classic Cars
America West Airlines B757-200	Planes
2002 Chevy Corvette	Classic Cars
1982 Ducati 996 R	Motorcycles

Insighs: Classic Cars and Motorcycles perform well and need restocking, with a priority on Classic Cars due to high sales and better performance.

Question 2: How do we adjust marketing and communication strategies based on customer behaviors?

In order to address the second question regarding customer information, our focus will be on classifying customers into highly valuable customers(VIPs) and less-engaged customers. VIPs contribute the most profit, while less-engaged customers bring in lower profits. This categorization allows us to develop targeted strategies to meet the unique needs of each group. Before proceeding, it's essential to calculate the profit generated by each customer.

In [23]:
```
%%sql
SELECT o.customerNumber, ROUND(SUM(od.quantityOrdered * (od.priceEach -
FROM orders o
JOIN orderdetails od ON od.orderNumber = o.orderNumber
JOIN products p ON p.productCode = od.productCode
GROUP BY o.customerNumber
ORDER BY profit DESC;
```

260	24118.93
216	24113.54
242	23905.16
333	22579.18
471	22433.82
484	21225.65
339	20737.79
189	19588.29
447	18957.41
344	18953.3
452	18358.11
487	17230.12
475	17186.93

Finding the VIP and Less Engaged Customers

In [24]:
```
# The Top Engaged Customers
```

In [25]:
```
%%sql
WITH profit_gen_table AS (
    SELECT os.customerNumber, SUM(od.quantityOrdered * (od.priceEach - p
    FROM products pr
    JOIN orderdetails od ON pr.productCode = od.productCode
    JOIN orders os ON od.orderNumber = os.orderNumber
    GROUP BY os.customerNumber)

SELECT cust.contactLastName, cust.contactFirstName, cust.city, cust.coun
FROM customers cust
JOIN profit_gen_table pg ON pg.customerNumber = cust.customerNumber
ORDER BY pg.prof_gen DESC
LIMIT 5;
```

```
 * sqlite:////Users/menglingjiang/Desktop/stores.db
Done.
```

Out[25]:

contactLastName	contactFirstName	city	country	prof_gen
Freyre	Diego	Madrid	Spain	326519.65999999986
Nelson	Susan	San Rafael	USA	236769.38999999998
Young	Jeff	NYC	USA	72370.09000000001
Ferguson	Peter	Melbourne	Australia	70311.06999999999
Labrune	Janine	Nantes	France	60875.30000000001

In [26]:
```
# The Less Engaged Customers
```

In [27]:
```
%%sql
WITH profit_gen_table AS (
    SELECT os.customerNumber, SUM(od.quantityOrdered * (od.priceEach - p
    FROM products pr
    JOIN orderdetails od ON pr.productCode = od.productCode
    JOIN orders os ON od.orderNumber = os.orderNumber
    GROUP BY os.customerNumber)

SELECT cust.contactLastName, cust.contactFirstName, cust.city, cust.coun
FROM customers cust
JOIN profit_gen_table pg ON pg.customerNumber = cust.customerNumber
ORDER BY pg.prof_gen
LIMIT 5;
```

```
 * sqlite:////Users/menglingjiang/Desktop/stores.db
Done.
```

Out[27]:

contactLastName	contactFirstName	city	country	prof_gen
Young	Mary	Glendale	USA	2610.870000000001
Taylor	Leslie	Brickhaven	USA	6586.0199999999995
Ricotti	Franco	Milan	Italy	9532.93
Schmitt	Carine	Nantes	France	10063.800000000001
Smith	Thomas	London	UK	10868.039999999999

Insights:

Now that we have the most-important and least-committed customers, we can determine how to drive loyalty and attract more customers. We are tailoring two strategies for the VIP and the less engaged customers.

- For VIP customers, exclusive events and initiatives will be organized to foster loyalty and enhance satisfaction.
- For less engaged customers, specific campaigns and initiatives will be launched to re-engage them, boosting their interest and involvement with our brand. By tailoring efforts based on customer categorization, we aim to drive loyalty among VIP customers and revitalize engagement for those less engaged.

Question 3: What is our budget for acquiring new customers?

Before answering this question, let's find the number of new customers arriving each month. That way we can check if it's worth spending money on acquiring new customers. This query helps to find these numbers.

In [28]:
```
%%sql

WITH payment_with_year_month_table AS (
    SELECT *, CAST(SUBSTR(paymentDate, 1, 4) AS INTEGER) * 100 + CAST(SUI
    FROM payments p),

customers_by_month_table AS (
    SELECT p1.year_month, COUNT(*) AS number_of_customers, SUM(p1.amount
    FROM payment_with_year_month_table p1
    GROUP BY p1.year_month),

new_customers_by_month_table AS (
    SELECT p1.year_month, COUNT(*) AS number_of_new_customers,SUM(p1.amou
        (SELECT number_of_customers
         FROM customers_by_month_table c
         WHERE c.year_month = p1.year_month) AS number_of_customers,
        (SELECT total
         FROM customers_by_month_table c
         WHERE c.year_month = p1.year_month) AS total
    FROM payment_with_year_month_table p1
    WHERE p1.customerNumber NOT IN (
            SELECT customerNumber
            FROM payment_with_year_month_table p2
            WHERE p2.year_month < p1.year_month)
    GROUP BY p1.year_month)

SELECT year_month, ROUND(number_of_new_customers * 100 / number_of_custor
       ROUND(new_customer_total * 100 / total, 1) AS new_customers_total_
FROM new_customers_by_month_table;
```

200309	80.0	95.9
200310	69.0	69.3
200311	57.0	53.9
200312	60.0	54.9
200401	33.0	41.1
200402	33.0	26.5
200403	54.0	55.0
200404	40.0	40.3
200405	12.0	17.3
200406	33.0	43.9
200407	10.0	6.5
200408	18.0	26.2
200409	40.0	56.4

As you can see, the number of clients has been decreasing since 2003, and in 2004, we had the lowest values. The year 2005, which is present in the database as well, isn't present in the table above, this means that the store has not had any new customers since September of 2004. This means it makes sense to spend money acquiring new customers.

To determine how much money we can spend acquiring new customers, we can compute the Customer Lifetime Value (LTV), which indicates the average monetary value generated by a customer over their entire relationship with a business. This calculation allows us to determine the optimal amount that can be allocated towards marketing efforts.

In [29]:
```
%%sql
WITH LifetimeProfitTable AS (
    SELECT os.customerNumber, SUM(od.quantityOrdered * (od.priceEach - p
    FROM products pr
    JOIN orderdetails od ON pr.productCode = od.productCode
    JOIN orders os ON od.orderNumber = os.orderNumber
    GROUP BY os.customerNumber)

SELECT AVG(lpt.lifetimeProfit) AS lifetimeValue
FROM LifetimeProfitTable lpt;
```

```
 * sqlite:////Users/menglingjiang/Desktop/stores.db
Done.
```

Out[29]:

lifetimeValue
39039.59438775511

Insights:

The Lifetime Value (LTV) metric informs us about the average profit generated by a customer throughout their association with our store. This insight is crucial for predicting future profits. For example, if we gain ten new customers next month, we can expect to earn $390,395. Such predictions help us to make well-informed decisions about allocating funds for acquiring new customers.

Question 4: To maximize returns, which countries should we concentrate our marketing efforts on?

Identifying potential markets for the highest profit is crucial, considering the costs associated with marketing. Focusing on these markets ensures that our marketing efforts yield the best return on investment, ultimately contributing to the maximization of profitability.

In [30]:
```
%%sql
SELECT c.country, ROUND(SUM(od.quantityOrdered * (od.priceEach - p.buyPr
FROM orders o
JOIN orderdetails od ON od.orderNumber = o.orderNumber
JOIN products p ON p.productCode = od.productCode
JOIN customers c ON o.customerNumber = c.customerNumber
GROUP BY c.country
ORDER BY totalProfit DESC
LIMIT 5;
```

```
 * sqlite:////Users/menglingjiang/Desktop/stores.db
Done.
```

Out[30]:

country	totalProfit
USA	1308815.59
Spain	440004.54
France	413016.12
Australia	222207.18
New Zealand	189506.58

Insights:

Considering the findings above, it is recommended to focus our efforts on targeting the USA, Spain, France, Australia, and New Zealand. By focusing our marketing efforts on these specific markets, we can efficiently allocate resources and concentrate on seizing the most promising opportunities within these regions, ultimately improving our overall business performance.

Question 5: Find the top and bottom categories for each country.

Analyze the "order details" table based on the quantity of product lines ordered to find the best and worst-performing product lines in each country. By checking how these product lines are represented in the "orders" table, we can identify which ones are doing exceptionally well and which ones are falling behind in each specific country.

In [31]:
```
%%sql
WITH
best_category AS
(SELECT country, productLine, max(profit) as max_profit
FROM (SELECT c.country ,p.productLine, round(SUM(od.quantityOrdered * (o
FROM orders o
JOIN orderdetails od ON od.orderNumber = o.orderNumber
JOIN products p ON p.productCode = od.productCode
JOIN customers c ON o.customerNumber = c.customerNumber
GROUP BY TRIM(c.country) ,p.productLine
ORDER BY profit DESC)
GROUP BY TRIM(country)
ORDER BY max_profit DESC)


SELECT productLine AS Best_Category, ROUND(SUM(Max_Profit_Percentage),2)
FROM (SELECT
    productLine,
    ROUND(max_profit * 100 / SUM(max_profit) OVER(), 2) AS Max_Profit_Pe
FROM
    best_category)
GROUP BY productLine
ORDER BY SUM(Max_Profit_Percentage) DESC
```

```
 * sqlite:////Users/menglingjiang/Desktop/stores.db
Done.
```

Out[31]:

Best_Category	Max_Profit_Percentage
Classic Cars	97.04
Planes	1.97
Vintage Cars	0.99

In [32]:
```
%%sql
WITH
worst_category AS
(SELECT country, productLine, min(profit) as min_profit
FROM (SELECT c.country ,p.productLine, round(SUM(od.quantityOrdered * (o
FROM orders o
JOIN orderdetails od ON od.orderNumber = o.orderNumber
JOIN products p ON p.productCode = od.productCode
JOIN customers c ON o.customerNumber = c.customerNumber
GROUP BY TRIM(c.country) ,p.productLine
ORDER BY profit DESC)
GROUP BY TRIM(country)
ORDER BY min_profit DESC)

SELECT productLine AS Worst_Category, ROUND(SUM(Min_Profit_Percentage),2
FROM (SELECT
    productLine,
    ROUND(min_profit * 100 / SUM(min_profit) OVER(), 2) AS Min_Profit_Pe
FROM
    worst_category)
GROUP BY productLine
ORDER BY SUM(Min_Profit_Percentage) DESC
```

```
 * sqlite:////Users/menglingjiang/Desktop/stores.db
Done.
```

Out[32]:

Worst_Category	Min_Profit_Percentage
Trains	52.91
Classic Cars	39.1
Ships	3.0
Motorcycles	1.85
Vintage Cars	1.62
Trucks and Buses	1.51

Insights:

The analysis clearly shows that Classic cars are the most favored product category, commanding a significant share of 97.04%. Planes are the next preferred category with a share of 1.97%, followed by Vintage cars at 0.99%.

On the contrary, Trains stand out as the least favored category, comprising a substantial portion of 52.91%. Classic cars constitute 39.1% of the least favored category, while Ships account for 3.0%. Motorcycles, Trucks and Buses, along with Vintage cars, each represent around 1.5% among the least favored categories.

Question 6: How did sales perform during the entire period when recorded?

To evaluate performance, we will examine monthly sales based on the profits generated. Analyzing the profitability of each month allows us to access the success of that specific period.

In [36]:
```
%%sql
WITH order_shipped AS
(SELECT p.customerNumber, strftime('%Y-%m', p.paymentDate) as year_month
FROM payments p
JOIN orders o ON o.customerNumber =p.customerNumber
WHERE status = "Shipped"
ORDER BY year_month)

SELECT year_month, round(sum(amount),2) as total
FROM order_shipped osh
JOIN customers c ON c.customerNumber = osh.customerNumber
GROUP BY year_month
ORDER BY year_month;
```

```
 * sqlite:////Users/menglingjiang/Desktop/stores.db
Done.
```

Out[36]:

year_month	total
2003-01	89351.87
2003-02	1247289.83
2003-03	599113.44
2003-04	642905.52
2003-05	655731.4
2003-06	599498.29
2003-07	1197111.09
2003-08	2229925.11
2003-09	444833.59
2003-10	1777878.91
2003-11	2645240.58
2003-12	3630166.7
2004-01	1763695.14
2004-02	280414.97
2004-03	1659680.61
2004-04	451088.32
2004-05	1004630.84
2004-06	616870.27
2004-07	1562155.02
2004-08	2502415.89
2004-09	1118188.4
2004-10	410614.72
2004-11	3870448.2
2004-12	5574121.33
2005-01	511815.22
2005-02	805506.66
2005-03	6041863.89
2005-04	1640349.66
2005-05	1849609.5
2005-06	270581.66

Insights:

The provided dataset spans 2.5 years and highlights significant increases in November and December of 2004, along with a spike in March 2005. Moreover, there's a consistent pattern of profit decline observed from April to June within this period. This reduction in profit could be linked to different factors, such as shifts in market demand, increased competition, seasonal changes, economic conditions, or internal operational issues.

Question 7: Assess how well our present sales team is doing.

Model Motorworks has outlined a strategy to grow their sales team. Before moving forward with the expansion, it's important to assess the current sales team's performance. Additionally, we aim to recognize and acknowledge the top-performing sales employee in each country.

In [37]:
```
%%sql
WITH best_employee AS
    (SELECT c.country, c.city, e.employeeNumber, e.lastName, e.firstName
            p.productLine, ROUND(SUM(od.quantityOrdered * (od.priceEach -
    FROM orders o
    JOIN orderdetails od ON od.orderNumber = o.orderNumber
    JOIN products p ON p.productCode = od.productCode
    JOIN customers c ON o.customerNumber = c.customerNumber
    JOIN employees e ON e.employeeNumber = c.salesRepEmployeeNumber
    GROUP BY e.employeeNumber
    ORDER BY c.city, profit DESC)

SELECT country, ROUND(SUM(profit) / SUM(SUM(profit)) OVER () * 100, 2) AS
FROM best_employee
GROUP BY country
ORDER BY total_percentage_sales DESC;
```

```
 * sqlite:////Users/menglingjiang/Desktop/stores.db
Done.
```

Out[37]:

country	total_percentage_sales
USA	36.27
Spain	17.29
Denmark	8.91
UK	7.59
Germany	7.23
France	6.14
New Zealand	6.03
Australia	5.81
Philippines	4.74

Insights:

It clearly shows that the USA sales team contributes the most significant profit to the company. This is logical, given that the USA sales team accounts for 36.27% of the total sales across all countries. After the USA sales team, the sales team in Spain ranks second in terms of profitability.

In [ ]:
```
# Top-performing sales employee in each country
```

In [ ]:
```
%%sql
WITH best_employee AS
(SELECT c.country,c.city, e.employeeNumber ,e.lastName ,e.firstName ,e.j
p.productLine, round(SUM(od.quantityOrdered * (od.priceEach - p.buyPrice
FROM orders o
JOIN orderdetails od ON od.orderNumber = o.orderNumber
JOIN products p ON p.productCode = od.productCode
JOIN customers c ON o.customerNumber = c.customerNumber
JOIN employees e ON e.employeeNumber = c.salesRepEmployeeNumber
GROUP BY e.employeeNumber
ORDER BY profit DESC)

SELECT lastName ||" "|| firstName as name ,jobTitle,city,country, produc
FROM best_employee
GROUP BY country
ORDER BY max_profit DESC;
```

It's important to recognize and appreciate the hard work of your top-performing sales employee as it significantly boosts team morale, motivation, and overall performance.

Question 8: Are there products in our inventory that haven't sold in a while?

Deadstock, referring to products remaining unsold for an extended period, poses financial challenges through storage occupation and potential losses from damage. Managing these items involves addressing the risk of prolonged non-sale and the associated additional costs. In this context, our focus is on identifying products unsold for one year and determining the incurred costs.

In [ ]:
```
%%sql
SELECT productCode, productName,quantityInStock, buyPrice
FROM products p
WHERE productCode NOT IN (SELECT productCode FROM orderdetails o);
```

Insights:

To tackle sluggish inventory movement, one viable approach is to contemplate reducing prices for deadstock items. While it might appear counterintuitive to lower prices and potentially generate less revenue from underperforming products, this strategy can enhance the appeal of the items to potential buyers. Offering discounted prices, perhaps even selling at cost, allows you to expedite the sales process, ultimately leading to long-term cost savings. Keeping these items in stock for an extended period only extends the associated costs for your business.

Question 9: Give a list of the highest spenders in each country.

To motivate our valued customers to increase their spending, we've put together a list of top spenders from each country, organized alphabetically by country. By acknowledging and appreciating their loyalty and support, our aim is to encourage them to maintain their patronage and improve their shopping experiences with us.

In [ ]:
```
#Find the customer from each country that has spent
# the most money at our store, ordered alphabetically by country.
```

In [ ]:
```
%%sql
WITH  performance AS
(SELECT o.customerNumber, round(SUM(od.quantityOrdered * (od.priceEach -
FROM orders o
JOIN orderdetails od ON od.orderNumber = o.orderNumber
JOIN products p ON p.productCode = od.productCode
GROUP BY o.customerNumber
ORDER BY profit DESC)

SELECT c.contactLastName ||" "||c.contactFirstName as name,c.city,c.coun
FROM customers c
JOIN performance ON performance.customerNumber = c.customerNumber
GROUP BY c.country
ORDER BY c.country;
```

Insights:

To recognize the customer with the highest spending at your store, you can take the following steps:

- Encourage the customer to share their thoughts, feedback, or suggestions regarding their experiences with your company.
- Show appreciation by offering exclusive benefits or rewards, like VIP access to upcoming sales or events, along with special discounts.
- Express gratitude through a personalized thank-you note or a small gift, acknowledging their loyalty and support.

Conclusions:

After analyzing the dataset given by the Model Motorworks, we can offer the following recommendations based on the insights gained.

Products:

- To boost the popularity of Classic cars, emphasizing their historical significance and related stories can enhance their value and demand among customers. Focusing on the history of Classic and Vintage car models can contribute to increased value and higher demand for these product lines.
- Creating additional categorizations beyond the current product line is suggested to understand why certain product lines such as Trains, are less favored. Sub-classification based on the year of manufacture or specific dates may provide insights into customer preferences for different models.
- There is only one product classified as Deadstock, it's advisable not to delay action, as holding onto it impacts profits. A practical approach would be to consider it as an add-on when selling other products to clear the inventory and recover some costs. Taking action promptly is crucial to avoid potential severe losses, especially damage to the product, making a price reduction a viable strategy.
- Exploring additional product types beyond model vehicles, such as stickers, action figures, toys, etc., could be considered to expand the business if budget permits.

Customers:

- Recognizing and rewarding loyal customers is crucial. We can organize exclusive events and initiatives for VIP customers fosters loyalty and satisfaction. If a loyalty program is not already in place, it is recommended to maintain business and encourage larger orders.
- To re-engage less active customers, we can run targeted campaigns and initiatives tailored to renew their interest and boost participation. Understanding their preferences allows us to create appealing promotions and experiences that reconnect them with our brand and reignite their enthusiasm.
- Focus on encouraging existing customers to make additional purchases to reduce the dependence on acquiring new ones, which can be costly. While working on increasing sales from current customers, continue efforts to attract new customers and sustain monthly sales. The absence of new customers since Sep 2004, as indicated by existing data is a concern, considering their significant contribution to current sales.

Sales representatives:

- In general, the sales representatives are performing well, and it's crucial to maintain their motivation to prompt customers in their regions to make larger and more frequent purchases.
- Boost motivation by publicly acknowledging the top-performing sales employee, celebrating their achievements, and inspiring others in the team. Provide personalized rewards like bonuses, commissions, or gift cards to recognize outstanding performance. Organize team celebrations, lunches, or outings to show appreciation for their hard work.

These strategies create a motivating environment, acknowledging and rewarding sales representatives for exceptional performance while encouraging others to excel in their roles.

Company:

- The profit spikes in November and December 2004 are likely due to increased holiday season sales, while the March 2005 spike may be linked to spring sales or specific promotions. Effective marketing and special offers likely contributed to these increases. The decline in profits from April to June could result from factors like seasonal decreases in demand, heightened competition, or market saturation. Economic fluctuations, shifts in consumer behavior, and internal operational challenges may have also played a role. To identify the specific cause of the profit decrease, further analysis and additional contextual information are needed. Collecting data on overhead costs, fees, discounts, and refunds for damaged goods would contribute to a more thorough understanding of the factors influencing the declining trend.
- The report should be assessed by the Marketing and Finance teams. Some assumptions may be incorrect since these teams haven't provided input. For instance, the reported overall profit for 2003 and 2004 is slightly over $3,000,000; it doesn't consider overhead costs such as fees, replacement fees, and refunds.
- We would recommend to gather additional data for improved future analysis. This should include information on:
  - Overhead costs for each order, encompassing fees and discounts.
  - Data on credits or refunds issued for damaged goods.
  - Customer-end sales data to better comprehend how end customers engage with our product. This information could aid company sales representatives in encouraging customers to make more purchases by showcasing end customer behavior.

Existing Market:

- A strategic move would be to focus marketing efforts on three main continents: North America (especially the USA), Europe (Spain and France), and Oceania (Australia and New Zealand). By concentrating our resources on these specific markets, we can work efficiently and make the most of promising opportunities in these regions. This focused approach will help improve our overall business performance.