



PROJECT: MINT CLASSICS COMPANY

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PROJECT OVERVIEW

CONTEXT

This project examines the business processes of Mint Classic, a well-established company with offices across five countries. The company specializes in selling replicas of classic and vintage cars, along with a range of other products. It aims to streamline operations by closing one of its warehouses while maintaining its sales and services. This project will focus on analysing inventory processes and providing actionable recommendations for reducing or reorganizing inventory.

ACTIONS

The original database scripts were used to reconstruct the database in Db Browser (SQLite). No changes were made to any tables, primary keys, foreign keys or constraints. Similarly, the original data was transferred successfully to populate the database.

RESULTS

It was recommended that the South warehouse be closed down since it houses the least number of products. Given that the other three warehouses have not reached full capacity, reorganising the inventory will be more viable.

Another suggestion was to strengthen the marketing department by assigning additional staff to the VP of Marketing. An active marketing team can implement campaigns that have the potential to boost overall company sales.

Additionally, it was suggested that the database be updated to include more information regarding inventory acquisition, such as shipping and assembly times, to improve the process of acquiring new stock. Furthermore, assigning a dedicated staff member to oversee inventory management and implementing key performance indicators (KPIs) would better position the company to handle their inventory in the future.

CONCEPT OVERVIEW

In this project, SQL language was used to query the relational database, employing DML (SELECT) and DDL (CREATE, ALTER, DROP) statements, along with joins, window functions, and common table expressions (CTEs).

DATA OVERVIEW AND PREPARATION

Database Structure

Tables

This database consists of **nine** tables, namely:

- 1) **warehouses** - Four warehouses that store all the company's inventory.
- 2) **products** – A total of 110 products, with details including name, vendor, and unit price. This table is linked to the Warehouses table to specify where each product is stored.
- 3) **productlines** – There are seven distinct/unique product lines (categories), each linked to specific products. These categories are:
 - Classic cars
 - Vintage cars
 - Planes
 - Motorcycles
 - Ships
 - Trains
 - Trucks and Buses
- 4) **offices** – This table contains detailed information about each of the company's seven offices. The headquarters is located in the USA, with branches in the UK, France, Japan, and Australia.
- 5) **employees** – This table contains comprehensive information about the company's 23 employees working across the offices mentioned above. The organisational structure includes one President, two Vice Presidents (Sales and Marketing), three Sales Managers (one for each region: APAC, EMEA, and NA), and 16 Sales Representatives working under the respective Sales Managers.
- 6) **customers** – This table contains complete information about the company's 122 customers, including details on the specific Sales Representative assigned to each.
- 7) **orders** – Information related to customer orders is stored in this table. This includes the order date, shipping date, status and customer number.
- 8) **orderdetails** – This table contains additional information related to each order, such as the product being sold, the quantity, and the price of each item.
- 9) **payments** – **payments** – this table is linked to the customer (making the payment) and has information such as date of payment, amount and check number (suggesting payments are made through bank checks only).

Data cleaning

The data is clean, with no duplicates and very little missing information.

Ambiguous data

- In the **warehouses table**, there is a column called **warehousePCTCap** that is not clearly defined. I assume this refers to "PCT Capacity" or "percentage capacity," indicating the percentage of the warehouse currently utilised for inventory.
- The **creditLimit** column in the **customers table** is also not clearly defined. It is unclear what this figure represents or its significance, especially since it is not referenced in any other table.

Null data

In the productlines table there were two fields (htmlDescription and image) that were null for all values.

	productLine	textDescription	htmlDescription	image
1	Classic Cars	Attention car enthusiasts: Make you...	NULL	NULL
2	Motorcycles	Our motorcycles are state of the ar...	NULL	NULL
3	Planes	Unique, diecast airplane and ...	NULL	NULL
4	Ships	The perfect holiday or anniversary ...	NULL	NULL
5	Trains	Model trains are a rewarding hobby ...	NULL	NULL
6	Trucks and Buses	The Truck and Bus models are ...	NULL	NULL
7	Vintage Cars	Our Vintage Car models realistica...	NULL	NULL

These two columns were deleted using the following alter table command

```
-- dropping columns
ALTER TABLE productlines
DROP COLUMN image,
DROP COLUMN htmlDescription;
```

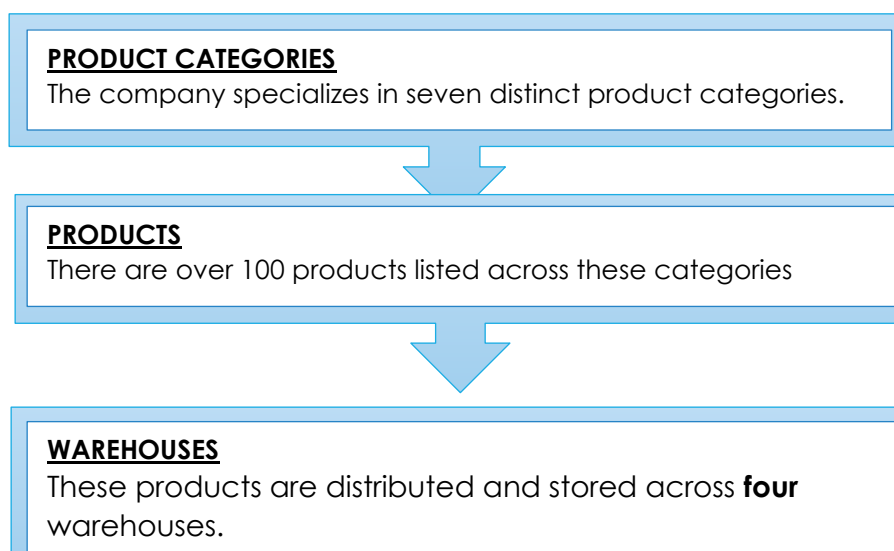
	productLine	textDescription
1	Classic Cars	Attention car enthusiasts: Make you...
2	Motorcycles	Our motorcycles are state of the ar...
3	Planes	Unique, diecast airplane and ...
4	Ships	The perfect holiday or anniversary ...
5	Trains	Model trains are a rewarding hobby ...
6	Trucks and Buses	The Truck and Bus models are ...
7	Vintage Cars	Our Vintage Car models realistica...

Database Schema

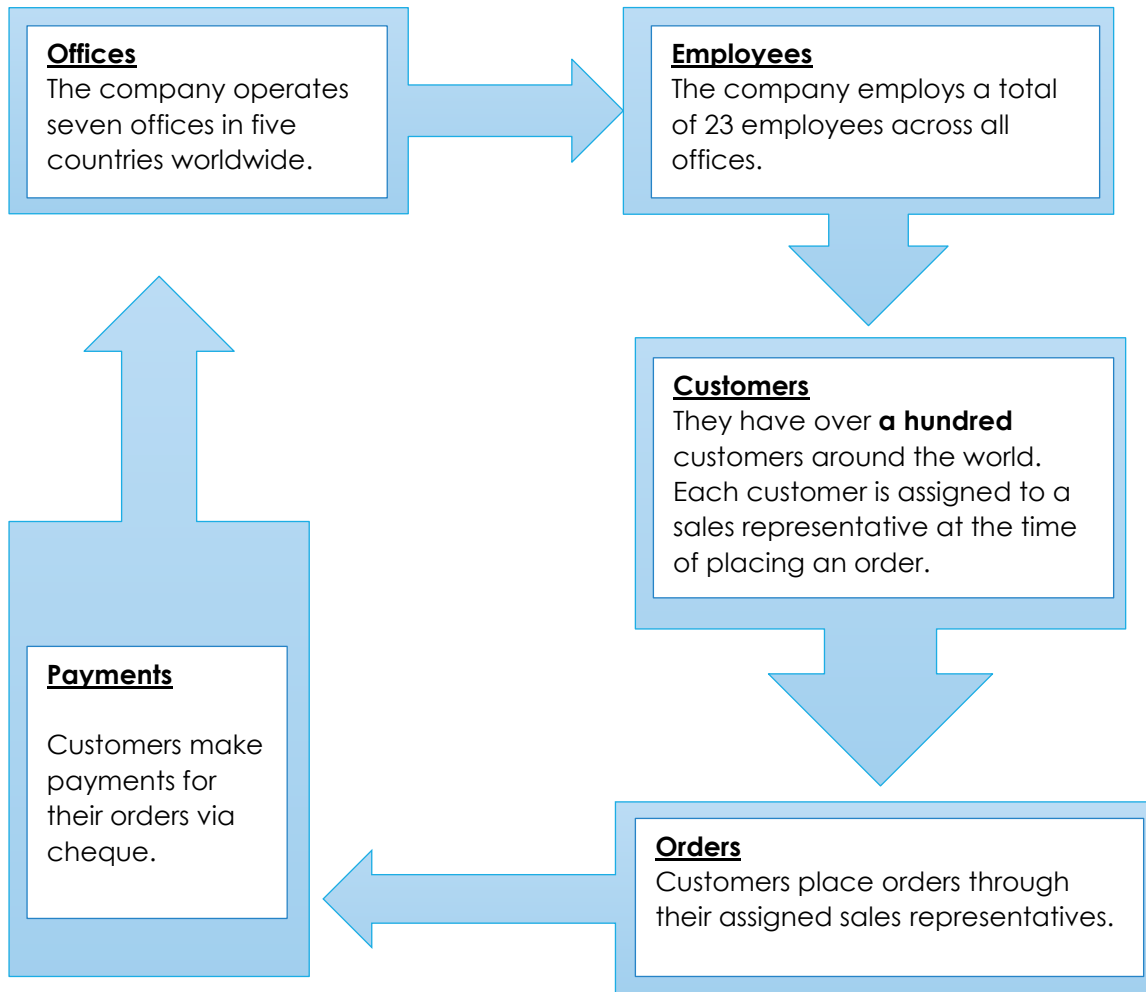
The structure of the database is highly normalized and employs a snowflake schema. The primary fact table is the Order Details table, which contains information regarding the quantity and price of each order. Additional information related to orders is distributed among dimension tables, including Product, Product Lines, Orders, and Customers.

Company Workflows

Inventory workflow



Sales workflow



APPLICATION

Inventory

Product categories

There are 7 categories of products(product lines) that the company deals with. These are:

```
-- checking for productLines / product categories
SELECT
    productLine
FROM
    productlines;
```

	productLine
1	Classic Cars
2	Motorcycles
3	Planes
4	Ships
5	Trains
6	Trucks and Buses
7	Vintage Cars

Products

Listing the number of products that fall under each category.

```
-- checking for count of products by category
SELECT
    productline as product_category,
    COUNT (DISTINCT productCode) as product_count
FROM
    products
GROUP BY
    productline
ORDER BY
    COUNT (DISTINCT productCode) DESC;
```

	product_category	product_count
1	Classic Cars	38
2	Vintage Cars	24
3	Motorcycles	13
4	Planes	12
5	Trucks and Buses	11
6	Ships	9
7	Trains	3

This shows that the largest number of products fall under the classic cars and vintage cars categories.

Warehouses

Checking the structure of the Warehouse table to determine the total number of warehouses owned by the company.

```
-- check warehouse data
SELECT
    *
FROM
    warehouses;
```

	warehouseCode	warehouseName	warehousePctCap
1	a	North	72
2	b	East	67
3	c	West	50
4	d	South	75

There are a total of four warehouses and none of them are currently operating at full capacity.

Determining if there is any linkage between products and where their storage location.

```
-- checking how products and warehouses are linked
SELECT
    productline as product_category,
    warehouseName as warehouse,
    COUNT (productCode) as product_count
FROM
    products
    inner join warehouses on
        products.warehouseCode = warehouses.warehouseCode
GROUP BY
    warehouseName,
    productline
ORDER BY
    COUNT (productCode) DESC;
```

	product_category	warehouse	product_count
1	Classic Cars	East	38
2	Vintage Cars	West	24
3	Motorcycles	North	13
4	Planes	North	12
5	Trucks and Buses	South	11
6	Ships	South	9
7	Trains	South	3

INSIGHTS:

- All Classic Cars are stored in the East warehouse
- Vintage Cars are stored in the West warehouse.
- The North warehouse is designated for two products: Motorcycles and Planes.
- The South warehouse stores Trucks and Buses, Ships, and Trains.
- There are only a total of 10 products across the Ships and Trains categories.

Product Inventory check

Checking the stock quantity in each warehouse and estimating the total value of the inventory.

```
--checking products, quantity in stock and total inventory value
SELECT
    warehouseName as warehouse_name,
    COUNT(productName) as number_of_products,
    printf('%d', SUM(quantityInStock)) as total_stock_quantity,
    printf('%.2f', SUM(buyPrice * quantityInStock)) as total_inventory_value
FROM
    products pro
    join warehouses wh on
    pro.warehouseCode = wh.warehouseCode
GROUP BY
    warehouseName
ORDER BY
    total_inventory_value;
```

	warehouse_name	number_of_products	total_stock_quantity	total_inventory_value
1	East	38	219,183	14,059,337.71
2	South	23	79,380	4,105,721.76
3	West	24	124,880	5,704,259.82
4	North	25	131,688	6,664,996.94

INSIGHTS:

- The East warehouse has the highest number of products (38), followed by North (25), West (24), and finally South (23).
- The quantity of items in stock reaches hundreds of thousands in most warehouses, which is noteworthy. There is no available information on the inventory's origin or the shipping and assembly times. It may be worth considering whether this high volume of stock is truly necessary.
- The cost of inventory is significant, with the highest inventory value in the East warehouse at 14 million, and the lowest in the South warehouse at 4 million.

Offices and Employees

Gathering data on the number and locations of the company's offices, along with employee information for each branch.

```
-- checking offices, employees and number of employees per branch
]WITH BranchEmployeeCount AS (
    SELECT
        o.officeCode,
        country,
        city,
        COUNT(employeeNumber) AS count_employees
    FROM
        offices o
    INNER JOIN employees e ON o.officeCode = e.officeCode
    GROUP BY
        o.officeCode, country, city
)

SELECT
    bec.*,
    (SELECT COUNT(employeeNumber) FROM employees) AS total_employees
FROM
    BranchEmployeeCount bec;
```

	officeCode	country	city	count_employees	total_employees
1	1	USA	San Francisco	6	23
2	2	USA	Boston	2	23
3	3	USA	NYC	2	23
4	4	France	Paris	5	23
5	5	Japan	Tokyo	2	23
6	6	Australia	Sydney	4	23
7	7	UK	London	2	23

INSIGHTS:

- The main office appears to be located in San Francisco, USA, which has the highest number of employees (6).
- They have two other offices in the USA, in Boston and New York City.
- Additionally, they have offices in other four countries, namely France (capital city Paris), Japan (capital city Tokyo), United Kingdom (capital city London) and Australia (city Sydney).
- The countries with the highest employees are France and Japan.
- Overall, the company has 23 employees across all branches.

Structural Layout of Employees

Investigating the Employees table to gain a better understanding of job titles and the managerial structure within the company.


```
-- checking the office structure and who reports to who
```

```
SELECT
    e.employeeNumber,
    e.firstName,
    e.lastName,
    e.jobTitle,
    CASE
        WHEN (e.reportsTo IS NOT NULL)
            THEN CONCAT(m.firstName, ' ', m.lastName)
            else ''
        END as manager_name
FROM
    employees e
LEFT JOIN employees m
on e.reportsTo = m.employeeNumber
ORDER BY
    e.employeeNumber;
```

	employeeNumber	firstName	lastName	jobTitle	manager_name
1	1002	Diane	Murphy	President	
2	1056	Mary	Patterson	VP Sales	Diane Murphy
3	1076	Jeff	Firrelli	VP Marketing	Diane Murphy
4	1088	William	Patterson	Sales Manager (APAC)	Mary Patterson
5	1102	Gerard	Bondur	Sale Manager (EMEA)	Mary Patterson
6	1143	Anthony	Bow	Sales Manager (NA)	Mary Patterson
7	1165	Leslie	Jennings	Sales Rep	Anthony Bow
8	1166	Leslie	Thompson	Sales Rep	Anthony Bow
9	1188	Julie	Firrelli	Sales Rep	Anthony Bow
10	1216	Steve	Patterson	Sales Rep	Anthony Bow
11	1286	Foon Yue	Tseng	Sales Rep	Anthony Bow
12	1323	George	Vanauf	Sales Rep	Anthony Bow
13	1337	Loui	Bondur	Sales Rep	Gerard Bondur
14	1370	Gerard	Hernandez	Sales Rep	Gerard Bondur
15	1401	Pamela	Castillo	Sales Rep	Gerard Bondur
16	1501	Larry	Bott	Sales Rep	Gerard Bondur
17	1504	Barry	Jones	Sales Rep	Gerard Bondur
18	1611	Andy	Fixter	Sales Rep	William Patterson
19	1612	Peter	Marsh	Sales Rep	William Patterson
20	1619	Tom	King	Sales Rep	William Patterson
21	1621	Mami	Nishi	Sales Rep	Mary Patterson
22	1625	Yoshimi	Kato	Sales Rep	Mami Nishi
23	1702	Martin	Gerard	Sales Rep	Gerard Bondur

INSIGHTS:

- Diana Murphy is the President of Mint Classics
- Two Vice Presidents work directly under her. These are VP Sales (Mary Patterson) and VP Marketing (Jeff Firrelli).
- Interestingly, VP Marketing has no sub-ordinates working under him.
- The company also has three Sales Managers responsible for the three regions: Asia-Pacific (APAC), Europe, the Middle East, and Africa (EMEA), and North America (NA).
- The Sales Managers for EMEA and NA have the highest number of Sales Representatives working under them, **six** each (this may be because it's a vast geographical area to cover or there may be more sales coming from these regions).
- There are **three** Sales Representatives assigned to the Asia-Pacific region.

- Employee 1621 (Mami Nishi) is an interesting Sales Representative because she reports directly to VP Sales (Mary Patterson), rather than a Sales Manager.
- Another noteworthy observation is that Mami Nishi has a subordinate, who reports to her (employee 1625: Yoshimi Kato). This difference in structural hierarchy may be because the office in Japan only employs two people.

Orders

Date range for orders

Checking the date range for the orders.

```
SELECT
    MIN(orderDate) as first_order,
    MAX(orderDate) as last_order
from
    orders;
```

	first_order	last_order
1	2003-01-06	2005-05-31

The orders in the database are from 6th January 2003 to 31st May 2005.

Total orders and customers

Examining the Orders table to identify the total number of orders and customers.

```
SELECT
    count(orderNumber) as total_orders,
    count(DISTINCT customerNumber) as Customers
FROM
    orders;
```

	total_orders	Customers
1	326	98

A total of 326 orders have been placed by 98 individual customers.

The total number of customers enlisted are:

```
SELECT
    count(customerNumber) as total_customers
from
    customers;
```

	total_customers
1	122

Interestingly, there are customers who have not placed any orders.

Top orders and customers

Viewing the top 10 customers who have placed the highest number of orders, along with their locations and the sales representatives handling their orders.

```
-- viewing orders placed by customerNumber, along with location and
-- the sales rep who helped place the order
SELECT
    o.customerNumber,
    c.customerName as customer_name,
    count(orderNumber) as orders_placed,
    c.city,
    c.country.
```

	customerNumber	customer_name	orders_placed	city	country	sales_rep
1	141	Euro+ Shopping Channel	26	Madrid	Spain	Gerard Hernandez
2	124	Mini Gifts Distributors Ltd.	17	San Rafael	USA	Leslie Jennings
3	114	Australian Collectables, Co.	5	Melbourne	Australia	Andy Fixter
4	145	Danish Wholesale Imports	5	Kobenhavn	Denmark	Pamela Castillo
5	148	Dragon Souvenirs, Ltd.	5	Singapore	Singapore	Mami Nishi
6	323	Down Under Souvenirs, Inc	5	Auckland	New Zealand	Peter Marsh
7	353	Reims Collectables	5	Reims	France	Loui Bondur
8	119	La Rochelle Gifts	4	Nantes	France	Gerard Hernandez
9	121	Baane Mini Imports	4	Stavern	Norway	Barry Jones
10	128	Blauer See Auto, Co.	4	Frankfurt	Germany	Barry Jones

INSIGHTS:

- Based on the customer names, it appears they are not individuals but businesses, such as gift shops and souvenir shops.
- Customers are located worldwide.
- Most customers place multiple orders.

Difference between order date and shipping date

Viewing the top 10 customers who have placed the highest number of orders, along with their locations and the sales representatives handling their orders.

```

SELECT
    orderNumber,
    orderDate,
    requiredDate,
    shippedDate,
    printf('%d', (julianday(shippedDate) - julianday(orderDate))) AS day_difference,
    customerName,
    CONCAT(city, ', ', country) as customer_location
FROM
    orders
    inner join customers on
        orders.customerNumber = customers.customerNumber
WHERE
    shippedDate IS NOT NULL
ORDER BY
    orderDate DESC
LIMIT 8;

```

	orderNumber	orderDate	requiredDate	shippedDate	day_difference	customerName	customer_location
1	10419	2005-05-17	2005-05-28	2005-05-19	2	Salzburg Collectables	Salzburg, Austria
2	10418	2005-05-16	2005-05-24	2005-05-20	4	Extreme Desk Decorations, Ltd	Wellington, New Zealand
3	10417	2005-05-13	2005-05-19	2005-05-19	6	Euro+ Shopping Channel	Madrid, Spain
4	10416	2005-05-10	2005-05-16	2005-05-14	4	L'ordine Souvenirs	Reggio Emilia, Italy
5	10415	2005-05-09	2005-05-20	2005-05-12	3	Australian Collectables, Ltd	Glen Waverly, Australia
6	10413	2005-05-05	2005-05-14	2005-05-09	4	Gift Depot Inc.	Bridgewater, USA
7	10412	2005-05-03	2005-05-13	2005-05-05	2	Euro+ Shopping Channel	Madrid, Spain
8	10411	2005-05-01	2005-05-08	2005-05-06	5	QuÃ©bec Home Shopping Network	MontrÃ©al, Canada

INSIGHTS:

- Looking at the day_difference column, which indicates the difference in days between the order being placed and when it is shipped out, it appears that most orders are shipped within 5 working days. This might explain why the company has high stock quantities for all products.

Top orders by category

Investigating the top-selling categories and their associated products.

```
-- checking the top products ordered by category
SELECT
    productLine as category,
    productName as product_name,
    SUM(quantityOrdered) AS amount_ordered
FROM
    orderdetails od
    INNER JOIN products p ON od.productCode = p.productCode
GROUP BY
    productLine,
    productName
ORDER BY
    amount_ordered DESC
limit 15;
```

	category	product_name	amount_ordered
1	Classic Cars	1992 Ferrari 360 Spider red	1808
2	Vintage Cars	1937 Lincoln Berline	1111
3	Planes	American Airlines: MD-11S	1085
4	Vintage Cars	1941 Chevrolet Special Deluxe ...	1076
5	Vintage Cars	1930 Buick Marquette Phaeton	1074
6	Trucks and Buses	1940s Ford truck	1061
7	Motorcycles	1969 Harley Davidson Ultimate ...	1057
8	Trucks and Buses	1957 Chevy Pickup	1056
9	Trucks and Buses	1964 Mercedes Tour Bus	1053
10	Classic Cars	1956 Porsche 356A Coupe	1052
11	Planes	Corsair F4U (Bird Cage)	1051
12	Planes	F/A 18 Hornet 1/72	1047
13	Planes	1980s Black Hawk Helicopter	1040
14	Vintage Cars	1913 Ford Model T Speedster	1038
15	Motorcycles	1997 BMW R 1100 S	1033

INSIGHTS:

- Class and vintage cars are the highest selling categories.
- Both Vintage Cars and Planes have 4 products each among the top 15 categories.
- Only two Classic Cars products are among the top 15 categories.
- The Ships and Trains categories have no products among the top 15 most-ordered items.

Order to stock ratio

Examining the relationship between the number of orders and stock quantity for the top 10 products.

```
SELECT
    orderDate,
    productLine as Category,
    productName,
    quantityOrdered as quantity_ordered,
    quantityInStock as stock_quantity,
    round(100 * (CAST(quantityOrdered AS FLOAT) / quantityInStock) ,2) AS percentage_stock_ordered,
    (p.quantityInStock - SUM(od.quantityOrdered) OVER (PARTITION BY p.productName ORDER BY orderDate DESC)) AS Stock_remaining
FROM
    orders o
    join orderdetails od on
    o.orderNumber = od.orderNumber
    join products p on
    od.productCode = p.productCode
ORDER BY
    orderDate DESC,
    productName
LIMIT 10;
```

	orderDate	Category	productName	quantity_ordered	stock_quantity	percentage_stock_ordered	Stock_remaining
1	2005-05-31	Trucks and Buses	1926 Ford Fire Engine	19	2018	0.94	1999
2	2005-05-31	Vintage Cars	1939 Cadillac Limousine	26	6645	0.39	6619
3	2005-05-31	Trucks and Buses	1940 Ford Pickup Truck	54	2613	2.07	2559
4	2005-05-31	Trucks and Buses	1940s Ford truck	38	3128	1.21	3090
5	2005-05-31	Classic Cars	1952 Alpine Renault 1300	50	7305	0.68	7255
6	2005-05-31	Trucks and Buses	1954 Greyhound Scenicruiser	11	2874	0.38	2863
7	2005-05-31	Trucks and Buses	1957 Chevy Pickup	33	6125	0.54	6092
8	2005-05-31	Classic Cars	1958 Chevy Corvette Limited Edition	31	2542	1.22	2511
9	2005-05-31	Trucks and Buses	1958 Setra Bus	49	1579	3.1	1530
10	2005-05-31	Classic Cars	1962 LanciaA Delta 16V	38	6791	0.56	6753

INSIGHTS:

- The percentage_stock_ordered is less than 1% for more than half of the orders, indicating that the company maintains a substantial amount of stock in its warehouses.

Payments

The payments table stores details about customer payments, including customer number, check number, and payment date, but it is not linked to the orders table.

```
SELECT  
  *  
FROM  
  payments  
LIMIT 5;
```

	customerNumber	checkNumber	paymentDate	amount
1	103	HQ336336	2004-10-19	6066.78
2	103	JM555205	2003-06-05	14571.44
3	103	OM314933	2004-12-18	1676.14
4	112	BO864823	2004-12-17	14191.12
5	112	HQ55022	2003-06-06	32641.98

ANALYSING THE RESULTS

Findings

- Mint Classic holds a substantial amount of inventory, distributed across four warehouses.
- Classic Cars and Vintage Cars are the best-selling categories, with each stored in separate dedicated warehouses that are not currently storing at full capacity.
- The least popular categories appear to be Planes and Ships, but the total stock for these combined is 10. They are housed in the South warehouse, along with Trucks and Buses.
- The order-to-stock percentage is below 1% for more than half of the orders, indicating that the inventory levels are significantly higher than the demand.

Recommendations

- The company should prioritise closing down the **South** warehouse because a) it houses the fewest products (a total of 20). b) The products are not among the most ordered items c) the remaining three warehouses are not at full capacity making it feasible to reorganise and redistribute the inventory.
- The Vice President of Marketing currently has no subordinates. Strengthening the marketing department is strongly recommended to boost promotional campaigns, especially for less popular products and items. This, in turn, could help increase overall sales of existing inventory.
- Updating the database to include additional vendor information related to inventory—such as the origin of items, shipping times, and assembly times—would provide better insight into the lead time required to acquire new stock.
- Assign a dedicated staff member to oversee inventory management and develop a dashboard that tracks orders and stock levels. Implement key performance indicators (KPIs) to monitor inventory and set alerts for when stock levels reach a predefined minimum.

- Linking payments to orders and offering additional payment methods to customers.

GROWTH AND NEXT STEPS

I would like to develop a dashboard for the database to visually show my findings.