**Title: Analyze Data in a Model Car Database with MySQL**

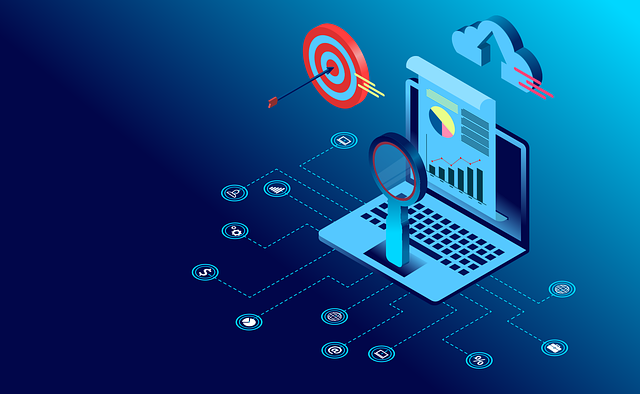
**Workbench**

This provides us with a realistic project scenario, complete with project objectives. This project also outlines specific tasks to execute to achieve these project objectives. The rest is up to you. We have to decide how to organize, build, and present your project.

There isn’t one solution for the project scenario, which means we can distinguish ourselves from others with a unique project. Should you get stuck or encounter a problem you can’t solve, we can conduct internet research or refer to the resources that they supply.

* **Overview**

In this project, you will step into the shoes of an entry-level data analyst at the fictional Mint Classics Company, helping to analyze data in a relational database with the goal of supporting inventory-related business decisions that lead to the closure of a storage facility.



* **Project Scenario**

Mint Classics Company, a retailer of classic model cars and other vehicles, is looking at closing one of their storage facilities.

To support a data-based business decision, they are looking for suggestions and recommendations for reorganizing or reducing inventory, while still maintaining timely service to their customers. For example, they would like to be able to ship a product to a customer within 24 hours of the order being placed.

As a data analyst, you have been asked to use MySQL Workbench to familiarize yourself with the general business by examining the current data. You will be provided with a data model and sample data tables to review. You will then need to isolate and identify those parts of the data that could be useful in deciding how to reduce inventory. You will write queries to answer questions like these:

1) Where are items stored and if they were rearranged, could a warehouse be eliminated?

2) How are inventory numbers related to sales figures? Do the inventory counts seem appropriate for each item?

3) Are we storing items that are not moving? Are any items candidates for being dropped from the product line?

The answers to questions like those should help you to formulate suggestions and recommendations for reducing inventory with the goal of closing one of the storage facilities.

* **Objectives**

1. Explore products currently in inventory.

2. Determine important factors that may influence inventory reorganization/reduction.

3. Provide analytic insights and data-driven recommendations.

* **project Challenge**

Your challenge will be to conduct an exploratory data analysis to investigate if there are any patterns or themes that may influence the reduction or reorganization of inventory in the Mint Classics storage facilities. To do this, you will import the database and then analyze data. You will also pose questions, and seek to answer them meaningfully using SQL queries to retrieve data from the database provided.

In this project, we'll use the fictional Mint Classics relational database and a relational data model. Both will be provided.

After you perform your analysis, we have to share your findings.

* **Data location**

https://www.coursera.org/learn/showcase-analyze-data-model-car-database-mysql-workbench/supplement/XqZpp/working-off-platform

* **Database Import:**

1. The learner should demonstrate the ability to import a database using an SQL script.
2. The working database should include all sample tables, relationships, and data.
3. The database should match the EER (Extended Entity-Relationship diagram) provided.

* **Data Understanding:**

1. The learner should demonstrate a deep understanding of the data and the problem being explored. The following should be included.
2. A clear description of the data as it relates to inventory-related business processes.
3. Evidence, in the form of SQL scripts, of a detailed exploration of the data, including summary statistics.
4. Any explanation of unknown variables that could affect the validity of the data analysis.

* **Analysis Techniques:**

1. The learner should use a variety of appropriate analysis techniques to explore the data and draw insights. The following should be included.
2. A clear explanation of the analysis techniques used and why they were chosen.
3. Appropriate statistical tests, models, and algorithms to analyse the data.
4. Thoughtful consideration of the limitations and assumptions of the analysis techniques used.

* **Insights:**

1. The inventory currently holds 110 distinct products.
2. There are a total of 7 product categories within the inventory.
3. The product "1969 Harley Davidson Ultimate Chopper" boasts the highest stock quantity.
4. Among the products, "1960 BSA Gold Star DBD34" has the least stock availability.
5. By examining the list of products and their corresponding warehouse codes, it becomes evident that some products experience lower sales across the entire database, prompting the need for rearrangement.
6. Analyzing the data reveals that "1960 BSA Gold Star DBD34" has recorded fewer orders and generated lower revenue in warehouse code 'A'. In warehouse code 'B', the product "1972 Alfa Romeo GTA" exhibits reduced revenue. In contrast, for warehouse code 'C', "1941 Chevrolet Special Deluxe Cabriolet" has minimal revenue and sales despite higher stock levels.
7. The data above highlights products that haven't been sold over a specific time span, warranting attention.
8. Delving deeper into the information, we observe that in warehouse code 'C', "1928 Ford Phaeton Deluxe" necessitates increased stock due to its stock quantity. Conversely, warehouse code 'B' sees "1968 Ford Mustang" generating substantial revenue and orders, indicating the need for increased stock. Warehouse code 'D' has "The Mayflower" with high orders and revenue but insufficient stock.
9. Provided below is a list of products that remained unordered in the previous year. These products require more focus and consideration, remaining unchanged in the inventory.
10. Extracting insights from the aforementioned data unveils the inventory's top customers.
11. Further analysis of the data yields the top 10 customers who purchased products from a specific warehouse.
12. Warehouse 'A' received 24,650 orders, while 'B' managed 35,582 orders. Notably, warehouse 'D' recorded fewer orders compared to the other three warehouses.
13. The data provides a comprehensive view of vendors and their aggregate orders categorized by warehouse code.
14. We identify vendors who are experiencing slower product sales based on the data.
15. Synthesizing the information, we can offer suggestions on which sellers excel in selling top products and the respective warehouses these products originate from.

* **Solution**

use mintclassics;

**# Exploring Current Inventory.**

**Q.1 How many unique products are currently in the inventory?**

SELECT

COUNT(DISTINCT productName)

FROM

products;

* **conclusion:**

There are 110 currently unique products in the inventory .

**Q.2 Can you list all the product categories and the count of products within each category?**

SELECT

COUNT(productline) as total\_products ,

productLine

FROM

products

GROUP BY productLine;

* **conclusion:**

there are a total 7 product category in an inventory .

**Q.3 What is the total quantity of each product available in the inventory?**

SELECT

sum(quantityInStock), productName

FROM

products

GROUP BY productName;

**Q.4 Which products have the highest and lowest quantities in the inventory?**

SELECT

MAX(quantityInStock) AS highest\_quantity\_product,

productName

FROM

products

GROUP BY productName

limit 1

;

SELECT

min(quantityInStock),

productName

FROM

products

GROUP BY productName

order by min(quantityInStock) asc

limit 1;

* **conclusion:**

product 1969 Harley Davidson Ultimate Chopper has maximum stock. product 1960 BSA Gold Star DBD34 has minimum stock.

**#Inventory Reorganization and Reduction:**

**Q.5 What is the current storage location of each product?**

SELECT

p.productname,

p.quantityinstock,

w.warehousecode,

w.warehousename

FROM

products p

JOIN

warehouses w ON p.warehouseCode = w.warehouseCode;

* **conclusion:**

It gives current location of every product and quatity of product.

**Q.6 Can you identify products that share the same storage location?**

SELECT

productname,

warehouseCode

FROM

products

order by warehouseCode;

* **conclusion:**

This gives the products that shares same location.

**Q.7 Are there products with low quantities that can be consolidated into fewer storage locations?**

SELECT

productcode,

productname,

warehousecode,

SUM(quantityinstock) AS total\_quantity

FROM

products

GROUP BY productcode ,warehousecode

order by total\_quantity ,warehouseCode asc;

* **conclusion:**

from abovr question we can suggest that warehouse code a has 1960,BSA Gold Star DBD34 product in very less quantity 15 and warehouse b having 68 quantity of 1968 Ford Mustang.

**# Identifying Slow-Moving Products:**

**Q.8 Are there any storage locations that can be eliminated by rearranging the products?**

SELECT

p.productCode,

p.productname,

sum(p.quantityinstock) as total\_quantity,

sum(o.quantityOrdered) as total\_sale,

warehouseCode,

count(p.warehouseCode)

FROM

orderdetails o

JOIN

products p ON p.productCode = o.productCode

group by p.productCode

order by total\_sale asc;

* **conclusion:**

from belew table we get the list of products and warecousecode that has the low and sale over the overall database there is need to rearrange the products.

**Q.9 Which products which is in warehouse D and not in A,B,C ?**

SELECT DISTINCT

p.productName

FROM

products p

INNER JOIN

orderdetails o ON p.productCode = o.productCode

WHERE

p.warehouseCode = 'D'

AND p.productCode NOT IN (SELECT DISTINCT

p2.productCode

FROM

products p2

INNER JOIN

orderdetails o2 ON p2.productCode = o2.productCode

WHERE

p2.warehouseCode IN ('A' , 'B', 'c'));

* **conclusion:**

products which is in warehouse D and not in A,B,C

**Q.10 Can you identify products that have not been sold for a specific period of time?**

SELECT

o.orderDate,

od.quantityOrdered,

p.productName,

od.productCode,

p.productName,

p.quantityInStock,

p.warehouseCode

FROM

orders o

INNER JOIN

orderdetails od ON o.orderNumber = od.orderNumber

INNER JOIN

products p ON p.productcode = od.productcode

WHERE

o.orderDate IS NULL

OR o.orderDate < DATE\_SUB(NOW(), INTERVAL 300 DAY)

;

* **conclusion:**

1. from above we get products that have not been sold for a specific period of time.

**Q.11 Identify products with low turnover rates that might be candidates for reevaluation or reduction.**

SELECT

sum(py.amount) as total\_amount,

sum(od.quantityordered) as total\_orders,

p.productname,

p.warehouseCode,

sum(p.quantityInStock),

count( p.productname)

FROM

payments py

JOIN

orders o ON py.customernumber = o.customernumber

JOIN

orderdetails od ON o.orderNumber = od.orderNumber

JOIN

products p ON od.productcode = p.productcode

group by p.productName, p.warehouseCode

order by p.warehouseCode, total\_amount asc;

* **conclusion:**

1. The product 1960 BSA Gold Star DBD34 has less orders as well as low revenue in overall sell in warehousecode 'A'.
2. In ware housecode 'B' the product 1972 Alfa Romeo GTA has less revenue.
3. In ware housecode 'c' from quantity in stock we can say that 1941 Chevrolet Special Deluxe Cabriolet has less revenue and less sell in overall sell but has more stock.

**Q.12 Are there products that consistently have high sales but low inventory, indicating a potential opportunity for increased stocking?**

SELECT

SUM(py.amount) AS total\_amount,

SUM(od.quantityordered) AS total\_orders,

p.productname,

p.warehouseCode,

SUM(p.quantityInStock),

COUNT(p.productname)

FROM

payments py

JOIN

orders o ON py.customernumber = o.customernumber

JOIN

orderdetails od ON o.orderNumber = od.orderNumber

JOIN

products p ON od.productcode = p.productcode

GROUP BY p.productName , p.warehouseCode

ORDER BY p.warehouseCode , total\_amount ASC;

* **conclusion:**

1. product 1928 Ford Phaeton Deluxe In ware housecode 'c' from quantity in stock 1928 Ford Phaeton Deluxe need of keeping more stock.
2. In ware housecode 'B' ,1968 Ford Mustang has more revenue and has more orders but has very less in stock there is a need of keeping more stock of this model.
3. In warehouse code 'D' the model The Mayflower has more orders and more revenue from it but we have less stock of it.

**Q.13 Can you identify products that have not been sold within a lat year ?**

SELECT

p.productName, p.warehouseCode, o.orderdate

FROM

products p

LEFT JOIN

orderdetails od ON p.productCode = od.productCode

JOIN

orders o ON o.ordernumber = od.orderNumber

WHERE

o.orderDate IS NULL

or (o.orderDate >= '2004-01-01' AND o.orderDate <= '2005-12-01')

ORDER BY p.warehouseCode;

* **conclusion:**

1. Below is the list of product are not ordered in last year.
2. there is a need of focusing and thinking more about this products they are remain as it is in inventory.

**# Analyzing Supplier Relationships**

**Q.14 Which customer borrow the most products from the inventory?**

SELECT

c.customerName,

c.customerNumber,

c.country,

sum(od.quantityOrdered) as total\_order

FROM

customers c

JOIN

orders o ON c.customerNumber = o.customerNumber

JOIN

orderdetails od ON od.ordernumber = o.orderNumber

group by c.customerNumber,c.city,c.country

order by total\_order desc ;

* **conclusion:**

1. from above code we get the top customers of inventory.

**Q.15 how many unique customer inventory has ?**

SELECT

COUNT(DISTINCT customername) as total\_unique\_customers

FROM

customers;

* **conclusion:**

1. inventory has 122 unique customers.

# Q.16 top 10 customer bought the products from the inventory?

SELECT

c.customerName,

c.customerNumber,

c.country,

SUM(od.quantityOrdered) AS total\_order

FROM

customers c

JOIN

orders o ON c.customerNumber = o.customerNumber

JOIN

orderdetails od ON od.ordernumber = o.orderNumber

JOIN

products p ON p.productCode = od.productCode

GROUP BY c.customerNumber , c.country

ORDER BY total\_order DESC

LIMIT 10;

* **conclusion:**

1.from above code we get the top 10 customers that bought product .

**Q.17 which top customers bought products from the inventorry ? and provide warehouse core with it .**

SELECT

c.customerName,

c.customerNumber,

c.country,

sum(od.quantityOrdered) as total\_order,

p.warehouseCode

FROM

customers c

JOIN

orders o ON c.customerNumber = o.customerNumber

JOIN

orderdetails od ON od.ordernumber = o.orderNumber

join

products p on p.productCode=od.productCode

group by c.customerNumber,c.country,p.warehouseCode

order by p.warehouseCode ;

* **conclusion:**

1.from above code we get the top 10 customers that bought product from particular warehouse.

**Q.18 How are inventory numbers related to sales figures? Do the inventory counts seem appropriate for each item?**

SELECT

sum(od.quantityOrdered) as total\_order,

p.warehouseCode

FROM

orderdetails od

join

products p on p.productCode=od.productCode

group by p.warehouseCode

order by p.warehouseCode ;

* **conclusion:**

1.the warehouse 'A' has 24650 orders, 'B' has 35582 orders ,'d' has the less orders than other 3 warehouses .

**Q.19 identifying suppliers whose products consistently sell well or have high demand?**

SELECT

p.productVendor,

SUM(od.quantityOrdered) AS total\_order,

p.warehousecode

FROM

orderdetails od

JOIN

products p ON p.productCode = od.productCode

GROUP BY p.productVendor,p.warehouseCode

order by p.warehouseCode desc

;

* **conclusion:**

1.we get vendors and their total orders by warehousecode.

**Q.20 find top 10 vendors whose products have not been selling well and might need revaluation?**

SELECT

p.productVendor, SUM(od.quantityOrdered) AS total\_order

FROM

orderdetails od

JOIN

products p ON p.productCode = od.productCode

GROUP BY p.productVendor

ORDER BY total\_order ASC

limit 10;

* **conclusion:**

1. we get venders that not selling products fast.

**# 21. which customer have highest shopping and from which warehouse,top 50 customers?**

SELECT

c.customerName,

c.customerNumber,

c.country,

count(c.country) as no\_of\_customer,

sum(od.quantityOrdered) as total\_order,

p.warehousecode,

p.productName

FROM

customers c

JOIN

orders o ON c.customerNumber = o.customerNumber

JOIN

orderdetails od ON od.ordernumber = o.orderNumber

join

products p on p.productCode=od.productCode

group by c.customerNumber,c.city,c.country,warehouseCode,p.productName

order by no\_of\_customer desc

limit 50;

* **conclusion:**

1. we can also say that which country has top buyer or top customer and from which warehouse, customer Euro+ Shopping Channel has customer no 141 from country Spain and 8 total customers 308 total orders from warehouse 'b'. alter and which country, vender and from which warehouse we have less orders and revenue we can rearrange the warehouse and stocking .

**# Q 22 which seller sale less products and from which warehouse they belongs ?**

SELECT

c.customerName,

c.customerNumber,

c.country,

count(c.country) as no\_of\_customer,

sum(od.quantityOrdered) as total\_order,

p.warehousecode,

p.productName

FROM

customers c

JOIN

orders o ON c.customerNumber = o.customerNumber

JOIN

orderdetails od ON od.ordernumber = o.orderNumber

join

products p on p.productCode=od.productCode

group by c.customerNumber,c.city,c.country,p.warehouseCode,p.productName

order by p.warehouseCode desc ;

* **conclusion:**

1. it tells us that warehouse b has very high customers in Spain and c has 6 orders from usa and warehouse c, also c has less no of orders. we can see the country and rearrange the warehouses and products .

* **Conclusion**

Based on the findings from the MySQL analysis of the Mint Classics inventory database, here are the actionable conclusions that can be drawn:

1. **Warehouse Optimization:**

Leverage insights about top customers and their geographical locations to make informed decisions regarding warehouse locations. This involves considering opening new warehouses in regions with high customer activity while evaluating the viability of closing underperforming warehouses.

1. **Vendor Strategy:**

Identify vendors with slow-moving products or lower order volumes. This necessitates a review of vendor relationships and the possibility of seeking new vendors to improve the availability and sales performance of products.

1. **Customer Engagement Initiatives:**

Engage top customers through promotions and incentives to stimulate increased sales. Additionally, focus on customers from countries showing high order volumes to gather feedback and enhance inventory selection.

1. **Country-Centric Approach:**

Utilize customer order data from different countries to develop tailored strategies for each country. This includes adjusting product stock levels, promotions, and warehouse allocation based on specific country trends.

1. **Efficient Warehouse Operations:**

Prioritize the optimization of warehouse operations, particularly in warehouses with lower order volumes. This could encompass evaluating warehouse layouts, staffing, and inventory management processes to enhance efficiency.

1. **Enhancing Vendor Performance:**

Collaborate with vendors to improve their product offerings, sales tactics, and marketing efforts. This collaborative approach aims to elevate vendor sales and contribute to overall inventory performance.

1. **Diversifying Inventory:**

Explore the addition of new products or categories to diversify the inventory and attract a broader customer base. This strategy helps adapt to changing market preferences and expand customer reach.

1. **Demand Forecasting and Planning:**

Implement a comprehensive demand forecasting system to ensure that inventory levels match anticipated customer demand. This proactive approach minimizes the risk of stockouts or overstocking.

1. **Continual Analysis:**

Establish a routine of regular inventory data analysis to monitor shifting trends, fine-tune strategies, and uphold alignment with customer preferences and market dynamics.

While these insights gleaned from the analysis provide valuable direction, it's crucial to emphasize that executing these recommendations will require well-coordinated efforts across various departments, including procurement, marketing, sales, and warehouse management. Regular evaluation of the effectiveness of these actions will be key to adapting strategies and ensuring long-term success in inventory management.

* **Suggestions**

1. **Restock High-Selling Products**:

Identify products like "F/A 18 Hornet 1/72" that have a high number of sales but low stock. Restock these products to meet the demand and avoid potential stockouts.

1. **Reorganize Slow-Selling Products:**

Products with low sales and high quantities in stock ("S18\_4933", "S24\_1046", etc.) might need to be reorganized or reevaluated. Consider reducing their stock levels to free up space for more popular items.

1. **Review Low-Selling Products:**

Analyze the products that have low sales and revenue in specific warehouse codes. Consider removing or reducing stock for products like "1960 BSA Gold Star DBD34" or "1972 Alfa Romeo GTA" if they consistently perform poorly across multiple warehouses.

1. **Focus on Non-Ordered Products:**

Address the list of products that have not been ordered in the last year. Determine whether these products are still relevant or if they should be phased out of the inventory.

1. **Optimize Warehouse Locations:**

Based on your findings about top customers and their locations, consider opening new warehouses in areas with high customer concentration or closing down warehouses with lower orders to optimize distribution.

1. **Vendor Evaluation:**

Identify vendors that are not selling products quickly or are underperforming in terms of orders. Consider re-evaluating vendor relationships and exploring new vendors to improve product availability and sales.

1. **Customer Engagement:**

Offer promotions or incentives to top customers to encourage more sales. Additionally, reach out to customers from specific countries with higher orders to gather insights about their preferences and improve inventory selection.

1. **Country-Based Strategy:**

Use data about customer orders from different countries to develop a country-specific strategy. Adjust product stocking, promotions, and warehouse allocation based on country-level performance.

1. **Warehouse Efficiency:**

Focus on optimizing warehouse operations, especially for the warehouse with fewer orders. This could involve evaluating warehouse layout, staffing, and inventory management processes.

1. **Vendor Performance Improvement:**

Work with vendors to enhance their product offerings, sales strategies, and marketing efforts to boost their sales and contribute to better overall inventory performance.

1. **Inventory Diversification:**

Explore adding new products or categories to diversify the inventory and attract a broader range of customers.

1. **Forecasting and Demand Planning:**

Implement a robust demand forecasting system to ensure that inventory levels are aligned with expected customer demand. This can help prevent overstocking or stockouts.

1. **Regular Analysis:**

Conduct regular reviews of inventory data to identify changing trends, adjust strategies, and ensure that the inventory remains aligned with customer preferences and market dynamics.

Remember that while the analysis provides valuable insights, the implementation of these suggestions will require careful planning and coordination across various departments, including purchasing, marketing, sales, and warehouse management. It's also important to continuously monitor the effectiveness of these actions and adjust strategies accordingly.