INVENTORY_MANAGEMENT

USING SQL

OBJECTIVE & DATA OVERVIEW

Objective

- The objective of this analysis is to address ad-hoc business queries from management and uncover meaningful insights from the provided dataset to support decision-making.
- The goal of this representation is to transform raw data into clear insights, enabling management to make informed strategic and operational decisions.

Data

The dataset provided consists of **six CSV files**, each capturing a different aspect of the business operations:

- **Category** – Contains information about product categories and classifications.
- **Product** – Includes details of individual products such as product ID, name, and category linkage, price , Reorder Level
- **Inventory** – contains quantity available with product id, warehouse id, inventory id
- **Customer** – Holds customer-related data including IDs , phone , email , address
- **Order_Details** – Captures sales transactions with fields like order date, quantity ordered, and pricing, customer id, product id.
- **Warehouse -** tracks the stocks availability with respect location , warehouse name , warehouse id

1. Retrieve all the product information, including its category & inventory levels

Query

```
WITH product_info AS (
        SELECT  PRODUCTID,  SUM(QuantityAvailable) AS QUANTITY
        FROM  inventory
        GROUP BY 1
)
SELECT  p.productid,  p.productname,  c.categoryname,  i.QUANTITY
FROM  product as p JOIN category c
on  c.CategoryID = p.CategoryID  join
product_info i  on i.PRODUCTID = p.ProductID
order by QUANTITY desc;
```

Output

productid	productname	categoryname	QUANTITY
IN32Re-Key	Real Keyboard	Keybord	3394
IN33ParSCNR	Partner Scanner	Printer	3269
IN10CoCPU	Collection CPU	CPU	3259
IN44SaMtrbrd	Say Motherboard	Motherboard Assocries	3237
IN34SucMtr	Successful Monitor	Monitor	3225
IN378ReaMDM	Really Modem	Modem	3221
IN453Meedriv	Meeting External Hard Drive	Disk	3209
IN12WheMou	Whether Mouse	Mouse	3152
IN34HeaMtr	Heart Monitor	Monitor	3110
IN45UpPntr	Upon Printer	Printer	3080
IN34EmpMtr	Employee Monitor	Monitor	3072
IN45Sosply	Soldier Power Supply	Power Supply adaptor	3064
IN678CaRotr	Can Router	Router	3028
IN44PuMtrbrd	Purpose Motherboard	Motherboard Assocries	3003
IN34IntMtr	Interest Monitor	Monitor	2964
IN32Wh-Key	Whose Keyboard	Keybord	2954
IN45Stsply	Start Power Supply	Power Supply adaptor	2953
IN12AnyMou	Anything Mouse	Mouse	2941
IN68ParPROC...	Partner Processor	Processor	2939
IN45Casply	Carry Power Supply	Power Supply adaptor	2938
IN34GovMtr	Government Monitor	Monitor	2934

Insights

- The company holds significant stock in essential computer peripherals like **Keyboards, Printers, Monitors, and CPUs.** This suggests these are either high-demand categories or areas where the company has invested heavily in inventory.
- There is a clear opportunity to create and promote product bundles. This could help increase the average order value and move inventory more quickly.

2. Get All Orders Placed By Customers , Showing Product Names , Order Date, And Quantity Ordered

Query

```
SELECT  C.customername,  p.productname,
o.orderdate,  o.QuantityOrdered
FROM  order_details AS o
JOIN customer AS c ON  o.CustomerID = c.customerid
JOIN product AS p ON   p.productid = o.ProductID;
```

Output

customername	productname	orderdate	QuantityOrdered
Austin Cantu	Always Webcam	2024-01-04	218
Scott Griffin	Others Monitor	2024-03-13	3
Marcus Armstrong	Keep Graphics Card	2024-06-07	34
Susan Jenkins	Under Router	2024-07-12	379
Pamela Walton	Meeting External Hard Drive	2024-03-02	39
Mr. Christopher Taylor	Send Monitor	2024-03-07	412
Andrea Greene	Can Router	2024-02-18	121
Olivia Johnson	Government Monitor	2024-05-29	165
David Santana	Nearly Network Adapter	2024-07-29	216
Kelly Foley	Ever Router	2024-06-26	141
Barbara Logan	Third Monitor	2024-01-22	290
Patricia Rocha	Heart Monitor	2024-08-26	356
Kristina Clark	Fast Network Adapter	2024-02-05	143
Brian Moore	Successful Monitor	2024-02-19	85
Stephanie Leon	Close Power Supply	2024-05-13	450
Kristen Hicks	Really Modem	2024-03-13	167
Dana Morrison	Partner Scanner	2024-03-22	119
Beth Miller	Face Mouse	2024-02-15	476
Shawn Garcia	Medical Printer	2024-01-07	365
Kenneth Henry	Purpose Motherboard	2024-05-03	270
Lee Smith	Full GPU	2024-05-15	306
Karen Gonzalez	Man Processor	2024-04-02	415
Brent Carrillo	Anything Mouse	2024-04-05	331

Insights

- The various in order quantities suggests the company serves a diverse customer base, including both individual buyers and large corporate clients, which may require different marketing and service strategies.
- Customers like **Beth Miller & Stephanie Leon** placed large single orders
- These customers are likely B2B clients or resellers and should be flagged for follow-up by the sales team to nurture these high-value relationships.

3. List All The Customer Who Placed An Order Along With Thier Contact Information

Query

```
SELECT c.customerid, c.customername, c.phone,
c.email, c.address, o.QuantityOrdered, o.OrderID,
o.OrderDate
FROM customer AS c JOIN order_details o ON
o.CustomerID = c.CustomerID;
```

Insights

- With direct access to customer emails and phone numbers alongside their order history, the marketing team can send personalized offers, new product announcements, and follow-up promotions to specific customer segments.
- The data clearly shows a diverse**, international customer base** with clients in locations like Bangalore, London, New York, and Dubai. This allows management to analyze regional purchasing patterns and develop targeted sales strategies for different markets

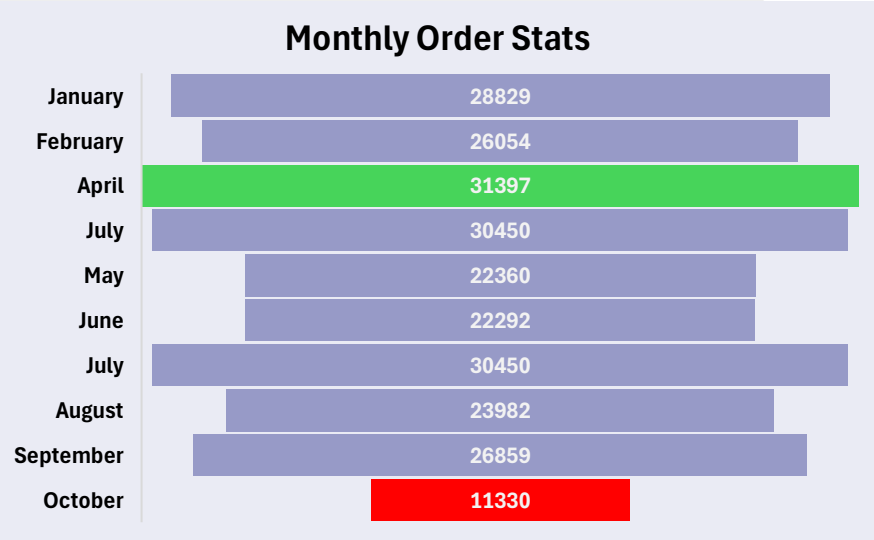
Output

customerid	customername	phone	email	address	QuantityOrdered	OrderID	OrderDate
91Aus	Austin Cantu	9791176864	thomasvalerie@collier.biz	Bangalore	218	OD1	2024-01-04
87Sco	Scott Griffin	8982749031	oferguson@gmail.com	switzerland	3	OD2	2024-03-13
66Mar	Marcus Armstrong	9742293686	jennifervaughan@mullins-smith.com	London	34	OD3	2024-06-07
54Sus	Susan Jenkins	9367641033	qmaxwell@gmail.com	London	379	OD4	2024-07-12
75Pam	Pamela Walton	9266509589	laurenbranch@bauer.com	Patna	39	OD5	2024-03-02
47Mr.	Mr. Christopher Taylor	9531971797	perezwillie@gmail.com	Patna	412	OD6	2024-03-07
65And	Andrea Greene	9479791919	johnsonkim@martin.com	Delhi	121	OD7	2024-02-18
65Oli	Olivia Johnson	9536529863	cynthia69@combs.com	Dubai	165	OD8	2024-05-29
58Dav	David Santana	8993637104	imartinez@flores-davis.com	Pune	216	OD9	2024-07-29
62Kel	Kelly Foley	9186475353	james28@hotmail.com	London	141	OD10	2024-06-26
62Bar	Barbara Logan	9652076145	jeremyarmstrong@yahoo.com	Bangalore	290	OD11	2024-01-22
39Pat	Patricia Rocha	9012643531	elliottjill@yahoo.com	New York	356	OD12	2024-08-26
95Kri	Kristina Clark	8964088899	stewarttheresa@gmail.com	Patna	143	OD13	2024-02-05
27Bri	Brian Moore	9959359351	lthompson@gmail.com	New York	85	OD14	2024-02-19
64Ste	Stephanie Leon	9072034596	ericreynolds@yahoo.com	Dubai	450	OD15	2024-05-13

4. Total Quantity Of Products Ordered Per Customer And Month

Query

```
SELECT  monthname(orderdate) AS month,
c.customername,  sum(o.QuantityOrdered) AS quantity
FROM  customer AS cJOIN order_details o
ON o.CustomerID = c.CustomerID
GROUP BY 1,2;
```



Output

month	customername	quantity
January	Austin Cantu	218
March	Scott Griffin	349
June	Marcus Armstrong	363
July	Susan Jenkins	1760
March	Pamela Walton	412
March	Mr. Christopher Taylor	1045
February	Andrea Greene	1149
May	Olivia Johnson	311
July	David Santana	1473
June	Kelly Foley	324
January	Barbara Logan	684
August	Patricia Rocha	836
February	Kristina Clark	143
February	Brian Moore	1077

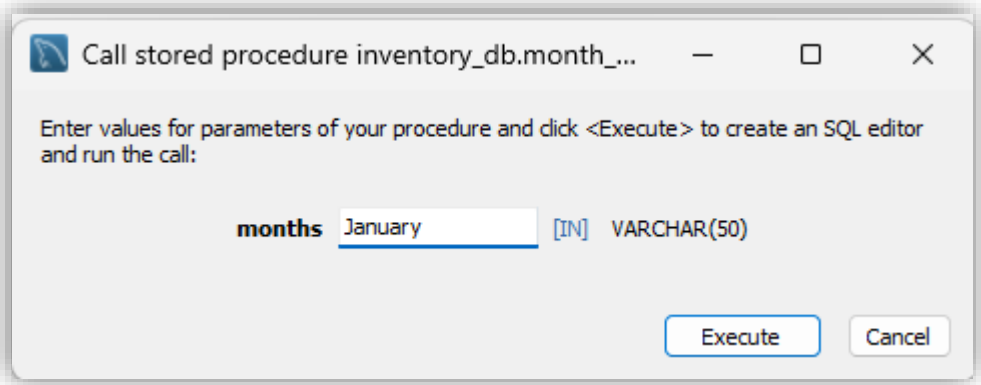
5. TOTAL QUANTITY OF PRODUCTS ORDERED FOR A SELECTED MONTH

Query

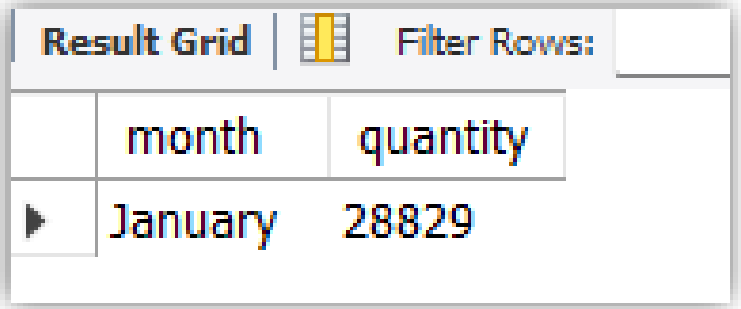
```
delimiter //

CREATE PROCEDURE month_quantity (IN months VARCHAR(50))
BEGIN
SELECT monthname(orderdate) AS month,
 sum(o.QuantityOrdered) AS quantity
FROM customer as c  JOIN order_details o
ON o.CustomerID = c.CustomerID
 WHERE monthname(orderdate) = months
GROUP BY 1;
END;
//
```

Input



Output



- **With this function you do no need to run query again manually for each month. Just type month name and get result .**

6.Get details of all products stored in a particular warehouse

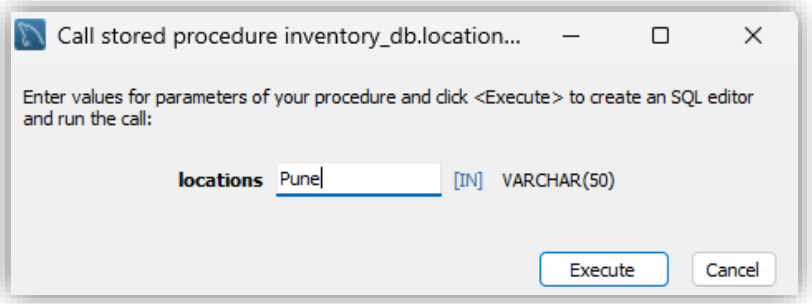
Query

```
delimiter //

CREATE PROCEDURE location_stock (IN locations VARCHAR(50))
BEGIN
SELECT    p.productname,    i.QuantityAvailable,
w.WarehouseName,    w.location
FROM warehouse w    JOIN inventory AS i ON
i.warehouseid = w.Warehouseid    JOIN product AS p ON
i.ProductID = p.ProductID
WHERE w.location = locations;
END;
//
```

With this function you can simply fetch the required result by just typing Location name

Input



Output

productname	QuantityAvailable	WarehouseName	location
Cut Router	413	South Angela Warehouse	Pune
Teach Mouse	365	South Angela Warehouse	Pune
Send Monitor	35	South Angela Warehouse	Pune
Nearly Network Adapter	224	South Angela Warehouse	Pune
Be Network Adapter	169	South Angela Warehouse	Pune
Interest Monitor	124	South Angela Warehouse	Pune
Really Modem	373	South Angela Warehouse	Pune
Medical Printer	4	South Angela Warehouse	Pune
Man Processor	195	South Angela Warehouse	Pune
Red HDD	283	South Angela Warehouse	Pune
Can Router	434	North Kevinchester Ware...	Pune
Ever Router	113	North Kevinchester Ware...	Pune
Fast Network Adapter	181	North Kevinchester Ware...	Pune
Successful Monitor	375	North Kevinchester Ware...	Pune

7.Get the details of product with specific product id

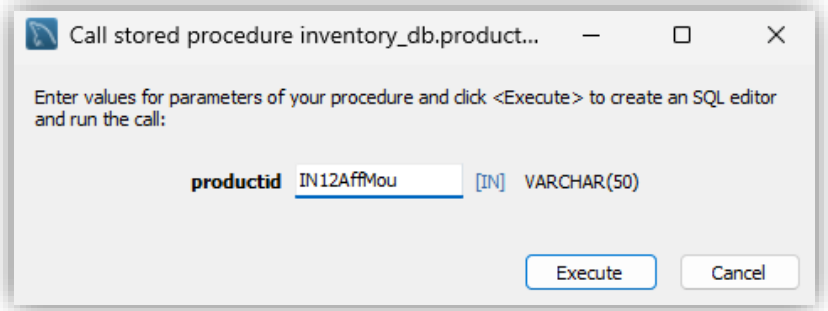
Query

```
delimiter //

CREATE PROCEDURE product_ocation (IN productid VARCHAR(50))
BEGIN
SELECT    p.productname,    i.QuantityAvailable,
w.WarehouseName,    w.location
FROM warehouse w    JOIN inventory AS i ON
i.warehouseid = w.Warehouseid    JOIN product AS p ON
i.ProductID = p.ProductID
WHERE  p.productid = productid;
END;
//
```

With this function you can simply fetch the required result by just giving product id to function

Input



Output

productname	QuantityAvailable	WarehouseName	location
Affect Mouse	40	North Jamesshire Warehouse	Bangalore
Affect Mouse	60	East Jessica Warehouse	Patna
Affect Mouse	26	North Linda Warehouse	switzerland
Affect Mouse	234	Jamesport Warehouse	Dubai
Affect Mouse	3	Russellfurt Warehouse	London
Affect Mouse	16	Kevinfurt Warehouse	Pune
Affect Mouse	352	Lake Jennifer Warehouse	Delhi
Affect Mouse	473	Amandaside Warehouse	Sweden
Affect Mouse	357	West Lindabury Warehouse	New York
Affect Mouse	175	North Angelatown Warehouse	Bangalore

8.Give the reorder alert for the product with shortage

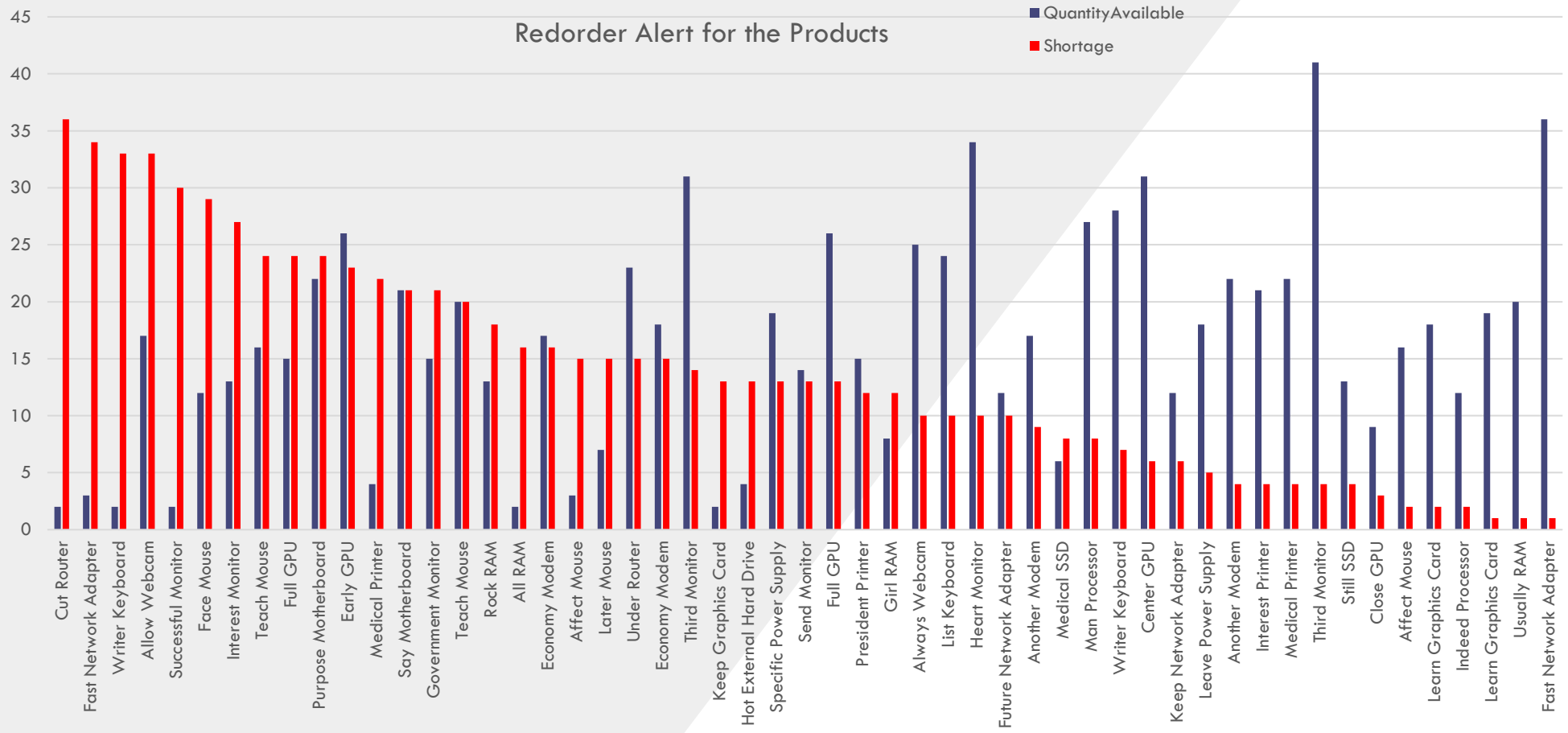
Query

```
SELECT p.productname, p.ReorderLevel,
i.QuantityAvailable, (p.ReorderLevel - i.QuantityAvailable) AS
Shortage
FROM product p JOIN inventory AS i
ON i.ProductID = p.productid
WHERE p.ReorderLevel > i.QuantityAvailable
ORDER BY Shortage DESC;
```

Output

productname	ReorderLevel	QuantityAvailable	Shortage
Cut Router	38	2	36
Fast Network Adapter	37	3	34
Writer Keyboard	35	2	33
Allow Webcam	50	17	33
Successful Monitor	32	2	30
Face Mouse	41	12	29
Interest Monitor	40	13	27
Teach Mouse	40	16	24
Full GPU	39	15	24
Purpose Motherboard	46	22	24
Early GPU	49	26	23
Medical Printer	26	4	22
Say Motherboard	42	21	21
Government Monitor	36	15	21

Reorder alert for the product with shortage



Insights

- Significant number of products are well below their minimum reorder levels, posing an immediate risk of stockouts and lost sale.
- The stark contrast between available stock and reorder levels across the product line indicates that the current reorder strategy may be flawed.
- Management should review and adjust the reorder levels for all products to better align with actual sales velocity and prevent both stockouts and overstocking.

9. Identify high-value customers who may be at risk of churning (no purchase in the last 6 months).

Query

```
WITH CustomerValue_LastOrder AS (
    SELECT    c.CustomerID,    c.CustomerName,
    CONCAT("Rs.",Round(SUM(od.QuantityOrdered *
    od.Price)/100000,2),"Lakhs") AS TotalSpent,
    MAX(od.OrderDate) AS LastOrderDate
    FROM customer c    JOIN order_details od ON
    c.CustomerID = od.CustomerID
    GROUP BY    c.CustomerID,    c.CustomerName
    )

SELECT *FROM CustomerValue_LastOrder
WHERE LastOrderDate < (CURRENT_DATE - INTERVAL 6 MONTH);
```

Output

CustomerID	CustomerName	TotalSpent	LastOrderDate
91Aus	Austin Cantu	Rs.29.89Lakhs	2024-10-05
87Sco	Scott Griffin	Rs.25.78Lakhs	2024-10-10
66Mar	Marcus Armstrong	Rs.22.29Lakhs	2024-09-11
54Sus	Susan Jenkins	Rs.26.98Lakhs	2024-09-18
75Pam	Pamela Walton	Rs.29.81Lakhs	2024-09-17
47Mr.	Mr. Christopher Taylor	Rs.28.32Lakhs	2024-10-13
65And	Andrea Greene	Rs.20.49Lakhs	2024-10-03
65Oli	Olivia Johnson	Rs.31.69Lakhs	2024-10-16
58Dav	David Santana	Rs.31.56Lakhs	2024-10-03
62Kel	Kelly Foley	Rs.22.42Lakhs	2024-10-02
62Bar	Barbara Logan	Rs.20.9Lakhs	2024-09-18
39Pat	Patricia Rocha	Rs.33.68Lakhs	2024-10-17
95Kri	Kristina Clark	Rs.24.52Lakhs	2024-09-10
27Bri	Brian Moore	Rs.25.09Lakhs	2024-10-03
64Ste	Stephanie Leon	Rs.21.14Lakhs	2024-10-15
99Kri	Kristen Hicks	Rs.29.22Lakhs	2024-10-13

Insights

- There are 49 high value customers who didn't placed order in previous 6 month of interval.
- They represent a high-value segment, losing these clients means losing a substantial and previously reliable stream of revenue.
- The fact that all these high-value customers stopped purchasing around the same time (September/October 2024) is a major red flag
- This pattern strongly suggests a specific event uch as a price increase, a change in service, or a new competitor's offering may have driven them away
- they have spent significantly in the past, they are prime candidates for a personalized win-back campaign. Management should task the sales or marketing team with reaching out to them immediately to understand their needs and bring them back.

10. What is the average time between orders for repeat customers?

Query

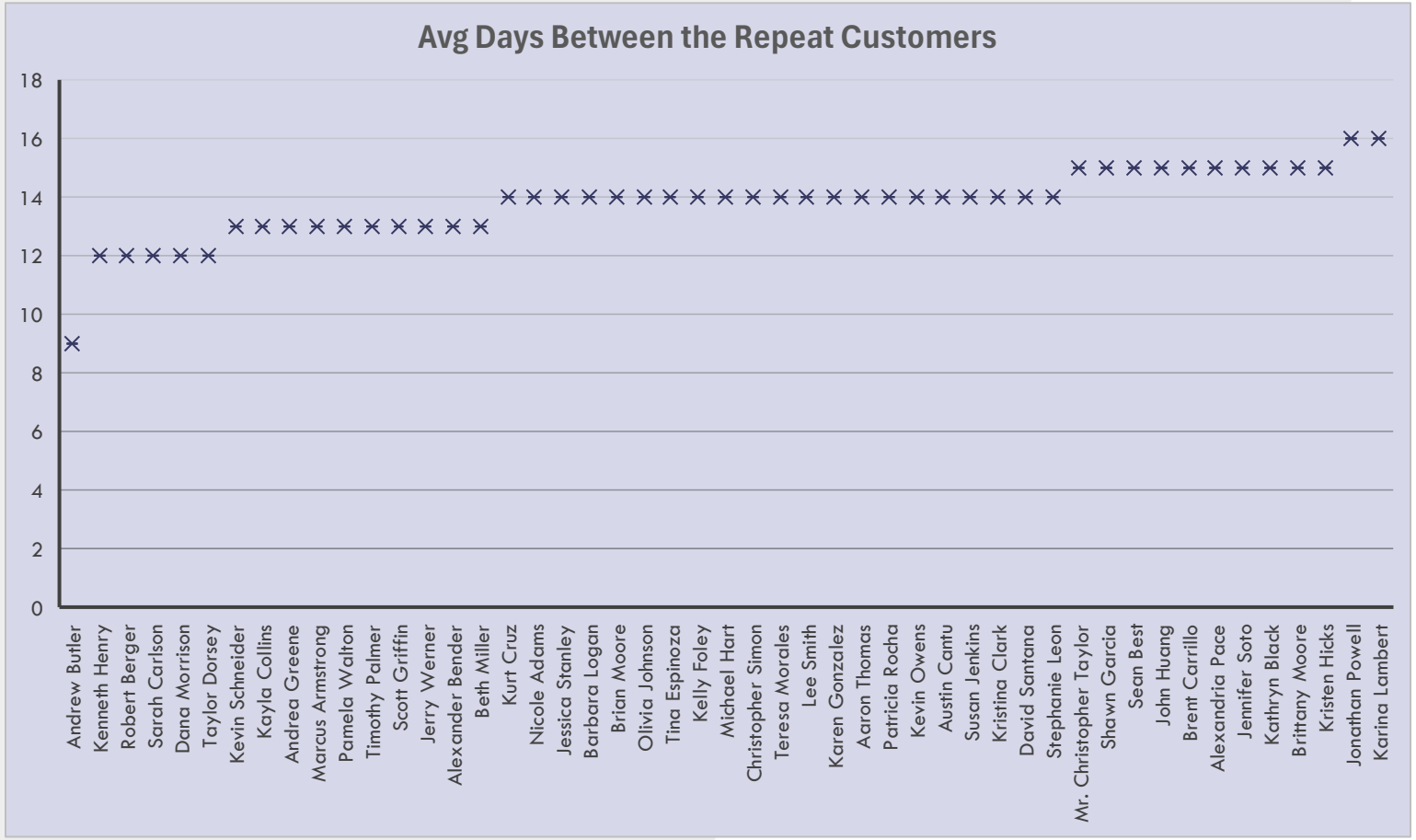
```
WITH OrderedDates AS (
  SELECT  CustomerID,  OrderDate,
  LAG(OrderDate, 1) OVER ( PARTITION BY CustomerID ORDER BY
OrderDate) AS PreviousOrderDate
FROM (SELECT DISTINCT CustomerID, OrderDate
 FROM Order_Details  ) AS sub
)

SELECT  c.CustomerName,  AVG(DATEDIFF(OrderDate,
PreviousOrderDate)) AS AvgDaysBetweenOrders
FROM OrderedDates odJOIN Customer c
ON  od.CustomerID = c.CustomerID
WHERE PreviousOrderDate IS NOT NULL
GROUP BY c.CustomerName
ORDER BY AvgDaysBetweenOrders;
```

Output

CustomerName	AvgDaysBetweenOrders
Andrew Butler	9
Kenneth Henry	12
Robert Berger	12
Sarah Carlson	12
Dana Morrison	12
Taylor Dorsey	12
Kevin Schneider	13
Kayla Collins	13
Andrea Greene	13
Marcus Armstrong	13
Pamela Walton	13
Timothy Palmer	13
Scott Griffin	13

Average time between orders for repeat customers



Insights

- Customers like **Andrew Butle**r, with the shortest time between purchases, are your most loyal and engaged.
- There's a highly frequent group buying every 9–12 days, a regular group purchasing every 13–14 days, and a less frequent segment buying every 15 days or more.
- This segmentation allows for more targeted marketing.
- Management can schedule targeted marketing messages like reminders or special offers to arrive just before a customer's typical repurchase time, increasing the likelihood of another sale.

11. Rank products within each category based on their total sales revenue.

Query

```
SELECT c.CategoryName, p.ProductName,
       CONCAT("Rs.",ROUND(SUM
  (od.QuantityOrdered * od.Price)/100000,2),"lakhs") AS TotalRevenue,
       RANK() OVER (PARTITION BY c.CategoryName
       ORDER BY SUM(od.QuantityOrdered * od.Price) DESC) AS
RankInCategory
FROM Product p JOIN Order_Details od ON
p.ProductID = od.ProductID
JOIN Category c ON p.CategoryID = c.CategoryID
GROUP BY c.CategoryName, p.ProductID, p.ProductName
ORDER BY c.CategoryName, RankInCategory;
```

Output

CategoryName	ProductName	TotalRevenue	RankInCategory
CPU	On CPU	Rs.12.22Lakhs	1
CPU	Reality CPU	Rs.10.12Lakhs	2
CPU	Collection CPU	Rs.10.07Lakhs	3
Disk	Still SSD	Rs.20.24Lakhs	1
Disk	Me External Hard Drive	Rs.15.82Lakhs	2
Disk	All RAM	Rs.15.18Lakhs	3
Disk	Turn SSD	Rs.15.05Lakhs	4
Disk	Rock RAM	Rs.14.57Lakhs	5
Disk	Onto HDD	Rs.14.21Lakhs	6
Disk	Usually RAM	Rs.14.17Lakhs	7
Disk	Meeting External Hard...	Rs.13.83Lakhs	8
Disk	Red HDD	Rs.12.98Lakhs	9
Disk	Girl RAM	Rs.12.92Lakhs	10
Disk	Add SSD	Rs.12.41Lakhs	11

Insights

- By understanding which products are top-sellers and which are underperforming, Management can make smarter decisions about resource allocation. You should increase inventory levels for high-ranking products to avoid stockouts and potentially reduce stock for lower-ranked items.
- This data also helps focus your marketing budget on promoting the products that generate the most revenue.

12. Provide the monthly growth rate

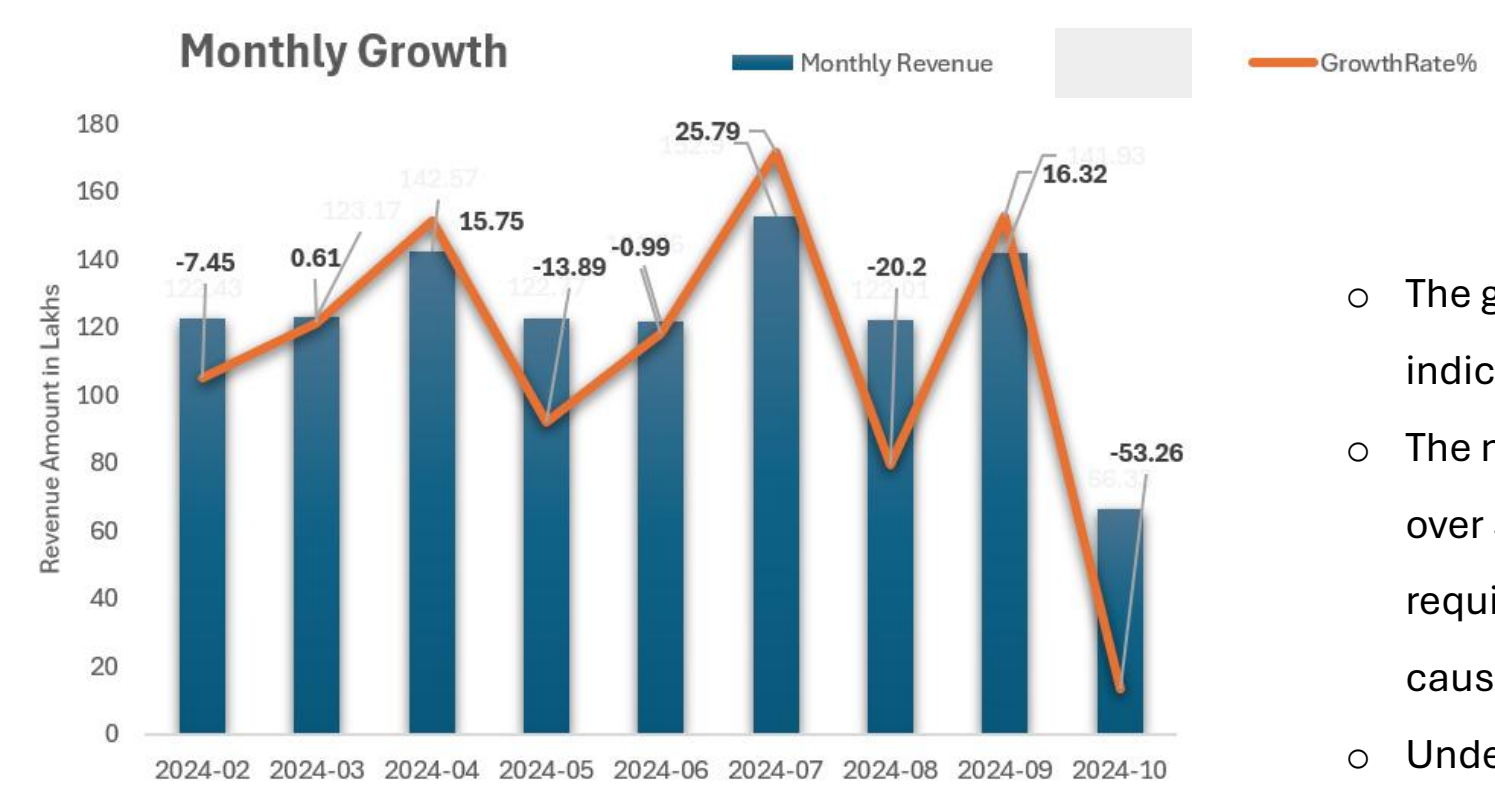
Query

```
SELECT c.CategoryName, p.ProductName,
       CONCAT("Rs.",ROUND(SUM
  (od.QuantityOrdered * od.Price)/100000,2),"lakhs") AS TotalRevenue,
       RANK() OVER (PARTITION BY c.CategoryName
       ORDER BY SUM(od.QuantityOrdered * od.Price) DESC) AS
RankInCategory
FROM Product p JOIN Order_Details od ON
p.ProductID = od.ProductID
JOIN Category c ON p.CategoryID = c.CategoryID
GROUP BY c.CategoryName, p.ProductID, p.ProductName
ORDER BY c.CategoryName, RankInCategory;
```

Output

SalesMonth	MonthlyRevenue	GrowthRatePercent
2024-01	Rs.132.28Lakhs	NULL
2024-02	Rs.122.43Lakhs	-7.45%
2024-03	Rs.123.17Lakhs	0.61%
2024-04	Rs.142.57Lakhs	15.75%
2024-05	Rs.122.77Lakhs	-13.89%
2024-06	Rs.121.56Lakhs	-0.99%
2024-07	Rs.152.9Lakhs	25.79%
2024-08	Rs.122.01Lakhs	-20.2%
2024-09	Rs.141.93Lakhs	16.32%
2024-10	Rs.66.33Lakhs	-53.26%

Monthly Growth Rate



Insights

- The growth rate swings wildly from positive to negative, indicating a lack of stable, sustained growth.
- The most critical insight is the alarming revenue drop of over 53% in October. This is a significant downturn that requires immediate investigation to determine the root cause.
- Understanding and addressing this issue is paramount to prevent further losses and stabilize the business.

13. Give the Customer Life Time Value

Query

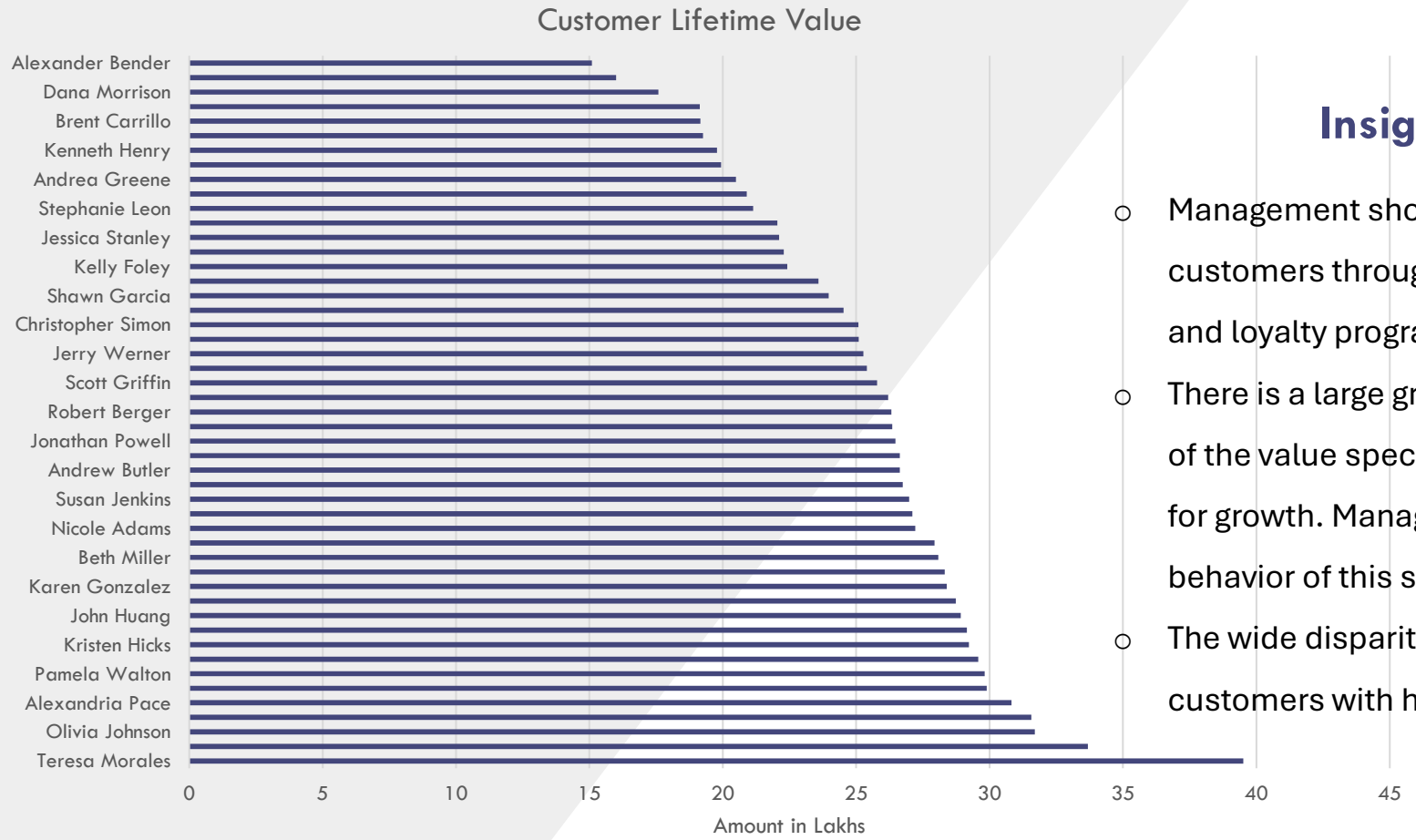
```
WITH CustomerSpending AS (
SELECT c.CustomerID,  c.CustomerName,
ROUND(SUM(od.QuantityOrdered * od.Price)/100000,2) AS TotalRevenue
FROM Customer c JOIN Order_Details od ON c.CustomerID = od.CustomerID
GROUP BY c.CustomerID,  c.CustomerName
)
SELECT  CustomerName,
 CONCAT("Rs.", TotalRevenue, " Lakhs") AS CustomerLifetimeValue
FROM CustomerSpending
ORDER BY TotalRevenue DESC;
```

Output

CustomerName	CustomerLifetimeValu
Teresa Morales	Rs.39.51 Lakhs
Patricia Rocha	Rs.33.68 Lakhs
Olivia Johnson	Rs.31.69 Lakhs
David Santana	Rs.31.56 Lakhs
Alexandria Pace	Rs.30.82 Lakhs
Austin Cantu	Rs.29.89 Lakhs
Pamela Walton	Rs.29.81 Lakhs
Michael Hart	Rs.29.58 Lakhs
Kristen Hicks	Rs.29.22 Lakhs
Kevin Owens	Rs.29.15 Lakhs
John Huang	Rs.28.92 Lakhs
Timothy Palmer	Rs.28.73 Lakhs
Karen Gonzalez	Rs.28.39 Lakhs
Mr. Christophe...	Rs.28.32 Lakhs
Beth Miller	Rs.28.08 Lakhs
Sean Best	Rs.27.94 Lakhs
Nicole Adams	Rs.27.21 Lakhs
Jennifer Soto	Rs.27.1 Lakhs
Susan Jenkins	Rs.26.98 Lakhs

14. Give the Customer Life Time Value

Query



Insights

- Management should focus resources on retaining these top-tier customers through personalized marketing, exclusive offers, and loyalty programs to protect a major source of revenue.
- There is a large group of customers in the middle and lower end of the value spectrum. This represents a significant opportunity for growth. Management should analyze the purchasing behavior of this segment to develop targeted strategies
- The wide disparity in CLV highlights the need to attract more customers with high-value potential.