

# Inventory Controlling Database System

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01

# Intro and Objectives



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# Importance and Goals

An inventory management system for an e-commerce company with multiple warehouses

Develop

Develop a multi  
warehouse inventory  
management system

Reduce

Reduces costs  
and streamlines  
operations

Enhance

Enhance user  
experience and  
data-driven decision  
making

# Expected Outcomes


 Operational Efficiency



Supplier management

Capacity checks

Inventory updates

 Cost Reduction



Average cost calculation

Low stock alerts

 Data-Driven Decisions



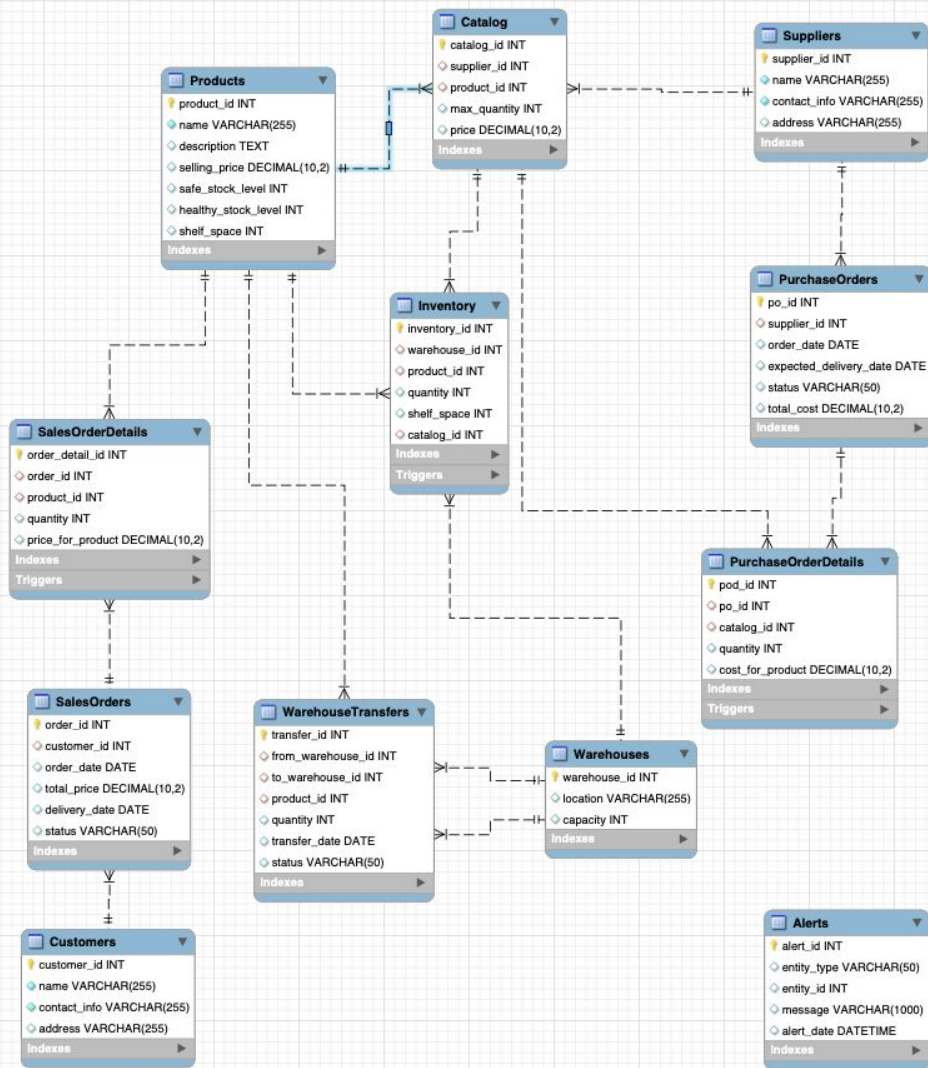
Inventory queries

Warehouse analytics

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# 02

## Database Design



# Design Around Inventory

## Products:

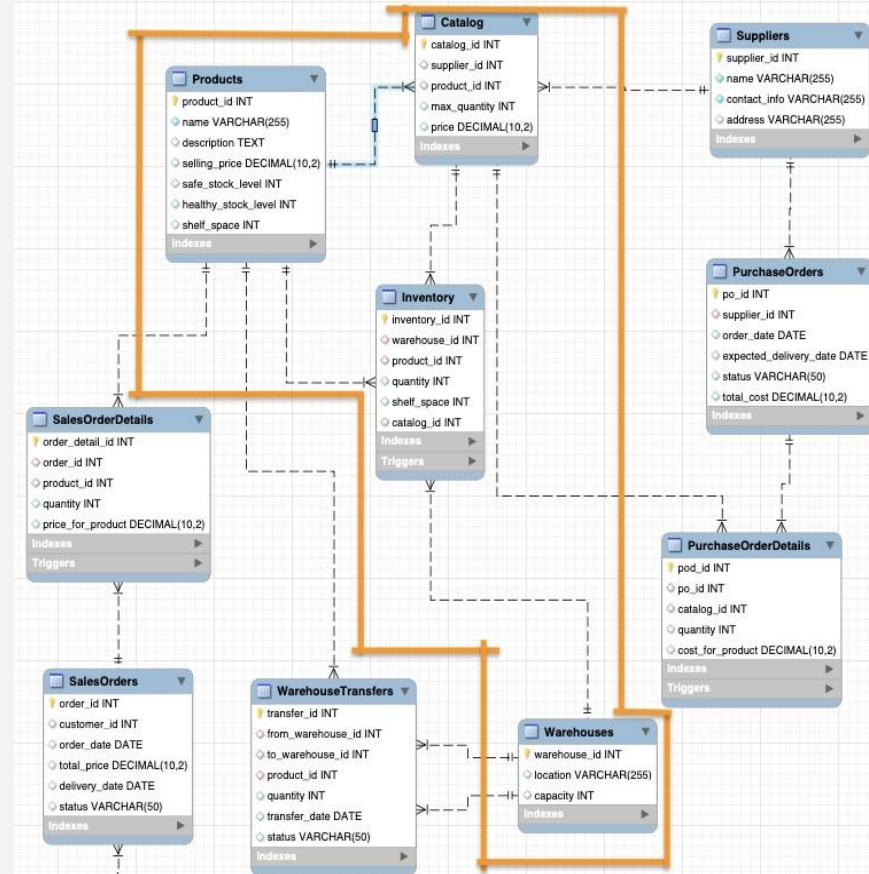
- To store detailed information about each product.
- Includes safety stock level, healthy stock level, shelf space and selling price (SO)

## Inventory (Linked Table):

- To track the quantity of each product available in each warehouse and the shelf space taken.
- According to the Products, Catalog ID and Warehouse ID.

## Warehouses:

- To store detailed information about each warehouse.
- Include Capacity which being useful to check if warehouse is full according the each product's shelf space.



# Design Around Supplier and PO

## Catalog (Linked Table):

- An intermediary that links products to suppliers and provides additional details.
- A supplier may carry multiple products.
- Find the price of a Product according to Supplier ID and also the production limitation for the supplier.

## Suppliers:

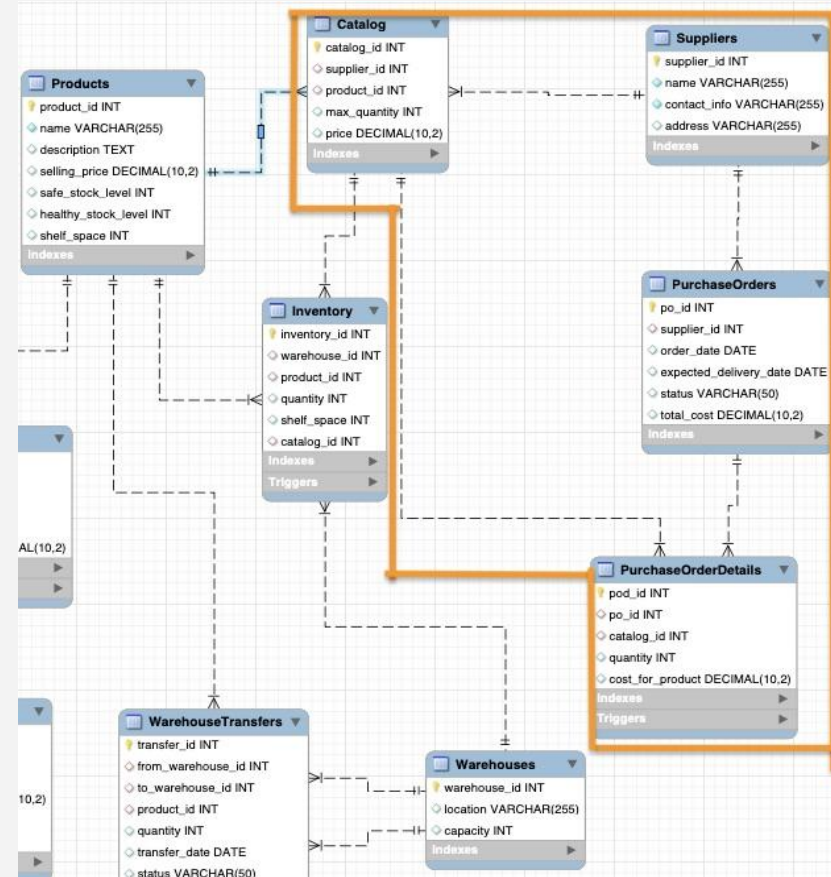
- To store detailed information about each supplier.

## Purchase Orders:

- The Order being placed to Suppliers.
- The PO also include a Total Cost for the Order.

## PurchaseOrderDetails (Linked Table):

- The details including quantity, and cost of product according to the Catalog.





# Design Around Customers and SO

## Customers

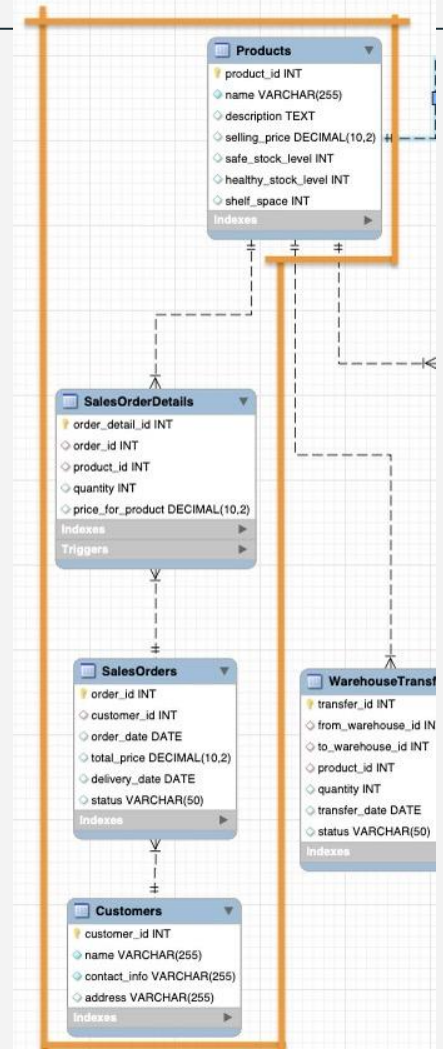
- Store detailed information about each customer.

## SalesOrders

- Represent orders placed by customers for purchasing products.

## SalesOrderDetails (Linked Table):

- Provide detailed information about the products included in each sales order.
- Include Product ID



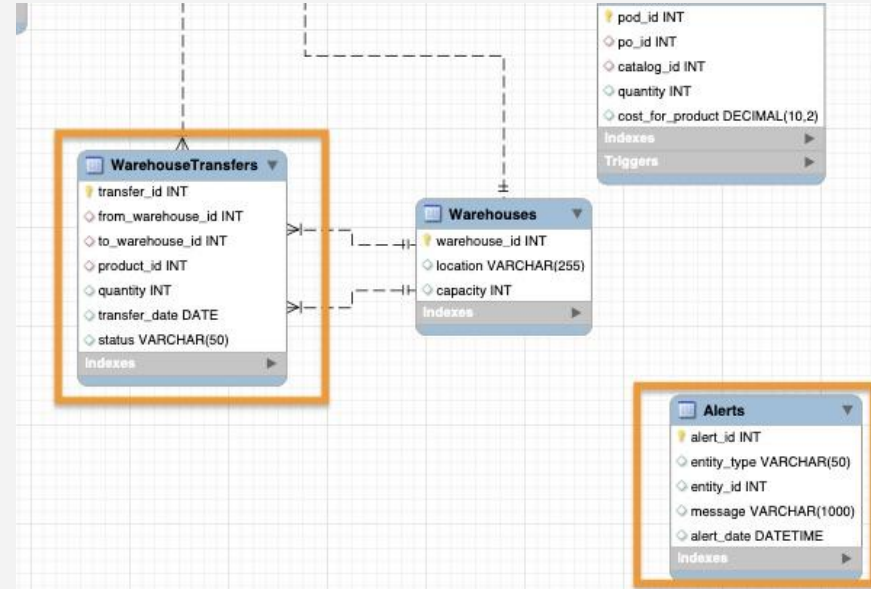
# Other Designs

## Warehouse Transfers:

- Track the transfer of products between different warehouses.
- Aimed to solve inter warehouse inventory transferring

## Alerts:

- Store alert messages related to various entities in the system for monitoring and notification purposes.
- Practical functionality and Important once alert is dismissed, there is a place to check all alerts.
- What type of alerts, What's the detailed message, what's the alert date...

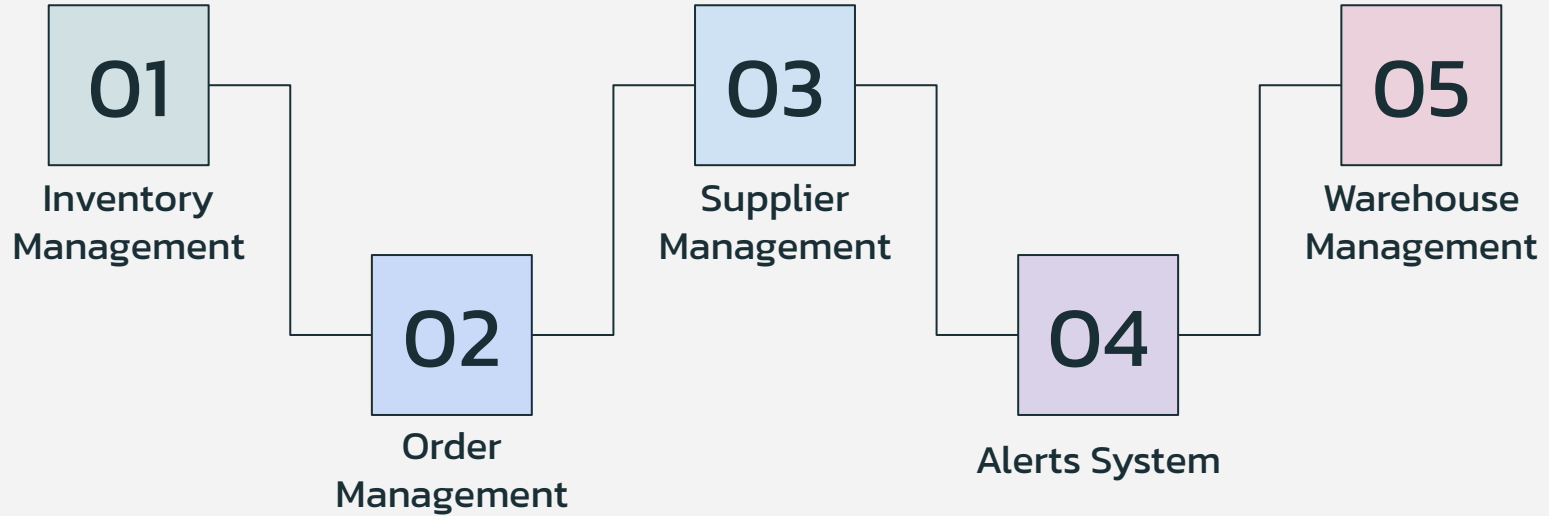


03

# Functionality and User Cases



# Functionalities



# Functionalities

## ■ ***Find the Cheapest Supplier***

- *Identify the supplier offering the lowest price for a specific product to ensure cost-effective procurement, leading to significant savings.*

## ■ ***Check Warehouse Capacity***

- *Assess the capacity of warehouses before creating purchase orders to prevent overstocking and optimize space utilization across warehouse.*

## ■ ***Calculate Average Price per Product***

- *Determine the average purchase price for each product based on past procurement, providing accurate cost data for financial analysis and pricing strategies.*

## ■ ***Get Product Inventory Details***

- *Retrieve detailed information about product quantities, suppliers, and prices in the current inventory to maintain accurate and up-to-date records.*
-

# Functionalities

## ■ **Monitor Stock Levels and Generates Alerts**

- *Continuously check stock levels and generate alerts if they fall below safe levels, ensuring timely restocking and avoiding stockouts.*

## ■ **Process Sales Orders and Update Inventory**

- *Handle sales orders and update inventory accordingly to ensure smooth order fulfillment and maintain accurate inventory records.*

## ■ **Monthly Inventory Changes Report**

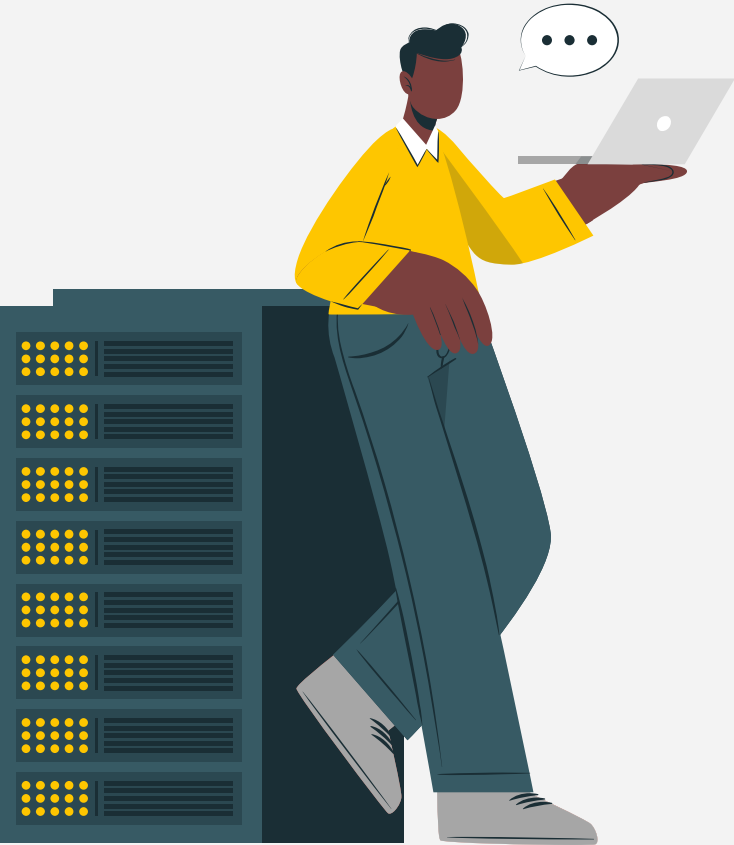
- *Report monthly inventory changes by warehouse to track stock movements and make informed decisions on inventory management.*

## ■ **Identify Frequently Transferred Products**

- *Identify the most frequently transferred products between warehouses to optimize transfer processes and improve efficiency.*
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# User Cases – Purchasing Manager Sam



- *Another way to operate ! ! !*

# User Cases – Purchasing Manager Sam

Product Management



Product List

Inventory List

Inventory remaining  
01067

Products on sale  
18

Warehouse quantity  
6

Total inventory value  
161000

Low  
inventory products

Product ID

Quantity

Product ID

Quantity

Client ID

Buy

Sell



# User Cases – Purchasing Manager Sam

Product List

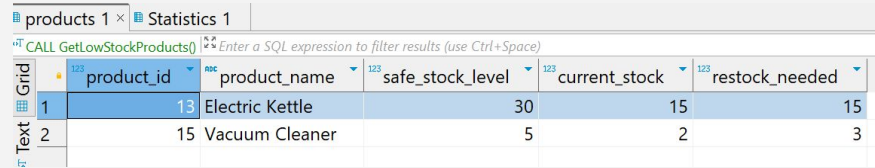
ID	Name	Description	Market Price	afe Stock	l. althy Stock	Shelf Space
1 1	Laptop	A high-performance laptop with 16GB RAM and 512GB SSD.	1200.00	10	50	3
2 2	Smartphone	Latest model smartphone with 8GB RAM and 128GB storage.	800.00	20	100	1
3 3	Washing Machine	Energy-efficient washing machine with 7kg load capacity.	500.00	5	25	8
4 4	Refrigerator	Double-door refrigerator with 350L capacity and inverter technology.	1000.00	3	15	12
5 5	Microwave Oven	Compact microwave oven with 800W power and multiple presets.	150.00	15	75	2
6 6	Television	55-inch 4K UHD Smart TV with HDR and voice control.	700.00	7	35	10
7 7	Tablet	10-inch tablet with 4GB RAM and 64GB storage.	300.00	12	60	1
8 8	Smartwatch	Fitness smartwatch with heart rate monitor and GPS.	200.00	25	125	1
9 9	Digital Camera	Mirrorless camera with 24.2MP sensor and 4K video recording.	1500.00	4	20	3
10 10	Headphones	Wireless noise-cancelling headphones with 30-hour battery life.	250.00	18	90	1
11 11	Bluetooth Speaker	Portable Bluetooth speaker with deep bass and 12-hour playtime.	100.00	20	100	1
12 12	Smart Home Hub	Voice-controlled smart home hub with compatibility with major smart ...	130.00	10	50	1
13 13	Electric Kettle	1.7L electric kettle with auto shut-off and boil-dry protection.	40.00	30	150	2
14 14	Air Fryer	Digital air fryer with 3.7 quart capacity and multiple presets.	120.00	8	40	4
15 15	Vacuum Cleaner	Cordless vacuum cleaner with powerful suction and long battery ...	350.00	5	25	5
16 16	Coffee Maker	Programmable coffee maker with 12-cup capacity and built-in grinder.	80.00	10	50	3
17 17	Gaming Console	Next-gen gaming console with 1TB storage and 4K support.	500.00	6	30	3
18 18	Electric Scooter	Foldable electric scooter with 15-mile range and 15mph top speed.	300.00	4	20	7
19 19	Smart Door Lock	Keyless entry smart door lock with fingerprint and keypad access.	180.00	10	50	1
20 20	Robot Vacuum	Automatic robot vacuum with app control and self-charging.	250.00	5	25	4
21 21	Air Purifier	HEPA air purifier with 3-stage filtration for large rooms.	200.00	8	40	5
22 22	Instant Pot	7-in-1 electric pressure cooker with 6-quart capacity.	100.00	12	60	3
23 23	Security Camera	Wireless security camera with motion detection and cloud storage.	90.00	20	100	1
24 24	Electric Toothbrush	Rechargeable electric toothbrush with multiple brush heads.	70.00	15	75	1
25 25	Hair Dryer	Ionic hair dryer with multiple heat and speed settings.	60.00	18	90	2
26 26	Smart Light Bulb	Color-changing smart LED bulb with app and voice control.	25.00	25	125	1
27 27	Fitness Tracker	Activity tracker with heart rate monitor and sleep tracking.	50.00	30	150	1
28 28	Portable Charger	10000mAh portable charger with dual USB ports.	30.00	40	200	1
29 29	Electric Shaver	Rechargeable electric shaver with pop-up trimmer and wet/dry use.	80.00	10	50	1
30 30	Wireless Mouse	Ergonomic wireless mouse with adjustable DPI.	25.00	20	100	1
31 31	Keyboard	Mechanical keyboard with customizable RGB lighting.	90.00	10	50	1

Stock List

Product ID	Product Name	Warehouse ID	Quantity	Shelf Space	Catalog ID	Price
1 1	Laptop	1	5	15	1	1150.00
2 1	Laptop	4	45	135	2	1200.00
3 1	Laptop	5	60	180	3	1250.00
4 1	Laptop	2	15	45	2	1200.00
5 1	Laptop	3	30	90	3	1250.00
6 2	Smartphone	1	10	10	4	750.00
7 2	Smartphone	5	80	80	6	850.00
8 2	Smartphone	4	60	60	5	800.00
9 2	Smartphone	2	25	25	5	800.00
10 2	Smartphone	3	40	40	6	850.00
11 3	Washing Machine	1	2	16	7	450.00
12 3	Washing Machine	3	15	120	9	550.00
13 3	Washing Machine	4	22	176	8	500.00
14 3	Washing Machine	2	8	64	8	500.00
15 3	Washing Machine	5	30	240	9	550.00
16 4	Refrigerator	1	1	12	10	950.00
17 4	Refrigerator	4	15	180	11	1000.00
18 4	Refrigerator	5	20	240	12	1050.00
19 4	Refrigerator	2	4	48	11	1000.00
20 4	Refrigerator	3	10	120	12	1050.00
21 5	Microwave Oven	1	8	16	13	140.00
22 5	Microwave Oven	3	40	80	15	160.00
23 5	Microwave Oven	5	70	140	15	160.00
24 5	Microwave Oven	4	55	110	14	150.00
25 5	Microwave Oven	2	20	40	14	150.00
26 6	Television	1	3	30	16	650.00
27 6	Television	2	10	100	17	700.00
28 6	Television	5	40	400	18	750.00
29 6	Television	4	30	300	17	700.00
30 6	Television	3	20	200	18	750.00
31 7	Tablet	1	10	10	19	280.00

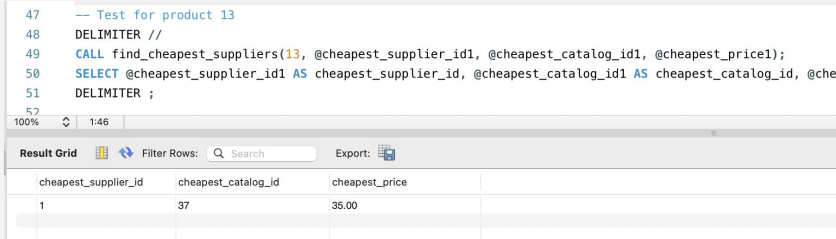
# User Cases – Inventory Manager Anna

**Action 1:** Runs SQL queries to check which products are below the safe stock level.



	product_id	product_name	safe_stock_level	current_stock	restock_needed
1	13	Electric Kettle	30	15	15
2	15	Vacuum Cleaner	5	2	3

**Action 2:** System triggers an alert for products below safe stock. Runs a query for finding a best supplier.



```
47 -- Test for product 13
48 DELIMITER //
49 CALL find_cheapest_suppliers(13, @cheapest_supplier_id1, @cheapest_catalog_id1, @cheapest_price1);
50 SELECT @cheapest_supplier_id1 AS cheapest_supplier_id, @cheapest_catalog_id1 AS cheapest_catalog_id, @cheapest_price1 AS cheapest_price;
51 DELIMITER ;
```

cheapest_supplier_id	cheapest_catalog_id	cheapest_price
1	37	35.00



# User Cases – Inventory Manager Anna

**Action 3:** Uses SQL queries to create a purchase order.

- If quantity exceeds supply limit, only available quantity is purchased.
- Checks warehouse capacity, splits PO if needed, triggers alert if space insufficient.

```
234
235      -- Test 2: Insufficient inventory
236 • CALL create_purchase_order(1, 100000);
237      -- Expected result: PO creation failed, alert logged for insufficient inventory
238
239      -- Test 3: Partial inventory allocation
240 •
```

100% 42/236

Result Grid Filter Rows: Search Export:

result
Warning: Not enough warehouse capacity for the entire order of 100000 units of product ID 1. PO rejected. Unallocated quantity: 98252

**Action 4:** Updates inventory information in the system upon arrival of new inventory.

**System Response:** Automatically calculates average price of new inventory and updates stock data.




04

## Summary and Future Outlook



# Future Outlook – Purchasing

Product Management



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Inventory List

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01067

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18

Warehouse quantity  
6

Total inventory value  
161000

Product ID

Product ID

Quantity

Buy

Quantity

Sell

Client ID

Refresh

Boss Key

Catalog Management

Order Management

Most frequently transferred products

Monthly inventory changes

Low inventory products

More??

More??

More??

More??

More??

# Competitor comparison table

Product List						
ID	Name	Description	Market Price	Safe Stock	Healthy Stock	Shelf Space
1	Laptop	A high-performance laptop with 16GB RAM and 512GB SSD.	1200.00	10	50	3
2	Smartphone	Latest model smartphone with 8GB RAM and 128GB storage.	800.00	20	100	1
3	Washing Machine	Energy-efficient washing machine with 7kg load capacity.	500.00	5	25	8
4	Refrigerator	Double-door refrigerator with 350L capacity and inverter technology.	1000.00	3	15	12
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6	Television	55-inch 4K UHD Smart TV with HDR and voice control.	700.00	7	35	10
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20	Robot Vacuum	Automatic robot vacuum with app control and self-charging.	250.00	5	25	4
21	Air Purifier	HEPA air purifier with 3-stage filtration for large rooms.	200.00	8	40	5
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30	Wireless Mouse	Ergonomic wireless mouse with adjustable DPI.	25.00	20	100	1
31	Keyboard	Mechanical keyboard with customizable RGB lighting.	90.00	10	50	1

Catalog List							
	ID	Product Name	Description	Supplier Name	Max Quantity	Selling Price	
1	1	Laptop	A high-performance laptop with 16GB RAM and 512GB SSD.	Supplier A	30	1150.00	
2	2	Laptop	A high-performance laptop with 16GB RAM and 512GB SSD.	Supplier B	50	1200.00	
3	3	Laptop	A high-performance laptop with 16GB RAM and 512GB SSD.	Supplier C	70	1250.00	
4	4	Smartphone	Latest model smartphone with 8GB RAM and 128GB storage.	Supplier D	40	750.00	
5	5	Smartphone	Latest model smartphone with 8GB RAM and 128GB storage.	Supplier E	60	800.00	
6	6	Smartphone	Latest model smartphone with 8GB RAM and 128GB storage.	Supplier F	80	850.00	
7	7	Washing Machine	Energy-efficient washing machine with 7kg load capacity.	Supplier A	20	450.00	
8	8	Washing Machine	Energy-efficient washing machine with 7kg load capacity.	Supplier B	40	500.00	
9	9	Washing Machine	Energy-efficient washing machine with 7kg load capacity.	Supplier C	60	550.00	
10	10	Refrigerator	Double-door refrigerator with 350L capacity and inverter technology.	Supplier D	10	950.00	
11	11	Refrigerator	Double-door refrigerator with 350L capacity and inverter technology.	Supplier E	20	1000.00	
12	12	Refrigerator	Double-door refrigerator with 350L capacity and inverter technology.	Supplier F	30	1050.00	
13	13	Microwave Oven	Compact microwave oven with 800W power and multiple presets.	Supplier A	30	140.00	
14	14	Microwave Oven	Compact microwave oven with 800W power and multiple presets.	Supplier B	60	150.00	
15	15	Microwave Oven	Compact microwave oven with 800W power and multiple presets.	Supplier C	90	160.00	

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# Summary

## **Comprehensive Design**

- Major Accomplishments: Modular Design, Data Integrity, Real-world scenarios, Frontend Development
- Limitations: Data Simulation, Performance Optimization, Scalability

## **Future Outlook**

- Enhancements: Continue improving the database and client application.
- Real-world Application: Aim to achieve practical significance.
- User Feedback: Collect and implement feedback to refine the system.

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