

# Supply Chain Management System

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## Project Description:

Supply chain database management system aims to streamline and optimize the flow of information and raw materials between suppliers, manufacturers, wholesalers, and retailers to consumers. It focuses on effectively managing and coordinating critical parts in the chain of operations including planning, sourcing, manufacturing, delivering, and returns. With the help of it, businesses can have more control over costs and production time while still be able to maintain high-quality products and reduce wastes. Because supply chain database management system is not industry specific, a wide range of industries like manufacturing, retail and E-commerce, logistics and transportation, pharmaceutical and healthcare, etc. that involves in supply chain operations can greatly benefit from the database. In essence, the system helps companies make accurate production plans from demand planning and forecasting which helps optimizing inventory levels and minimizing stockouts or excess inventory. On the supplier side, the system helps facilitate effective supplier management by maintaining supplier information, managing contracts, tracking supplier performance, and streamlining order purchases. This ensures that the whole process is reliable and efficient time management. In addition, the system supports order management where it keeps track of order processing, tracking, and fulfillment by maintaining customer information, managing inventory levels leading companies meet customer demands, reduce order lead time, and enhance customer satisfaction. Overall, the supply chain database management system helps companies overcome various challenges, such as inefficient inventory management, poor demand forecasting, supplier reliability issues, order fulfillment delays. It provides end-to-end visibility, collaboration, and control over the supply chain. Two current systems that can benefit from this database are the Blue Ridge software company where their focus of the database system is on pricing and planning optimization but lack in the emphasis on

the quick turnover of products with a short life cycle and Descartes Systems Group where they focus on logistics and collaboration across the supply chain but weak in efficient management.

## Functional Database Requirements:

### 1. Supplier

- 1.1 A supplier shall supply many types of materials at a time.
- 1.2 A supplier shall have many contacts.
- 1.3 A supplier shall have many contracts with the company.
- 1.4 A supplier shall have many purchase orders with company.
- 1.5 A supplier shall provide delivery information for each purchase order.
- 1.6 A supplier shall be a manufacturer.

### 2. Material:

- 2.1 A material shall be provided by multiple suppliers.
- 2.2 A material shall be used by multiple products.
- 2.3 A material shall be stored in multiple inventories.
- 2.4 A material shall have many product categories.

### 3. Product

- 3.1 A product shall be created by multiple materials.
- 3.2 A product shall be created for multiple product orders.
- 3.3 A product shall be stored in multiple inventories.
- 3.4 A product shall be undergone multiple inspections.
- 3.5 A product shall have one product category.

#### 4. Customer

- 4.1 A customer shall buy multiple products.
- 4.2 A customer shall have at least one contact information
- 4.3 A customer shall be a supplier.
- 4.4 A customer shall have many contacts.
- 4.5 A customer shall have many payments.
- 4.6 A customer shall have many invoices.

#### 5. Inventory

- 5.1 An inventory shall store multiple materials.
- 5.2 An inventory shall store multiple products.
- 5.3 An inventory shall be stored in one warehouse.

#### 6. Warehouse

- 6.1 A warehouse shall have many inventories.
- 6.2 A warehouse shall have many deliveries.

#### 7. Product category

- 7.1 A product category shall have many products.
- 7.2 A product category shall have many materials.

#### 8. Supply order

- 8.1 A supply order can come from many suppliers.
- 8.2 A supply order can include at least one material.
- 8.3 A supply order shall need one payment.

#### 9. Sale order

- 9.1 A sale order shall be made by one customer.

9.2 A sale order shall include at least one product.

9.3 A sale order shall need one invoice.

9.4 A sale order shall have a delivery.

## 10. Payment

10.1 A payment shall be associated with one sale order.

10.2 A payment shall be associated with one supply order.

10.3 A payment shall be made to one supplier.

10.4 A payment shall be received from one customer.

10.5 A payment shall be associated with one invoice.

## 11. Invoice

11.1 An invoice shall be associated with one sale order.

11.2 An invoice shall be associated with one supply order.

11.3 An invoice shall be associated with many payments.

11.4 An invoice shall be associated with one delivery.

11.5 An invoice shall be associated with one customer.

## 12. Delivery

12.1 A delivery can have many products.

12.2 A deliver can be made to one customer.

12.3 A deliver can come from one warehouse.

12.4 A deliver can be associated with one sale order.

## 13. Pricing

13.1 A price can be associated with one product.

13.2 A price can be associated with many customers.

13.3 A price can be associated with many sale orders.

13.4 A price can have many discounts.

13.5 A price can be expressed in many currencies.

## Non-functional Database Requirements:

### 1. Performance

1.1 The database system shall support concurrent transactions.

### 2. Storage

2.1 The database system shall assign 10 MB of memory per table.

2.2 The database system shall support persistent storage.

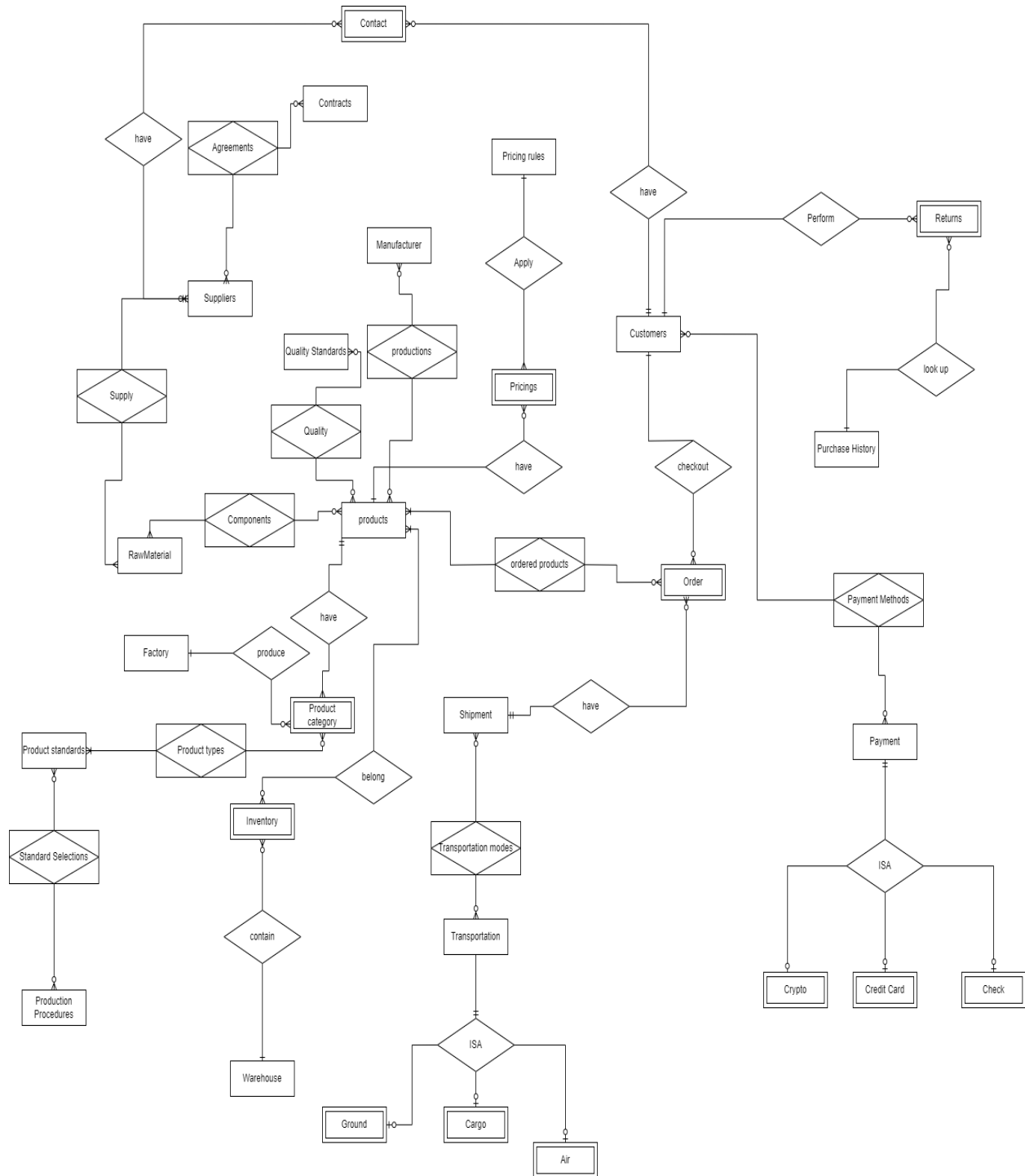
### 3. Compatibility

3.1 The database system shall be compatible with MySQL 8.0.33

### 4. Compliance

4.1 The database system shall comply with relevant industry standards.

## Entity Relationship Diagram(ERD):







## Entity Description:

1. Supplier (strong):
  - Supplier\_id: key, numeric
  - Name: composite, alphanumeric
  - Certification: multivalued, alphanumeric
2. Contact (weak):
  - Id: key, numeric
  - Supplier: key, numeric
  - Customer: key, numeric
3. Contract (strong):
  - Contract\_id: key, numeric
  - Start\_date: composite, alphanumeric
  - end\_date: composite, alphanumeric
4. Agreement (weak):
  - Agreement\_id: key, numeric
  - Contract: key, numeric
  - Supplier: key, numeric
5. Manufacturer (strong):
  - Manufacturer\_id: key, numeric
  - Name: composite, alphanumeric
  - Production\_capability: key, numeric
6. Productions (weak):

- Production\_id: key, numeric
- Manufacturer: key, numeric
- Product: key, numeric

7. Product (strong):

- Product\_id: key, numeric
- Name: composite, alphanumeric
- Description: composite, alphanumeric

8. Quality Standards (strong):

- Quality\_standard\_id: key, numeric
- Criteria:
- Description: composite, alphanumeric

9. Quality (weak):

- Quality\_id: key, numeric
- Quality\_standard: key, numeric
- Product: key, numeric

10. Raw materials (strong):

- Material\_id: key, numeric
- Description: composite, alphanumeric
- Specification: multivalue, alphanumeric

11. Components (weak):

- Component\_id: key, numeric
- Rawmaterial : key, numeric
- Product: key, numeric

## 12. Pricing Rules (strong):

- Rules\_id: key, numeric
- Pricing\_tier: key, numeric
- Description: composite, alphanumeric

## 13. Pricings (weak):

- Pricing\_id: key, numeric
- Pricing\_rule: key, numeric
- Product: key, numeric

## 14. Factory (strong):

- Factory\_id: key, numeric
- Name: composite, alphanumeric
- Location: multivalue, alphanumeric

## 15. Product Category (weak):

- Product\_category\_id: key, numeric
- Factory: key, numeric
- Product: key, numeric

## 16. Product Types (weak):

- Product\_type\_id: key, numeric
- Product\_standard: key, numeric
- Product\_category: key, numeric

## 17. Product Standards (strong):

- Product\_standards\_id: key, numeric
- Description: composite, alphanumeric

- Certification: multivalue, alphanumeric

18. Standard Selections (weak):

- Standard\_selection\_id: key, numeric
- Product\_standard: key, numeric
- Production\_procedure: key, numeric

19. Production procedures (strong):

- Procedure\_id: key, numeric
- Description: composite, alphanumeric
- Instructions: multivalue, alphanumeric

20. Inventory (weak):

- Inventory\_id : key, numeric
- Warehouse: key, numeric
- Product: key, numeric

21. Warehouse (strong) :

- Warehouse\_id: key, numeric
- Location: multivalue, alphanumeric
- Capacity: key, numeric

22. Transportation (strong):

- Transportation\_id: key, numeric
- Carrier\_info: composite, alphanumeric
- Types: key, numeric

23. Transportation modes (weak):

- Transportation\_mode\_id: key, numeric

- Transportation: key, numeric
- Shipment: key, numeric

24. Shipment (strong):

- Shipment\_id: key, numeric
- Tracking\_number: key, alphanumeric
- Delivery\_status: key, numeric

25. Orders (weak):

- Order\_id: key, numeric
- Customer: key, numeric
- Order\_status: key, numeric

26. Ordered Products (weak):

- Ordered\_product\_id: key, numeric
- Product: key, numeric
- Order: key, numeric

27. Customers (strong):

- Customer\_id: key, numeric
- Name: composite, alphanumeric
- Dob: multivalue, timestamp

28. Returns (weak):

Return\_id: key, numeric

Customer: key, numeric

Purchase\_history: key, numeric

29. Purchase History (strong):

- Purchase\_history\_id: key, numeric
- Purchase\_date: multivalue, timestamp
- Order\_detail: composite, alphanumeric

30. Payment Methods (weak):

- Payment\_method\_id: key, numeric
- Customer: key, numeric
- Payment: key, numeric

31. Payment (strong):

- Payment\_id: key, numeric
- Payment\_date: multivalue, timestamp
- Payment\_status: key, numeric