Set of FDs :

1. Product(Product_ID, Product_name, Mfg_date, Price, Exp_date)

Primary Key: `Product_ID`
FDs:

- `Product_ID → Product_name`
- `Product_ID → Mfg_date`
- `Product_ID → Price`
- `Product_ID → Exp_date`

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2. Retailer(Retailer_ID, Retailer_name, Area, Retailer_Contact_info)

Primary Key: `Retailer_ID`
FDs:

- `Retailer_ID → Retailer_name`
- `Retailer_ID → Area`
- `Retailer_ID → Retailer_Contact_info`

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3. Retailer_Payment(Retailer_Pay_ID, Received_amount, Method, Pay_date)

Primary Key: `Retailer_Pay_ID`
FDs:

- `Retailer_Pay_ID → Received_amount`
- `Retailer_Pay_ID → Method`
- `Retailer_Pay_ID → Pay_date`

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4. Retail_Orders(Retail_order_ID, Retailer_ID, Retail_Order_date, Retailer_Pay_ID)

Primary Key: `Retailer_order_ID`
FDs:

- `Retail_order_ID → Retailer_ID`
- `Retail_order_ID → Retail_Order_date`
- `Retail_order_ID → Retailer_Pay_ID`

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5. Retail_Order_Details(Retail_order_ID, Product_ID, Quantity_Ordered, Selling_Price)

Primary Key: `(Retail_order_ID, Product_ID)`
FDs:

- `(Retail_order_ID, Product_ID) → Quantity_Ordered`
- `(Retail_order_ID, Product_ID) → Selling_Price`

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6. Inventory(Inventory_ID, Product_ID, Quantity_data)

Primary Key: `Inventory_ID`
FDs:

- `Inventory_ID → Product_ID`
- `Inventory_ID → Quantity_data`

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7. Made_Of(Product_ID, Material_ID, Category)

Primary Key: `(Product_ID, Material_ID)`
FDs:

- `(Product_ID, Material_ID) → Category`

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8. Material(Material_ID, Supplier_ID, Material_name)

Primary Key: `Material_ID`
FDs:

- `Material_ID → Supplier_ID`
- `Material_ID → Material_name`

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9. Supplier(Supplier_ID, Supplier_name, Supplier_contact)

Primary Key: `Supplier_ID`
FDs:

- `Supplier_ID → Supplier_name`
- `Supplier_ID → Supplier_contact`

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10. Supplier_Payment(Supplier_Pay_ID, Paid_amount, Paid_date)

Primary Key: `Supplier_Pay_ID`
FDs:

- `Supplier_Pay_ID → Paid_amount`
- `Supplier_Pay_ID → Paid_date`

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11. Supply_Order(Supply_order_ID, Supplier_ID, Supply_order_date, Supplier_Pay_ID)

Primary Key: `Supplier_order_ID`
FDs:

- `Supply_order_ID → Supplier_ID`
- `Supply_order_ID → Supply_order_date`

- Supply_order_ID → Supplier_Pay_ID

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12. Supply_Order_Detail(Supplier_order_ID, Material_ID, Quantity, Cost_price)

Primary Key: (Supply_order_ID, Material_ID)
FDs:

- (Supply_order_ID, Material_ID) → Quantity
- (Supply_order_ID, Material_ID) → Cost_price

Minimal FD set :

Product_ID → Product_name
Product_ID → Mfg_date
Product_ID → Price
Product_ID → Exp_date

Retailer_ID → Retailer_name
Retailer_ID → Area
Retailer_ID → Retailer_Contact_info

Retailer_Pay_ID → Received_amount
Retailer_Pay_ID → Method
Retailer_Pay_ID → Pay_date

Retailer_order_ID → Retailer_ID
Retailer_order_ID → Retailer_Order_date
Retailer_order_ID → Retailer_Pay_ID

(Retailer_order_ID, Product_ID) → Quantity_Ordered
(Retailer_order_ID, Product_ID) → Selling_Price

Inventory_ID → Product_ID
Inventory_ID → Quantity_data

(Product_ID, Material_ID) → Category

Material_ID → Supplier_ID
Material_ID → Material_name

Supplier_ID → Supplier_name
Supplier_ID → Supplier_contact

Supplier_Pay_ID → Paid_amount
Supplier_Pay_ID → Paid_date

Supplier_order_ID → Supplier_ID
Supplier_order_ID → Supply_order_date
Supplier_order_ID → Supplier_Pay_ID

(Supplier_order_ID, Material_ID) → Quantity
(Supplier_order_ID, Material_ID) → Cost_price

Normalization :

Relation/Entity	Key(s)	FDs	Is LHS a Superkey?	BCNF?
Product	{Product_ID}	Product_ID → Product_name Product_ID → Mfg_date Product_ID → Exp_date Product_ID → Price	Yes	Yes
Material	{Material_ID}	Material_ID → Material_name Material_ID → Supplier_ID	Yes	Yes
Supplier	{Supplier_ID}	Supplier_ID → Supplier_name Supplier_ID → Supplier_contact	Yes	Yes
Supplier_Payment	{Supplier_Pay_ID}	Supplier_Pay_ID → Paid_amount Supplier_Pay_ID → Paid_date	Yes	Yes
Supply_Order	{Supply_order_ID}	Supply_order_ID → Supplier_ID Supply_order_ID → Supplier_Pay_ID Supply_order_ID → Supply_order_date	Yes	Yes
Supply_Order_Detail	{Supply_order_ID, Material_ID}	Supply_order_ID, Material_ID → Quantity Supply_order_ID, Material_ID → Cost_price	Yes	Yes

Made_Of	{Product_ID, Material_ID}	Product_ID, Material_ID → Category	Yes	Yes
Inventory	{Inventory_ID}	Inventory_ID → Product_ID Inventory_ID → Quantity_data	Yes	Yes
Retailer	{Retailer_ID}	Retailer_ID → Retailer_name Retailer_ID → Area Retailer_ID → Retailer_Contact_info	Yes	Yes
Retailer_Payment	{Retailer_Pay_ID}	Retailer_Pay_ID → Received_amount Retailer_Pay_ID → Method Retailer_Pay_ID → Pay_date	Yes	Yes
Retail_Orders	{Retail_order_ID}	Retail_order_ID → Retailer_ID Retail_order_ID → Retailer_Pay_ID Retail_order_ID → Retailer_Order_date	Yes	Yes
Retail_Order_Details	{Retail_order_ID, Product_ID}	Retail_order_ID, Product_ID → Quantity_Ordered Retail_order_ID, Product_ID → Selling_Price	Yes	Yes

For all the FDs, the LHS is either a super-key or a candidate key. Hence, all the relations are in BCNF.
So, Database is in BCNF.