**Multi-vendor E-commerce Platform**

# 0 GROUP INFORMATION

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# DATA REQUIREMENT ANALYSIS

The core data entities of the platform include suppliers, customers, products and transaction records. Vendor entities need to record unique identifiers: Vendor ID, business name, customer feedback, geographic location, and product library. As a subsidiary entity of the supplier, the product needs to include the product ID, name, label, and up to three descriptive labels, and the label content is customized by the supplier for classification and search optimization. Customer entities are required to maintain customer IDs, contact information, shipping addresses, and order history to support personalized service and transaction backtracking.

As the core business entity of the system, transaction records need to be related in multiple dimensions: on the one hand, they need to be bound to customer IDs to trace purchase behaviors, and on the other hand, they need to support cross-supplier order processing, that is, a single transaction can contain products from different suppliers. To do this, the transaction records need to be composite, containing a collection of order IDs, customer IDs, supplier IDs, and corresponding product purchase details, as well as record the order status to support subsequent modifications.

# 2 DATABASE DESIGN

# 1.1 Conceptual Structural Design



**Fig.1 ER Diagram**

# 1.2 Logical Structure Design

* Vendor ( vendor\_id VARCHAR(20) primary key, ven\_name VARCHAR(50), rating DECIMAL(3,2), location VARCHAR(50))
* Product ( product\_id VARCHAR(20) primary key, pro\_name VARCHAR(100), price DECIMAL(10,2), tags VARCHAR(255), vendor\_id VARCHAR(20) foreign key).
* Customer ( customer\_id VARCHAR(20) primary key, phone VARCHAR(20), shipping address TEXT)
* Order ( order\_id VARCHAR(20) primary key, customer\_id VARCHAR(20), status ENUM('pending', 'shipped', 'cancelled'))
* OrderItem ( order\_id VARCHAR(20) primary key, product\_id VARCHAR(20) primary key, quantity INT CHECK (quantity > 0))
* OrderLog ( order\_id VARCHAR(20) primary key, product\_id VARCHAR(20) primary key, quantity INT CHECK (quantity > 0))

# 2 SYSTEM IMPLEMENTATION

# 2.1 Database Development

# 2.1.1 Create Table

* Vendors Table

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Column Name | Data Type | Length | Null Value  (Yes/No) | Default value | Illustrate |
| vendor\_id | VARCHAR | 20 | No |  | Primary Key |
| name | VARCHAR | 50 | No |  |  |
| rating | DECIMAL | (3,2) | Yes |  | rating BETWEEN 0 AND 5 |
| location | VARCHAR | 50 | Yes |  |  |

**Tab.1 Vendor Table**

CREATE TABLE vendors (

vendor\_id VARCHAR(20) PRIMARY KEY,

name VARCHAR(50) NOT NULL,

rating DECIMAL(3,2) CHECK (rating BETWEEN 0 AND 5),

location VARCHAR(50)

);

* Products Table

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Column Name | Data Type | Length | Null Value  (Yes/No) | Default value | Illustrate |
| product\_id | VARCHAR | 20 | No |  | Primary Key |
| name | VARCHAR | 100 | No |  |  |
| price | DECIMAL | (10,2) | Yes |  | price > 0 |
| tags | VARCHAR | 255 | Yes |  |  |
| vendor\_id | VARCHAR | 20 | No |  | Foreign Key |

**Tab.2 Products Table**

CREATE TABLE products (

product\_id VARCHAR(20) PRIMARY KEY,

name VARCHAR(100) NOT NULL,

price DECIMAL(10,2) CHECK (price > 0),

tags VARCHAR(255),

vendor\_id VARCHAR(20),

FOREIGN KEY (vendor\_id) REFERENCES vendors(vendor\_id)

);

* Customers Table

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Column Name | Data Type | Length | Null Value  (Yes/No) | Default value | Illustrate |
| customer\_id | VARCHAR | 20 | No |  | Primary Key |
| phone | VARCHAR | 20 | No |  |  |
| shipping\_address | TEXT |  | Yes |  |  |

**Tab.3 Customers Table**

CREATE TABLE customers (

customer\_id VARCHAR(20) PRIMARY KEY,

phone VARCHAR(20) NOT NULL,

shipping\_address TEXT

);

* Orders Table

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Column Name | Data Type | Length | Null Value  (Yes/No) | Default value | Illustrate |
| order\_id | VARCHAR | 20 | No |  | Primary Key |
| customer\_id | VARCHAR | 20 | No |  | Foreign Key |
| status | ENUM |  | Yes | 'pending', 'shipped', 'cancelled' |  |

**Tab.4 Orders Table**

CREATE TABLE orders (

order\_id VARCHAR(20) PRIMARY KEY,

customer\_id VARCHAR(20),

status ENUM('pending', 'shipped', 'cancelled'),

FOREIGN KEY (customer\_id) REFERENCES customers(customer\_id)

);

* Order Items Table

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Column Name | Data Type | Length | Null Value  (Yes/No) | Default value | Illustrate |
| order\_id | VARCHAR | 20 | No |  | Primary Key |
| product\_id | VARCHAR | 20 | No |  | Primary Key |
| quantity | INT |  | Yes |  | quantity > 0 |

**Tab.5 Order Items Table**

CREATE TABLE order\_items (

order\_id VARCHAR(20),

product\_id VARCHAR(20),

quantity INT CHECK (quantity > 0),

PRIMARY KEY (order\_id, product\_id),

FOREIGN KEY (order\_id) REFERENCES orders(order\_id),

FOREIGN KEY (product\_id) REFERENCES products(product\_id)

);

# 2.1.2 Insert Data

* **Vendor Table Data Insertion**
* INSERT INTO vendors VALUES
* ('V001', 'Tech World', 4.5, 'Hong Kong'),
* ('V002', 'Fashion Hub', 4.2, 'Shenzhen'),
* ('V003', 'Home Essentials', 4.8, 'Guangzhou'),
* ('V004', 'Digital Zone', 4.3, 'Shanghai'),
* ('V005', 'Beauty Corner', 4.6, 'Beijing'),
* ('V006', 'Sports Elite', 4.4, 'Chengdu'),
* ('V007', 'Book Haven', 4.1, 'Wuhan'),
* ('V008', 'Baby Care Plus', 4.7, 'Nanjing'),
* ('V009', 'Auto Parts Pro', 4.0, 'Tianjin'),
* ('V010', 'Kitchen Master', 4.5, 'Hangzhou'),
* ('V011', 'Smart Home', 4.6, 'Suzhou'),
* ('V012', 'Outdoor Gear', 4.3, 'Xiamen'),
* ('V013', 'Pet Paradise', 4.7, 'Chongqing'),
* ('V014', 'Health Plus', 4.4, 'Changsha');

电脑萤幕截图

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**Fig. 2 Vendor Table**

* **Productc Table Data Insertion**
* INSERT INTO products VALUES
* ('P1001', 'Wireless Mouse', 59.99, 'electronics,computer', 'V001'),
* ('P1002', 'Bluetooth Speaker', 199.99, 'audio,electronics', 'V001'),
* ('P1003', 'Gaming Keyboard', 299.99, 'electronics,gaming', 'V001'),
* ('P1004', 'Summer Dress', 89.99, 'clothing,fashion', 'V002'),
* ('P1005', 'Leather Bag', 159.99, 'accessories,fashion', 'V002'),
* ('P1006', 'Smart Watch', 399.99, 'electronics,wearable', 'V004'),
* ('P1007', 'Yoga Mat', 45.99, 'sports,fitness', 'V006'),
* ('P1008', 'Baby Stroller', 299.99, 'baby,gear', 'V008'),
* ('P1009', 'Car Phone Holder', 25.99, 'auto,accessories', 'V009'),
* ('P1010', 'Coffee Maker', 129.99, 'kitchen,appliances', 'V010'),
* ('P1011', 'Smart Light', 89.99, 'electronics,smart', 'V011'),
* ('P1012', 'Camping Tent', 299.99, 'outdoor,gear', 'V012'),
* ('P1013', 'Pet Food', 39.99, 'pet,food', 'V013'),
* ('P1014', 'Air Purifier', 499.99, 'health,appliances', 'V014');

电脑屏幕截图

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**Fig.3 Products Table**

* **Customers Table Data Insertion**
* INSERT INTO customers VALUES
* ('C001', '13800138001', 'Beijing Chaoyang District'),
* ('C002', '13800138002', 'Shanghai Pudong New Area'),
* ('C003', '13800138003', 'Guangzhou Tianhe District'),
* ('C004', '13800138004', 'Shenzhen Nanshan District'),
* ('C005', '13800138005', 'Hangzhou West Lake District'),
* ('C006', '13800138006', 'Chengdu High-tech Zone'),
* ('C007', '13800138007', 'Wuhan Wuchang District'),
* ('C008', '13800138008', 'Nanjing Xianlin University Town'),
* ('C009', '13800138009', 'Tianjin Binhai New Area'),
* ('C010', '13800138010', 'Xian Hi-tech Industries Zone'),
* ('C011', '13800138011', 'Suzhou Industrial Park'),
* ('C012', '13800138012', 'Xiamen Software Park'),
* ('C013', '13800138013', 'Chongqing High-tech Zone'),
* ('C014', '13800138014', 'Changsha Economic Zone');

电脑屏幕截图

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**Fig. 4 Customers Table**

* **Orders Table Data Insertion**
* INSERT INTO orders (order\_id, customer\_id, status, created\_at) VALUES
* ('O001', 'C001', 'pending', DEFAULT),
* ('O002', 'C002', 'shipped', DEFAULT),
* ('O003', 'C003', 'pending', DEFAULT),
* ('O004', 'C004', 'cancelled', DEFAULT),
* ('O005', 'C005', 'shipped', DEFAULT),
* ('O006', 'C006', 'pending', DEFAULT),
* ('O007', 'C007', 'shipped', DEFAULT),
* ('O008', 'C008', 'cancelled', DEFAULT),
* ('O009', 'C009', 'pending', DEFAULT),
* ('O010', 'C010', 'shipped', DEFAULT);

电脑萤幕画面

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**Fig. 5 Order Table**

* **Order Items Table Data Insertion**
* INSERT INTO order\_items VALUES
* ('O001', 'P1001', 2),
* ('O001', 'P1002', 1),
* ('O002', 'P1004', 1),
* ('O003', 'P1006', 1),
* ('O004', 'P1008', 1),
* ('O005', 'P1010', 2),
* ('O006', 'P1011', 1),
* ('O007', 'P1012', 1),
* ('O008', 'P1013', 3),
* ('O009', 'P1014', 1);

表格

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**Fig. 6 Order\_items Table**

# 2.2 Interaction

After running the main.py file, users can select the corresponding operation to execute. Figure 7 shows the post-run interface. For the supplier management system, the system provides four functions.

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**Fig. 7 Main Function**

# 2.2.1 Vendor Management

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Vendor management provides three functions：display vendor list, support vendor registration and information maintennanc and implement a vendor rating system. The user only needs to enter the corresponding function number to enter the function.

* Display vendor list.

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* Support vendor registration and information maintennance.
* Implement a vendor rating system.

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# 2.2.2 Product Catalog Management

Product catalog management provides three features, which are: browse products by vendor, add and update product information and manage product tags.

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* Browse products by vendor.

图形用户界面, 文本

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* Add and update product information.
* Manage product tags.

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# 2.2.3 Product Search Feature

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* Search products by tags.
* Support fuzzy matching of product names.
* Optimize search response speed.

电脑屏幕的手机截图

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# 2.2.4 Order Management System

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* Support ordering products from multiple vendors in a single order.
* Track order status.
* Support order modification and cancellation.

To support the above business needs, there are six functions designed in Order Management:

**1. Select/Create Order;**

1. Select

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1. Create

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**2. Add Item to Order;**

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**3. Remove Item from Order;**

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**4. Cancel Order;**

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**5. Submit Order;**

**6. Display All Orders;**

**电脑的屏幕截图

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