**Multi-vendor E-commerce Database System**

1. Group Information

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1. ER Diagram Design

This project aims to create and execute a multi-vendor e-commerce platform with a focus on personalizing the user experience.

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|  |
| Fig.1 ER diagram |

* 1. Entity and Constraint

In the e-commerce scenario, we naturally include the following entities in an ER diagram: Product, Customer, Order, Offer, and Vendor.

The logic of customer ordering products is as follows: a customer can purchase one or multiple products, and a product can be purchased by any use customer. Customer are not forced to order products. Based on this logic, we design order relationship as many-to-many (cardinality constraint) and partial participation (participation constraint).

The logic of vendor offering products is as follows: a vendor can provide one or multiple products, and each product must be provided by one supplier. This implies that each product corresponds to a specific vendor. Based on this logic, we design offer relationship as one-to-many (cardinality constraint,one is vendor) and total participation (participation constraint).

* 1. Attribute adjustment

It is worth mentioning that inventory is typically managed by the vendor and should be considered as one of the vendor’s attributes. However, for the sake of frontend display, we have placed the inventory directly under the product. If a vendor needs to modify the inventory, they can do so by accessing the product through its Product ID (PID).

Moreover, the username, password and salt are prepared for log in page, so we added these in ER diagram.

1. Relational table design

Design the relational table according to the requirements. All relational tables are shown below. Some specific explanations are in remark.

In the database system, we have designed 5 relational tables. The offer table is implemented by vid foreign key in product table. We need a vendor admin table to store vendor administrator.

Tab.1 Customer table

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **attribute** | **data type** | **length** | **constraint type** | **allow null** | **attributes instructions** | **remark** |
| cid | integer |  | primary key | not null | customer id | auto-increment |
| contactNumber | integer | 8 |  | not null | customer’s contact number | multiple phone numbers are allowed |
| shippingDetail | char | 20 |  | not null | Order delivery status |  |
| username | varchar | 50 |  | not null | name of the customer log in | allow modification |
| password | char | 255 |  | not null | password of the customer log in | allow modification |
| salt | integer |  |  | not null | For hash password | random number |

Tab.2 Vendor table

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **attributes** | **data type** | **length** | **constraint type** | **null or not** | **attributes instructions** | **remark** |
| vid | integer |  | primary key | not null | vendor id | auto-increment |
| vname | char | 20 |  | not null | name of the vendor log in | allow modification |
| password | char | 255 |  | not null | password of the vendor log in | allow modification |
| score | integer |  |  | allow null | a vendor rating |  |
| geographic | char | 20 |  | not null | vendor location |  |
| salt | integer |  |  | not null | For hash password | random number |

Tab.3 product table

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **attributes** | **data type** | **length** | **constraint type** | **null or not** | **attributes instructions** | **remark** |
| pid | integer |  | primary key | not null | product id | auto-increment |
| pname | char | 20 |  | not null | product name | allow modification |
| price | real |  |  | not null | the price of product | allow modification |
| vid | integer |  | foreign key | not null | vendor id |  |
| inventory | integer |  |  | not null | Inventory of product |  |
| tag\_1 | char | 20 |  | not null | product tag, provided by vendor |  |
| tag\_2 | char | 20 |  | not null | product tag, provided by vendor |  |
| tag\_3 | char | 20 |  | not null | product tag, provided by vendor |  |

Tab.4 order table

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **attributes** | **data type** | **length** | **Constraint type** | **null or not** | **attributes instructions** | **remark** |
| oid | integer |  | composed primary key | not null | order id | auto-increment |
| cid | integer |  | composed primary key | not null |  | foreign key |
| pid | integer |  | composed primary key | not null |  | foreign key |
| quantity | integer |  |  | not null | the quantity of each product |  |
| orderStatus | ENUM |  |  | not null | 'order received', 'shipping', 'fulfilled', 'cancelled' |  |
| orderTime | Timestamp |  |  |  |  |  |

Tab.5 vendor admin table

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **attributes** | **data type** | **length** | **Constraint type** | **null or not** | **attributes instructions** | **remark** |
| id | integer |  | primary key | not null | vendor administrator id | auto-increment |
| username | varchar | 50 |  | not null | name of the vendor administrator log in | allow modification |
| password | char | 255 |  | not null | password of the vendor administrator log in | allow modification |
| salt | integer |  |  | not null | For hash password | random number |

1. Summary

Database systems will play a key role in storing and managing the complex relationships between vendor, products, customers, and transactions.

Through the effective design and implementation of the database system, the smooth operation of the platform can be ensured to provide users with a personalized and efficient shopping experience.