*Physical Data Model*

# User\_account

| **#** | **PK** | **FK** | **Column Name** | **Data Type** | **Mandatory** | **Description** |
| --- | --- | --- | --- | --- | --- | --- |
| 1 | X |  | user\_id | Integer | Yes | ID, auto increment |
| 2 |  |  | username | Varchar(30) | Yes | Unique username, UNIQUE |
| 3 |  |  | password | Varchar(5 0) | Yes | Password |
| 4 |  |  | role | Enum('manager', 'customer') | Yes | Role of the user |
| 5 |  |  | email | Varchar(100) | Yes | Email, UNIQUE |
| 6 |  |  | created\_at | Timestamp | Yes | Creation time, default CURRENT\_TIMESTAMP |

# Product

| **#** | **PK** | **FK** | **Column Name** | **Data Type** | **Mandatory** | **Description** |
| --- | --- | --- | --- | --- | --- | --- |
| 1 | X |  | product\_id | Bigint | Yes | ID, auto increment |
| 2 |  | X | category\_id | Integer | Yes | FK to CATEGORY, ON DELETE RESTRICT |
| 3 |  |  | product\_name | Varchar(50) | Yes | Name of product |
| 4 |  |  | product\_price | DECIMAL(10,2) | Yes | Price of product |
| 5 |  |  | product\_value | DECIMAL(10,2) | Yes | Value of product |
| 6 |  |  | product\_barcode | Varchar(20) | Yes | Barcode, UNIQUE |
| 7 |  |  | product\_description | Text | No | Description of product |
| 8 |  |  | product\_specification | Text | No | Specification |
| 9 |  |  | stock\_quantity | Integer | Yes | Number of products in stock |
| 10 |  |  | warehouse\_entry\_timestamp | Timestamp | Yes | When product was added, default CURRENT\_TIMESTAMP |

# Category

| **#** | **PK** | **FK** | **Column Name** | **Data Type** | **Mandatory** | **Description** |
| --- | --- | --- | --- | --- | --- | --- |
| 1 | X |  | category\_id | Integer | Yes | ID, auto increment |
| 2 |  |  | category\_name | Varchar(100) | Yes | Name of category |
| 3 |  |  | category\_description | Text | No | Description of category |

# Product\_image

| **#** | **PK** | **FK** | **Column Name** | **Data Type** | **Mandatory** | **Description** |
| --- | --- | --- | --- | --- | --- | --- |
| 1 | X |  | image\_id | Bigint | Yes | ID, auto increment |
| 2 |  | X | product\_id | Bigint | Yes | FK to PRODUCT, ON DELETE CASCADE |
| 3 |  |  | image\_url | Varchar(255) | Yes | URL or path to the image |

# Product\_review

| **#** | **PK** | **FK** | **Column Name** | **Data Type** | **Mandatory** | **Description** |
| --- | --- | --- | --- | --- | --- | --- |
| 1 | X |  | review\_id | Bigint | Yes | ID, auto increment |
| 2 |  | X | product\_id | Bigint | Yes | FK to PRODUCT, ON DELETE CASCADE |
| 3 |  | X | user\_id | Integer | Yes | FK to USER, ON DELETE RESTRICT |
| 4 |  |  | rating | TINYINT | Yes | Rating score, CHECK (1-5) |
| 5 |  |  | review\_comment | Text | No | Review content |
| 6 |  |  | review\_timestamp | Timestamp | Yes | Date of review, default CURRENT\_TIMESTAMP |

# Product\_edit\_history

| **#** | **PK** | **FK** | **Column Name** | **Data Type** | **Mandatory** | **Description** |
| --- | --- | --- | --- | --- | --- | --- |
| 1 | X |  | edit\_id | Bigint | Yes | ID, auto increment |
| 2 |  | X | product\_id | Bigint | Yes | FK to PRODUCT, ON DELETE CASCADE |
| 3 |  | X | editor\_user\_id | Integer | Yes | FK to USER, ON DELETE RESTRICT |
| 4 |  |  | edit\_timestamp | Timestamp | Yes | When edit occurred, default CURRENT\_TIMESTAMP |
| 5 |  |  | changes\_made | Text | No | What was edited |

# Related\_product

| **#** | **PK** | **FK** | **Column Name** | **Data Type** | **Mandatory** | **Description** |
| --- | --- | --- | --- | --- | --- | --- |
| 1 | X |  | relation\_id | Bigint | Yes | ID, auto increment |
| 2 |  | X | product\_id | Bigint | Yes | FK to PRODUCT, ON DELETE CASCADE |
| 3 |  | X | related\_product\_id | Bigint | Yes | FK to PRODUCT, ON DELETE CASCADE |
| 4 |  |  | relation\_type | Enum('similar', 'bundle', 'accessory') | No | Type of relation |

# Order

| **#** | **PK** | **FK** | **Column Name** | **Data Type** | **Mandatory** | **Description** |
| --- | --- | --- | --- | --- | --- | --- |
| 1 | X |  | order\_id | Bigint | Yes | ID, auto increment |
| 2 |  | X | customer\_id | Integer | Yes | FK to USER, ON DELETE RESTRICT |
| 3 |  |  | order\_status | Enum('pending', 'processing', 'shipped', 'delivered', 'cancelled') | Yes | Order status |
| 4 |  |  | is\_rush\_order | Boolean | Yes | Indicates rush order |
| 5 |  | X | delivery\_info\_id | Bigint | Yes | FK to DeliveryInfo, ON DELETE RESTRICT |
| 6 |  |  | subtotal | DECIMAL(10,2) | Yes | Subtotal price |
| 7 |  |  | shipping\_fee | DECIMAL(10,2) | Yes | Shipping fee |
| 8 |  |  | total | DECIMAL(10,2) | Yes | Total amount |
| 9 |  |  | created\_timestamp | Timestamp | Yes | Date order created, default CURRENT\_TIMESTAMP |
| 10 |  |  | discount | DECIMAL(10,2) | No | Discount applied |
| 11 |  |  | payment\_status | Enum('pending', 'completed', 'failed') | Yes | Payment status |

# Order\_item

| **#** | **PK** | **FK** | **Column Name** | **Data Type** | **Mandatory** | **Description** |
| --- | --- | --- | --- | --- | --- | --- |
| 1 | X |  | order\_item\_id | Bigint | Yes | ID, auto increment |
| 2 |  | X | order\_id | Bigint | Yes | FK to ORDER, ON DELETE CASCADE |
| 3 |  | X | product\_id | Bigint | Yes | FK to PRODUCT, ON DELETE RESTRICT |
| 4 |  |  | quantity | Integer | Yes | Quantity of products |
| 5 |  |  | unit\_price | DECIMAL(10,2) | Yes | Price per unit |

# Delivery\_info

| **#** | **PK** | **FK** | **Column Name** | **Data Type** | **Mandatory** | **Description** |
| --- | --- | --- | --- | --- | --- | --- |
| 1 | X |  | delivery\_info\_id | Bigint | Yes | ID, auto increment |
| 2 |  |  | recipient\_name | Varchar(100) | Yes | Name of recipient |
| 3 |  |  | phone\_number | Varchar(15) | Yes | Contact phone number |
| 4 |  |  | email | Varchar(100) | No | Recipient email |
| 5 |  |  | province\_city | Varchar(50) | Yes | Province or City (Enum không phù hợp vì danh sách dài) |
| 6 |  |  | address | Text | Yes | Full delivery address |
| 7 |  |  | shipping\_instruction | Text | No | Optional delivery instructions |

# Payment\_transaction

| **#** | **PK** | **FK** | **Column Name** | **Data Type** | **Mandatory** | **Description** |
| --- | --- | --- | --- | --- | --- | --- |
| 1 | X |  | transaction\_id | Bigint | Yes | ID, auto increment |
| 2 |  |  | transaction\_type | Enum('payment', 'refund') | Yes | Type of transaction |
| 3 |  | X | order\_id | Bigint | Yes | FK to ORDER, ON DELETE RESTRICT |
| 4 |  |  | total\_amount | DECIMAL(10,2) | Yes | Amount of transaction |
| 5 |  |  | transaction\_content | Varchar(100) | No | Description/details |
| 6 |  |  | transaction\_timestamp | Timestamp | Yes | Date of transaction, default CURRENT\_TIMESTAMP |
| 7 |  |  | payment\_method | Enum('card', 'paypal', 'bank\_transfer') | Yes | Payment method |
| 8 |  |  | payment\_status | Enum('successful', 'failed', 'pending') | Yes | Status |
| 9 |  |  | refund\_status | Enum('none', 'pending', 'completed') | No | Refund status |
| 10 |  |  | refund\_timestamp | Timestamp | No | Date of refund |

# Cart

| **#** | **PK** | **FK** | **Column Name** | **Data Type** | **Mandatory** | **Description** |
| --- | --- | --- | --- | --- | --- | --- |
| 1 | X |  | user\_id | Integer | Yes | FK to USER, ON DELETE CASCADE |
| 2 |  |  | total | DECIMAL(10,2) | Yes | Total value of the cart |

# Cart\_item

| **#** | **PK** | **FK** | **Column Name** | **Data Type** | **Mandatory** | **Description** |
| --- | --- | --- | --- | --- | --- | --- |
| 1 | X | X | user\_id | Integer | Yes | FK to Cart (USER), ON DELETE CASCADE |
| 2 | X | X | product\_id | Bigint | Yes | FK to PRODUCT, ON DELETE CASCADE |
| 3 |  |  | quantity | Integer | Yes | Quantity of product |
| 4 |  |  | product\_price | DECIMAL(10,2) | Yes | Price at the time |

# Audit\_log

| **#** | **PK** | **FK** | **Column Name** | **Data Type** | **Mandatory** | **Description** |
| --- | --- | --- | --- | --- | --- | --- |
| 1 | X |  | audit\_log\_id | Bigint | Yes | ID, auto increment |
| 2 |  |  | action\_type | Enum(“SEARCH”, “ VIEW\_PRODUCT”, “ ADD\_PRODUCT”, “ DELETE\_PRODUCT”, “ UPDATE\_PRODUCT”, “ PLACE\_ORDER”,  “PAYMENT”, “CANCEL\_ORDER”) | Yes | Type of action |
| 3 |  | X | user\_id | Integer | Yes | FK to USER, ON DELETE RESTRICT |
| 4 |  | X | product\_id | Bigint | No | FK to PRODUCT, ON DELETE SET NULL |
| 5 |  |  | keyword | Varchar(100) | No | Search or action keyword |
| 6 |  |  | role | Enum('manager', 'customer') | Yes | Role of the user |
| 7 |  |  | action\_timestamp | Timestamp | Yes | Time of action, default CURRENT\_TIMESTAMP |