

# Database Design and Documentation

## Introduction

This document provides an in-depth overview of the database design for a clothing line e-commerce site. The site aims to offer a seamless and secure platform for customers to browse, purchase, and manage a variety of clothing products. To support these functions, the database is designed to handle user registration, product management, orders, inventory control, shopping cart functionality, payment processing, and transaction details. The primary goal of the database design is to ensure efficient data storage, retrieval, and management to support both customer and admin needs while maintaining data integrity and scalability.

## Overview of the Database Design

The database for the clothing line e-commerce site is structured into a series of interrelated tables that represent different entities within the system. Each table is responsible for storing specific types of data, and relationships between tables are defined to enable efficient data retrieval. The main entities include:

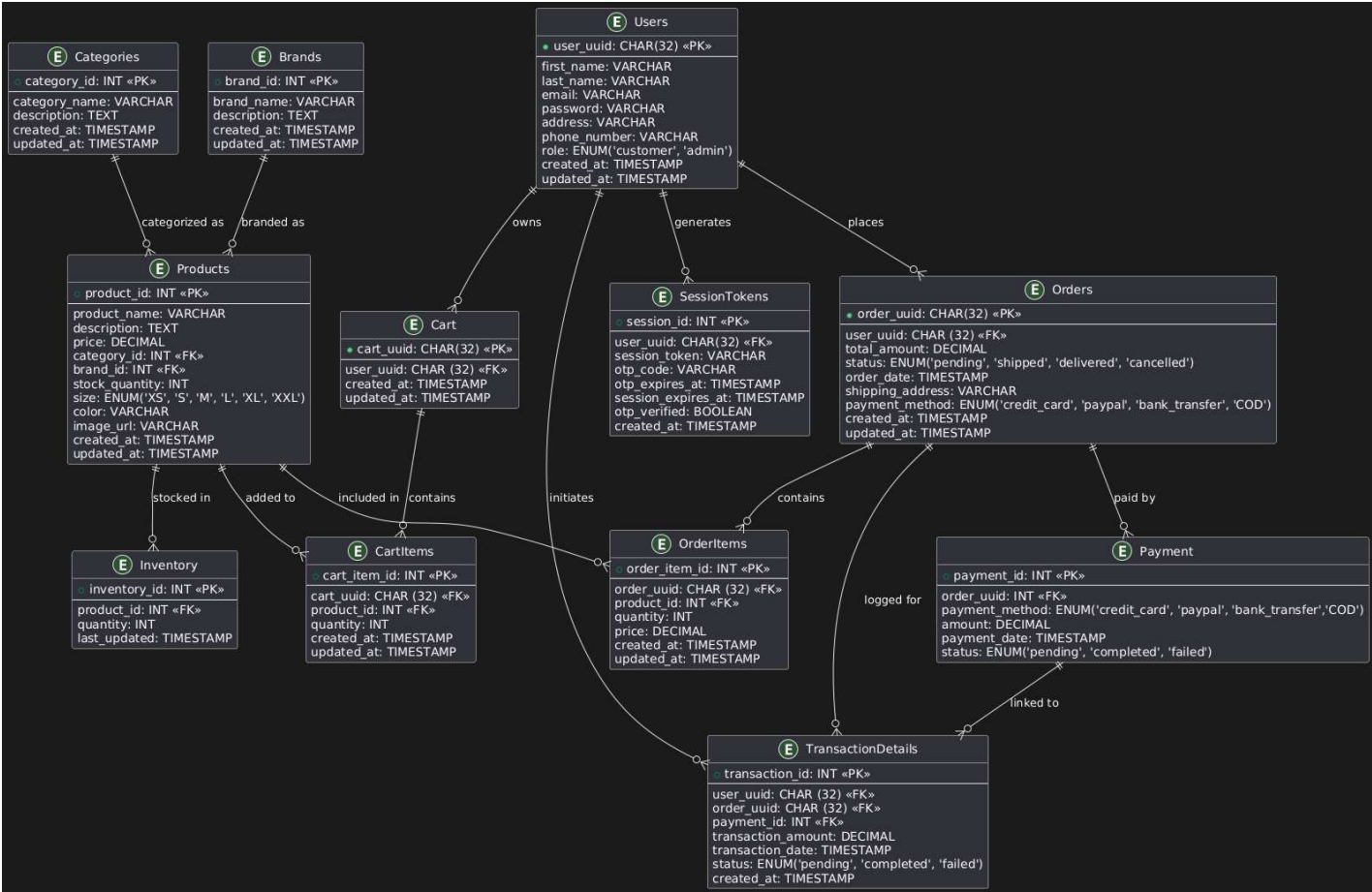
1. **Users:** Stores customer and admin information, including user roles, multi-factor authentication (MFA), and personal details.
2. **SessionTokens:** Manages user sessions for enhanced security, tracking session tokens, and handling one-time password (OTP) verification.
3. **Products:** Holds details about the clothing products available for sale, including size, color, price, and brand/category associations.
4. **Categories & Brands:** Provides classification for products to facilitate easy filtering and browsing.
5. **Orders:** Captures the order history for users, including status tracking (e.g., pending, shipped, delivered) and payment methods.
6. **OrderItems:** Records specific items within each order, along with their quantities and prices.
7. **Inventory:** Tracks the stock levels of products, ensuring products are available for purchase.
8. **Cart & CartItems:** Facilitates shopping cart functionality, allowing users to add products to their cart before proceeding to checkout.
9. **Payment:** Stores payment details for each order, including the method of payment and the current status (e.g., completed, pending).
10. **TransactionDetails:** Logs the complete history of transactions, linking users, orders, and payments to provide an audit trail for e-commerce operations.

The database design follows the relational database model, ensuring that data is normalized to minimize redundancy and maintain consistency. Key relationships between entities (such as users placing

orders, and products being included in those orders) are defined using foreign keys to enforce referential integrity. The design is optimized for scalability and flexibility, allowing the e-commerce platform to grow in the future while maintaining optimal performance.

This documentation will guide developers, administrators, and stakeholders through the database structure, ensuring they understand how the various components interact to support the functionality of the e-commerce platform.

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## Users Table

This table stores user information, including their authentication details and roles.

| Field Name   | Type                      | Description  |
|--------------|---------------------------|--|
| user_id      | CHAR (32) (PK)            | Unique identifier for the user.                          |
| first_name   | VARCHAR(255)              | User's first name.                                       |
| last_name    | VARCHAR(255)              | User's last name.  |
| email        | VARCHAR(255)              | Email address of the user. Must be unique.               |
| password     | VARCHAR(255)              | Hashed password for user authentication.                 |
| address      | VARCHAR(255)              | User's address.  |
| phone_number | VARCHAR(20)               | User's phone number.                                     |
| role         | ENUM('customer', 'admin') | Role of the user (either a customer or an admin).        |
| created_at   | TIMESTAMP                 | Timestamp of when the user was created.                  |
| updated_at   | TIMESTAMP                 | Timestamp of when the user information was last updated. |

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## SessionTokens Table

This table tracks user sessions, including OTP codes and session expiration.

| Field Name     | Type                        | Description   |
|----------------|-----------------------------|---|
| session_id     | INT (PK)                    | Unique identifier for each session.                     |
| user_uuid      | CHAR (32) (FK)              | Foreign key referring to the user who owns the session. |
| session_token  | VARCHAR(255)                | Token used to identify the session.                     |
| otp_code       | VARCHAR(10)                 | One-time password code for multi-factor authentication. |
| otp_expires_at | TIMESTAMP NULL DEFAULT NULL | Expiration timestamp for the OTP code.                  |

|                           |                             |   |
|---------------------------|-----------------------------|---|
| <b>session_expires_at</b> | TIMESTAMP NULL DEFAULT NULL | Expiration timestamp for the session.           |
| <b>otp_verified</b>       | BOOLEAN                     | Indicates if the OTP was successfully verified. |
| <b>created_at</b>         | TIMESTAMP                   | Timestamp of when the session was created.      |

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## Products Table

This table holds product details available in the e-commerce store.

| Field Name            | Type                                   | Description  |
|-----------------------|--|--|
| <b>product_id</b>     | INT (PK)                               | Unique identifier for each product.                      |
| <b>product_name</b>   | VARCHAR(255)                           | Name of the product.                                     |
| <b>description</b>    | TEXT                                   | Detailed description of the product.                     |
| <b>price</b>          | DECIMAL(10,2)                          | Price of the product.                                    |
| <b>category_id</b>    | INT (FK)                               | Foreign key linking to the product's category.           |
| <b>brand_id</b>       | INT (FK)                               | Foreign key linking to the product's brand.              |
| <b>stock_quantity</b> | INT                                    | Quantity of the product available in stock.              |
| <b>size</b>           | ENUM('XS', 'S', 'M', 'L', 'XL', 'XXL') | Available sizes for the product.                         |
| <b>color</b>          | VARCHAR(50)                            | Color options for the product.                           |
| <b>image_url</b>      | VARCHAR(255)                           | URL for the product's image.                             |
| <b>created_at</b>     | TIMESTAMP                              | Timestamp of when the product was added.                 |
| <b>updated_at</b>     | TIMESTAMP NULL DEFAULT NULL            | Timestamp of when the product details were last updated. |

## Categories Table

This table holds product categories.

| Field Name    | Type                        | Description                                      |
|---------------|-----------------------------|--|
| category_id   | INT (PK)                    | Unique identifier for the category.              |
| category_name | VARCHAR(255)                | Name of the category.                            |
| description   | TEXT                        | Description of the category.                     |
| created_at    | TIMESTAMP                   | Timestamp of when the category was created.      |
| updated_at    | TIMESTAMP NULL DEFAULT NULL | Timestamp of when the category was last updated. |

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## Brands Table

This table holds product brand details.

| Field Name  | Type                        | Description  |
|-------------|-----------------------------|--|
| brand_id    | INT (PK)                    | Unique identifier for the brand.                       |
| brand_name  | VARCHAR(255)                | Name of the brand.                                     |
| description | TEXT                        | Description of the brand.                              |
| created_at  | TIMESTAMP                   | Timestamp of when the brand was added.                 |
| updated_at  | TIMESTAMP NULL DEFAULT NULL | Timestamp of when the brand details were last updated. |

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## Orders Table

This table stores customer orders and their statuses.

| Field Name   | Type           | Description   |
|--------------|----------------|---|
| order_uuid   | CHAR (32) (PK) | Unique identifier for each order.                     |
| user_uuid    | CHAR (32) (FK) | Foreign key linking to the user who placed the order. |
| total_amount | DECIMAL(10,2)  | Total amount for the order.                           |

|                         |   |   |
|-------------------------|---|---|
| <b>status</b>           | ENUM('pending', 'shipped', 'delivered', 'cancelled')  | Status of the order.                          |
| <b>order_date</b>       | TIMESTAMP   | Timestamp of when the order was placed.       |
| <b>shipping_address</b> | VARCHAR(255)  | Shipping address for the order.               |
| <b>payment_method</b>   | ENUM('credit_card', 'paypal', 'bank_transfer', 'COD') | Payment method used for the order.            |
| <b>created_at</b>       | TIMESTAMP   | Timestamp of when the order was created.      |
| <b>updated_at</b>       | TIMESTAMP NULL<br>DEFAULT NULL                        | Timestamp of when the order was last updated. |

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### OrderItems Table

This table contains items within each order.

| Field Name           | Type                           | Description   |
|----------------------|--------------------------------|---|
| <b>order_item_id</b> | INT (PK)                       | Unique identifier for each order item.                      |
| <b>order_uuid</b>    | CHAR (32) (FK)                 | Foreign key linking to the related order.                   |
| <b>product_id</b>    | INT (FK)                       | Foreign key linking to the related product.                 |
| <b>quantity</b>      | INT                            | Quantity of the product ordered.                            |
| <b>price</b>         | DECIMAL(10,2)                  | Price of the product at the time of the order.              |
| <b>created_at</b>    | TIMESTAMP                      | Timestamp of when the order item was added.                 |
| <b>updated_at</b>    | TIMESTAMP NULL<br>DEFAULT NULL | Timestamp of when the order item details were last updated. |

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### Inventory Table

This table manages the stock and warehouse locations of products.

| Field Name          | Type     | Description                                |
|---------------------|----------|--|
| <b>inventory_id</b> | INT (PK) | Unique identifier for the inventory entry. |

|                     |           |   |
|---------------------|-----------|---|
| <b>product_id</b>   | INT (FK)  | Foreign key linking to the related product. |
| <b>quantity</b>     | INT       | Current stock quantity of the product.      |
| <b>last_updated</b> | TIMESTAMP | Timestamp of the last stock update.         |

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### Cart Table

This table manages user shopping carts.

| Field Name        | Type                        | Description  |
|-------------------|-----------------------------|--|
| <b>cart_uuid</b>  | CHAR (32) (PK)              | Unique identifier for each cart.                   |
| <b>user_uuid</b>  | CHAR (32) (FK)              | Foreign key linking to the user who owns the cart. |
| <b>created_at</b> | TIMESTAMP                   | Timestamp of when the cart was created.            |
| <b>updated_at</b> | TIMESTAMP NULL DEFAULT NULL | Timestamp of when the cart was last updated.       |

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### CartItems Table

This table holds items added to user shopping carts.

| Field Name          | Type                        | Description  |
|---------------------|-----------------------------|--|
| <b>cart_item_id</b> | INT (PK)                    | Unique identifier for each cart item.                      |
| <b>cart_uuid</b>    | CHAR (32) (FK)              | Foreign key linking to the related cart.                   |
| <b>product_id</b>   | INT (FK)                    | Foreign key linking to the related product.                |
| <b>quantity</b>     | INT                         | Quantity of the product added to the cart.                 |
| <b>created_at</b>   | TIMESTAMP                   | Timestamp of when the cart item was added.                 |
| <b>updated_at</b>   | TIMESTAMP NULL DEFAULT NULL | Timestamp of when the cart item details were last updated. |

## Payment Table

This table logs payment details for orders.

| Field Name     | Type  | Description                               |
|----------------|---|---|
| payment_id     | INT (PK)  | Unique identifier for the payment.        |
| order_uuid     | CHAR (32) (FK)  | Foreign key linking to the related order. |
| payment_method | ENUM('credit_card', 'paypal', 'bank_transfer', 'COD') | Payment method used.                      |
| amount         | DECIMAL(10,2)   | Payment amount.                           |
| payment_date   | TIMESTAMP   | Timestamp of when the payment was made.   |
| status         | ENUM('pending', 'completed', 'failed')                | Status of the payment.                    |

## TransactionDetails Table

This table logs transaction details for all payments.

| Field Name         | Type  | Description   |
|--------------------|---|---|
| transaction_id     | INT (PK)  | Unique identifier for the transaction.                      |
| user_uuid          | CHAR (32) (FK)  | Foreign key linking to the user initiating the transaction. |
| order_uuid         | CHAR (32) (FK)  | Foreign key linking to the related order.                   |
| payment_id         | INT (FK)  | Foreign key linking to the related payment.                 |
| transaction_amount | DECIMAL(10,2)   | Total amount of the transaction.                            |
| transaction_date   | TIMESTAMP   | Timestamp of when the transaction took place.               |
| payment_method     | ENUM('credit_card', 'paypal', 'bank_transfer', 'COD') | Payment method used in the transaction.                     |
| status             | ENUM('pending', 'completed', 'failed')                | Status of the transaction.                                  |



|                   |                             |  |
|-------------------|-----------------------------|--|
| <b>created_at</b> | TIMESTAMP                   | Timestamp of when the transaction was logged.                |
| <b>updated_at</b> | TIMESTAMP NULL DEFAULT NULL | Timestamp of when the transaction details were last updated. |

## Sample Queries:

### 1. Total Sales in a Specific Month

```
SELECT SUM(total_amount) AS total_sales
FROM Orders
WHERE MONTH(order_date) = ? AND YEAR(order_date) = ?;
```

**Note:** Replace the ? with the desired month and year.

### 2. Total Amount Spent by a Specific User

```
SELECT SUM(total_amount) AS total_spent
FROM Orders
WHERE user_uuid = ?;
```

**Note:** Replace the ? with the specific user UUID.

### 3. Most Product sold by quantity

```
SELECT P.product_name, SUM(OI.quantity) AS total_quantity
FROM OrderItems OI
```

```
JOIN Products P ON Ol.product_id = P.product_id  
GROUP BY P.product_name  
ORDER BY total_quantity DESC  
LIMIT 1;
```

#### **4. Product with the Highest Sales**

```
SELECT P.product_name, SUM(O.total_amount) AS total_sales  
FROM OrderItems Ol  
JOIN Products P ON Ol.product_id = P.product_id  
JOIN Orders O ON Ol.order_uuid = O.order_uuid  
GROUP BY P.product_name  
ORDER BY total_sales DESC  
LIMIT 1;
```

#### **5. User Information**

```
SELECT first_name, last_name, email, address, phone_number, role  
FROM Users  
WHERE user_uuid = ?;
```