**Online Shopping Application**

1. **Database Design**

**Tables and Attributes**

### Users Table

|  |  |  |
| --- | --- | --- |
| Column | Data Type | Description |
| \_id | ObjectId | Unique identifier (Primary Key) |
| name | String | User's full name |
| email | String | User's email (Unique) |
| photo | String | User's profile picture URL |
| password | String | Hashed password |
| districtName | String | User's district name (English) |
| districtNameBan | String | User's district name (Bengali) |
| upazilaName | String | User's upazila name (English) |
| upazilaNameBan | String | User's upazila name (Bengali) |
| districtID | String | ID of the district (Foreign Key) |
| upazilaID | String | ID of the upazila (Foreign Key) |
| status | String | Account status (active/inactive) |
| role | String | User role (e.g., user, admin) |

### 2. Products Table

|  |  |  |
| --- | --- | --- |
| Column | Data Type | Description |
| \_id | ObjectId | Unique identifier (Primary Key) |
| name | String | Product name |
| brand | String | Brand name |
| thumbnail | String | Product image URL |
| description | String | Product description |
| category | String | Category of product |
| price | Number | Price of the product |
| size | String | Size of the product (if applicable) |
| color | String | Color of the product |
| username | String | Name of the seller (Foreign Key - Users) |
| useremail | String | Email of the seller (Foreign Key - Users) |
| date | DateTime | Product creation date |
| status | String | Active or inactive |

### 3. Payments Table

|  |  |  |
| --- | --- | --- |
| Column | Data Type | Description |
| \_id | ObjectId | Unique identifier (Primary Key) |
| email | String | User email (Foreign Key - Users) |
| name | String | User's name |
| userPhoto | String | User's profile picture URL |
| amount | Number | Payment amount |
| date | DateTime | Payment date |
| productName | String | Name of the purchased product |
| brandName | String | Brand of the purchased product |
| productId | ObjectId | ID of the purchased product (Foreign Key - Products) |
| thumbnail | String | Product image URL |
| transactionId | String | Unique transaction ID |
| paidStatus | Boolean | Payment status (true/false) |

**Normalization Process (1NF, 2NF, 3NF, 4NF)**

## **1NF (First Normal Form)**

**Fixes Applied:**

* Separated multi-valued columns into individual attributes.
* Ensured atomic values (no multiple values in a single field).

| **Users Table**

## 2NF (Second Normal Form)

Fixes Applied:  
• Removed partial dependencies by creating Districts and Upazilas tables.

### Users Table

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| \_id | name | email | photo | password | districtID | upazilaID | status |
| 67b8b7a2 | a | a@gmail.com | http://res... | 1234aA | 2 | 19 | active |

### Districts Table

|  |  |  |
| --- | --- | --- |
| districtID | districtName | districtNameBan |
| 2 | Feni | ফেনী |

### Upazilas Table

|  |  |  |
| --- | --- | --- |
| upazilaID | upazilaName | upazilaNameBan |
| 19 | Feni Sadar | ফেনী সদর |

## 

## 3NF (Third Normal Form)

Fixes Applied:  
• Removed transitive dependencies by creating a separate Products Table.

### Payments Table

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| \_id | email | amount | productId | transactionId |
| 67c7e8bf | a2@gmail.com | 1497 | 67c74082 | pi\_3QzB16EA... |

### Products Table

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| \_id | name | brand | thumbnail | description | category | price | size | color | useremail | date |
| 67c74082 | Shirt | Easy | https://res... | Good Shirt | Fashion | 56 | XL | Blue | a@gmail.com | 2025-02-28T09:45:04Z |

## 4NF (Fourth Normal Form)

Fixes Applied:  
• Eliminated multivalued dependencies by creating a Product Variants Table.

### Products Table

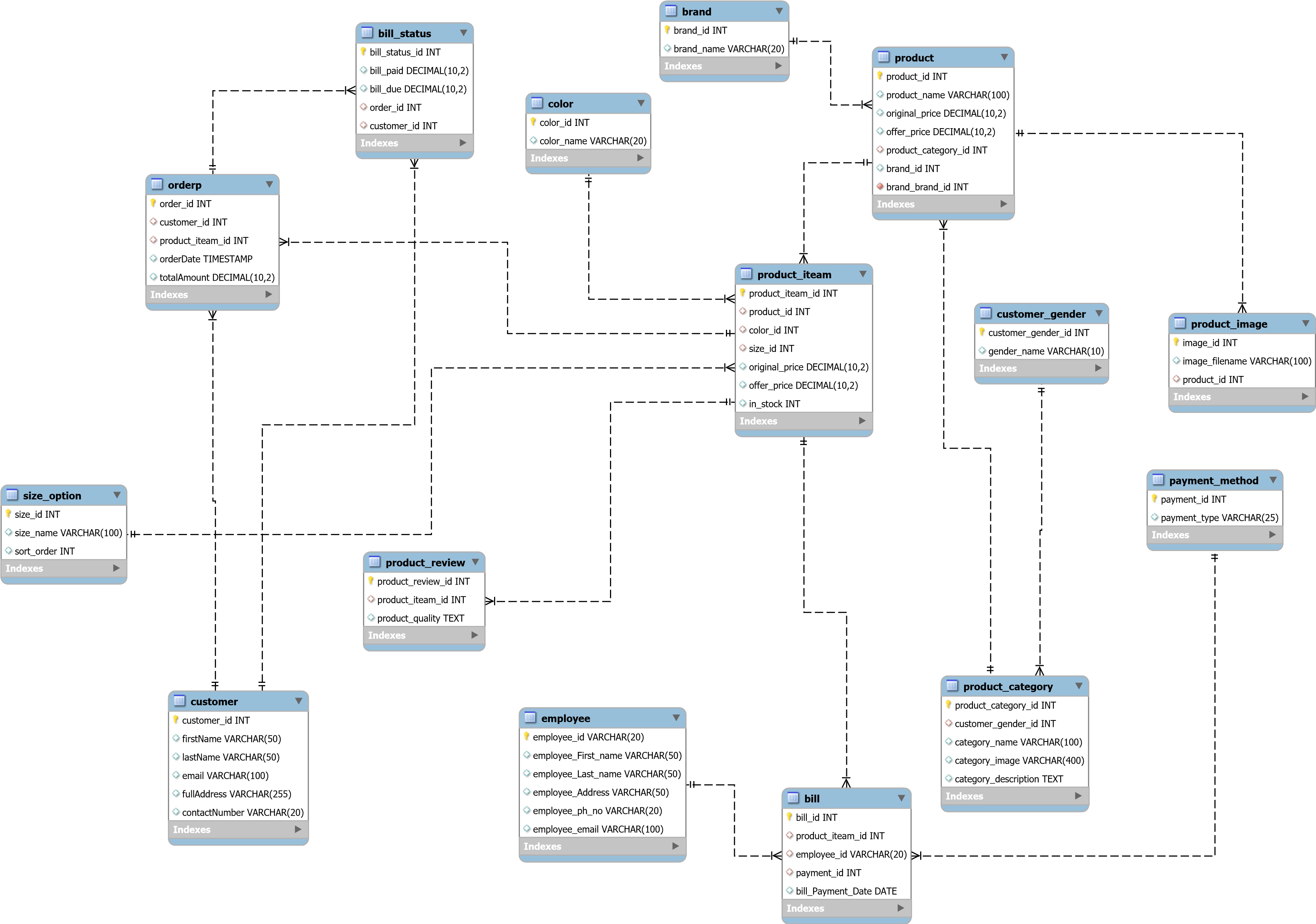
|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| \_id | name | brand | thumbnail | description | category | price | useremail | date |
| 67c74082 | Shirt | Easy | https://res... | Good Shirt | Fashion | 56 | a@gmail.com | 2025-02-28T09:45:04Z |

### Product Variants Table

|  |  |  |  |
| --- | --- | --- | --- |
| variantID | productID | size | color |
| 1 | 67c74082 | XL | Blue |

**2. ER Diagram:**

The ER diagram visually represents the relationships between the entities .

The main entities include Users, Products, Categories, Orders, OrderDetails, Cart etc. Attributes and primary keys are defined for each’

# Normalization

Normalization ensures that the database is structured efficiently:

* 1. First Normal Form (1NF)
     + Ensure that all attributes contain atomic values.
     + Example: Splitting full names into FirstName and LastName.
  2. Second Normal Form (2NF)
     + Remove partial dependencies; all non-key attributes are dependent on the entire primary key.
     + Example: Separate order details into an OrderDetails table to remove duplication.
  3. Third Normal Form (3NF)
     + Remove transitive dependencies; non-key attributes should not depend on other non-key attributes.

- Example: Store categories in a separate table to eliminate redundant data in the Products table.