

# NORMALIZATION ON DATABASE

## UNF (Unnormalized Form)

Collection	Fields
Products	name, image, brand, quantity, category (Object), description, reviews[], rating, numReviews, price, countInStock
Orders	user (Object), orderItems[], shippingAddress (nested), paymentMethod, paymentResult (nested), itemsPrice, taxPrice, shippingPrice, totalPrice, isPaid, paidAt, isDelivered, deliveredAt
Users	username, email, password, isAdmin
Categories	name

## 1NF (First Normal Form)

### ◆ Fixes Applied:

- Flattened shippingAddress into separate fields: address, city, postalCode, country
- Ensured atomic values (e.g., no nested address or embedded reviews with user details)
- Created separate arrays only where justified

Collection	Fields
Products	name, image, brand, quantity, category (ref), description, rating, numReviews, price, countInStock
Reviews	name, rating, comment, user (ref), timestamps (inside product OR separate collection if required)

Collection	Fields
Orders	user (ref), orderItems[], shippingAddress (with separate fields), paymentMethod, paymentResult fields, isPaid, paidAt, isDelivered, deliveredAt
OrderItems (logical)	name, qty, image, price, product (ref)
Users	username, email, password, isAdmin
Categories	name

## 2NF (Second Normal Form)

### ◆ Fixes Applied:

- Removed partial dependencies from arrays like orderItems
- Replaced embedded data with references where needed

Table	Fields
Users	userId, username, email, password, isAdmin
Categories	categoryId, name
Products	productId, name, image, brand, quantity, description, price, countInStock, rating, numReviews, categoryId (FK)
Orders	orderId, userId (FK), shippingAddress, paymentMethod, totalPrice, isPaid, isDelivered, paidAt, deliveredAt
OrderItems	itemId, orderId (FK), productId (FK), name, qty, price, image
Reviews	reviewId, productId (FK), userId (FK), rating, comment

## 3NF (Third Normal Form)

### ◆ Fixes Applied:

- Removed transitive dependencies (e.g., created Location table if needed)

Table	Fields
Users	userId, username, email, password, isAdmin
Categories	categoryId, name
Products	productId, name, brand, price, countInStock, description, categoryId (FK)
Orders	orderId, userId (FK), shippingMethod, paymentMethod, totalPrice, paidAt, deliveredAt, shippingAddressId (optional FK)
OrderItems	itemId, orderId (FK), productId (FK), qty, price, name, image
Reviews	reviewId, userId (FK), productId (FK), rating, comment
Locations (optional)	locationId, address, city, postalCode, country
ShippingAddress (optional)	shippingId, address, city, postalCode, country, orderId (FK)