

5. E-commerce Orders (Up to 4NF)

Table Data:

OrderID | CustomerID | Product | PaymentMethod
501 | 301 | Laptop | Credit Card
501 | 301 | Phone | Credit Card
502 | 302 | Tablet | PayPal
502 | 302 | Laptop | PayPal

Tasks:

- Identify multi-valued dependencies. - Check if the table violates 4NF.
- Normalize it to 4NF.

Hint:

A customer can order multiple products. A customer can use multiple payment methods. Product and PaymentMethod are independent.

Step 1: Understanding Multi-Valued Dependencies (MVDs)

A **multi-valued dependency (MVD)** exists when one attribute in a table uniquely determines multiple values of another attribute, **independently** of other attributes.

From the given table:

- A **customer** can place **multiple orders**.
- Each **order** can have **multiple products**.

- Each **order** has a **specific payment method**.
- **Products and payment methods are independent** at the **customer level** but not at the **order level**.

Thus, the **MVDs** are:

- 1 **OrderID** → → **Product** (Each order contains multiple products)
- 2 **OrderID** → **PaymentMethod** (Each order is paid using a single payment method)

Step 3: Normalize to 4NF

To remove the multi-valued dependencies, we create separate tables:

Final 4NF Schema

We'll create three tables:

- 1 **Orders Table** (Stores general order details, including payment method)
- 2 **Order_Items Table** (Stores the products associated with each order)
- 3 **Customers Table** (just for storing customer details)

click this link for see -> <https://dbdiagram.io/d/practice-question-5-67e63c2f4f7afba18487e55d>