In order to come up with a relational database schema for a simple e-commerce system and at the same time observe that it is normalized up to the 3rd Normal Form (3NF), we will be looking at the following entities and relationships:

* **Customers**
* **Orders**
* **Products**
* **Order Items**
* **Categories**
* **Product Categories**

Now let us go through in order sequentially in designing the schema and writing the required SQL scripts so that it is possible:

Entities and Attributes

**Customers**

* CustomerID (Primary Key)
* FirstName
* LastName
* Email
* Phone
* Address
* City
* State
* ZipCode

**Orders**

* OrderID (Primary Key)
* CustomerID (Foreign Key)
* OrderDate
* ShippingAddress
* ShippingCity
* ShippingState
* ShippingZipCode
* TotalAmount

**Products**

* ProductID (Primary Key)
* ProductName
* Description
* Price
* StockQuantity

**Order Items**

* OrderItemID (Primary Key)
* OrderID (Foreign Key)
* ProductID (Foreign Key)
* Quantity
* UnitPrice

**Categories**

* CategoryID (Primary Key)
* CategoryName
* Product Categories
* ProductID (Foreign Key)
* CategoryID (Foreign Key)

Relationships

Customers to Orders: One to Many

Orders to Order Items: One to Many

Products to Order Items: One to Many

Products to Categories: Many to Many (through Product Categories)

ER Diagram

Below is how the ER diagram looks like in order to explain the will of this relation.

Customers and orders, one to n relationship.

Orders to order items one to n relationships.

Products to order it one to n relationship and others.