ER Diagram to Third Normal Form

Entities

a. **Handle All Entities** – Customer, Order, Product, Store, City

**Customer** (customerName, email, address)

**Order** (orderNum, date)

**Product** (productID, size, color, weight, description)

**Store** (storeID, address, manager)

**City** (cityName, state, headquartersAddr)

b. **Strong Entities?** – Sorry, but no strong entities that are subtypes

c. **Weak Entities?** – Sorry, but no weak entities

Handle Relationships

a. **One-to-One Relationships?** – Sorry, but there are no one-to-one relationships

b. **One-to-Many Relationships?** – Order, Store

**Order** (orderNum, date, customerName † )

**Store** (storeID, address, manager, cityName †)

c. **Many-to-Many Relationships?** – Was ordered in, Hold, Is stored in

**Was ordered in** (orderNum†, productID†, quantity)

**Hold** (productID†, storeID†, quantity)

**Is stored in** (productID†, cityName†, quantity)

d. **Relationships Greater Than Binary?** – None

Listing Foreign Keys

**Order** (orderNum, date, customerName †)

* customerName† (Foreign Key), the home relation is Order

**Store** (storeID, address, manager, cityName†)

* cityName† (Foreign Key), the home relation is Store

**Was ordered in** (orderNum†, productID†, quantity)

* productID†, orderNum† (Foreign Keys)

**Hold** (productID†, storeID†, quantity)

* productID†, storeID† (Foreign Keys)

**Is stored in** (productID†, cityName†, quantity)

* cityName†, productName† (Foreign Keys)

The Final Relational Schema

**Customer** (customerName, email, address)

**Order** (orderNum, date customerName†)

**Product** (productID, size, color, weight, description)

**Store** (storeID, address, manager, cityName†)

**City** (cityName, state, headquartersAddr)

**Was ordered in** (orderNum†, productID†, quantity)

**Hold** (productID†, storeID†, quantity)

**Is stored in** (productID†, cityName†, quantity)