# **Phase 3: Data Modeling & Relationships 🛠️**

**Project:** Supply Chain Traceability & Inventory Management System

**Goal:** To establish the foundational database structure, custom objects, and core relationships necessary to map the physical journey of a product (Lot, Shipment, Location).

### **1. Data Model Overview**

The system relies on four primary custom objects linked via Master-Detail and Lookup relationships to ensure data integrity and traceability.

| **Object** | **API Name** | **Key Fields** | **Purpose** |
| --- | --- | --- | --- |
| **Product** | Product\_\_c | Name, SKU | Represents the abstract product type (e.g., "Organic Apples"). |
| **Lot** | Lot\_\_c | Name, **Barcode\_\_c** (Unique), **Current\_Inventory\_\_c** (Number) | Represents a specific manufacturing batch. This is the core traceability point. |
| **Shipment** | Shipment\_\_c | Name, **Quantity\_\_c** (Number) | Tracks a single movement of product from the factory/warehouse. |
| **Retail Location** | Retail\_Location\_\_c | Name, Address | Represents a final destination (Store or Warehouse). |

### **2. Relationship Architecture**

We utilized strong relationship types (Master-Detail) where appropriate to ensure cascading security and deletion behavior, which is critical for maintaining the integrity of the traceability chain.

| **Relationship** | **Field on Child Object** | **Type** | **Parent Object** | **Rationale** |
| --- | --- | --- | --- | --- |
| **Product-Lot** | Product\_\_c | Master-Detail | Product\_\_c | **Mandatory Link:** Ensures every batch belongs to a known product. |
| **Lot-Shipment** | Lot\_\_c | Master-Detail | Lot\_\_c | **Mandatory Link:** Every shipment must reference a specific batch ID. |
| **Shipment-Location** | Retail\_Location\_\_c | Lookup | Retail\_Location\_\_c | Links the shipment to its final point of sale/destination. |

### **3. Key Fields for Apex and LWC**

The following fields were created specifically to power the advanced functionality in later phases:

* **Barcode\_\_c (on Lot):** Set as **External ID** and **Unique**. This is the key search field for the **Traceability Scanner LWC** (Phase 6).
* **Current\_Inventory\_\_c (on Lot):** Tracks the available stock quantity, which is **decremented by the Apex Trigger** (Phase 5).
* **Quantity\_\_c (on Shipment):** Stores the quantity being shipped, serving as the input for the **Apex Trigger calculation**.

### **Data Model Visual Confirmation**

The Schema Builder view confirms the strong, parent-child relationships linking Product, Lot, and Shipment, forming the backbone of the traceability chain.

### **Custom Field Detail**

The Lot object configuration highlights the crucial Barcode\_\_c field setup.