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**Entities and Attributes**

1. **CUSTOMER**: Tracks information for each person placing an order.
   * CUSTOMER\_ID (PK): NOT NULL
   * CUSTOMER\_NAME: Full name, NOT NULL
   * CUSTOMER\_EMAIL: Email address, UNIQUE, NOT NULL
   * CUSTOMER\_ADDRESS: Shipping address, NOT NULL
   * CUSTOMER\_PHONE: Contact number
   * CUSTOMER\_SOURCE: How was customer acquired, NOT NULL
   * DATE\_REGISTERED: When customer first registered, DATE, NOT NULL
2. **ORDER**: Represents a single order placed by a customer.
   * ORDER\_ID (PK): Unique identifier, NOT NULL
   * ORDER\_DATE: When placed, DATETIME, NOT NULL, DEFAULT CURRENT\_TIMESTAMP
   * ORDER\_STATUS: Current state, ('Pending', 'Processing', 'Shipped', 'Completed', 'Cancelled'), NOT NULL
   * CUSTOMER\_ID (FK): References CUSTOMER(CUSTOMER\_ID), NOT NULL
3. **ORDER\_LINE**: Connects products to an order, detailing each item in the transaction.
   * ORDER\_ID (PK, FK): Part of composite key, NOT NULL
   * PRODUCT\_ID (PK, FK): Part of composite key, NOT NULL
   * QUANTITY: NOT NULL
   * PRICE\_PER\_UNIT: NOT NULL
   * IS\_BACKORDER: BOOLEAN
   * BACKORDER\_DATE: When backordered item is ordered, NOT NULL
4. **INVOICE**: Represents the bill generated for a completed order.
   * INVOICE\_ID (PK): NOT NULL
   * ORDER\_ID (FK): NOT NULL
   * INV\_DATE: datefield, NOT NULL
   * INV\_TOTAL: Sum of line items
   * SHIPPING\_CHARGES: Shipping cost
   * TAX\_AMOUNT: Sales tax
   * INV\_TOTAL: Final amount
   * PAYMENT\_STATUS: Status ('Pending', 'Paid', 'Failed', 'Refunded')
   * PAYMENT\_DATE: datefield, NOT NULL
5. **PRODUCT**: An item sold by the company, including its inventory level.
   * PRODUCT\_ID
   * PRODUCT\_NAME
   * PRODUCT\_CATEGORY
   * PRODUCT\_SCALE
   * PRODUCT\_PRICE
   * PRODUCT\_STOCK\_LEVEL
   * REORDER\_LEVEL
   * MFG\_ID
6. **MANUFACTURER**: A company from which RC\_Models sources its products.
   * MFG\_ID (PK): NOT NULL
   * MFG\_NAME: Company name,
   * MFG\_WEBSITE: URL for ordering
   * CONTACT\_INFO: Email/phone,
   * IS\_ACTIVE: available?
   * DATE\_ADDED: date listed

**Business Rules**

1. **CUSTOMER and ORDER**

* A **CUSTOMER** can place many **ORDER**s.
* Each **ORDER** is placed by only one **CUSTOMER**.

1. **ORDER, ORDER\_LINE, and PRODUCT**

* An **ORDER** must contain one or more products (recorded as **ORDER\_LINE**s).
* Each **ORDER\_LINE** belongs to only one **ORDER**.
* A **PRODUCT** can be included in many different **ORDER\_LINE**s.

1. **ORDER and INVOICE**

* Each **ORDER** generates one and only one **INVOICE**.
* An **INVOICE** is associated with exactly one **ORDER**.

1. **MANUFACTURER and PRODUCT**

* A **MANUFACTURER** may supply many **PRODUCT**s.
* Each **PRODUCT** is supplied by only one **MANUFACTURER**.

**Assumptions**

1. **CUSTOMER AND INVOICES**
   1. A customer may generate many invoices.
   2. Each invoice is generated by only one customer.
   3. Some customers have not generated an invoice until now.
2. **MANUFACTURER AND PRODUCT**
   1. A specific product is supplied by only one manufacturer.
   2. Each manufacturer may supply many products.
3. **Order, Lines and Pricing**  
    a. Every order must include at least one order line when created, even if some products are back-ordered.  
    b. The unit price on each order line is fixed at the time of order and never changes if product prices are updated later.  
    c. If a product is back-ordered, it must include an expected ship date that is on or after the order date.
4. **Inventory and Replenishment**  
    a. The actual stock is tracked through inventory transactions (sales, receipts, adjustments) the stock level column is just a summary view.  
    b. Reorders happen automatically when stock falls below the reorder level, and the quantity depends on product-specific policies.  
    c. Products unsold for 28 days are either scrapped or discounted, and backorders don’t reduce stock until items are shipped.
5. **Payments and settlement**  
    a. Payments are stored as payment transactions linked to invoices; multiple partial or reversal payments are allowed.  
    b. An invoice is marked Paid only when the total payments equal the invoice amount.  
    c. Refunds must relate to a prior payment and can’t exceed the total paid amount.
6. **Marketing Lists and Attribution**  
    a. External subscriber lists can be imported and linked to new customers for **source attribution** tracking.  
    b. Customers must **opt-in** to promotions; consent can’t be assumed for imported leads.
7. **Data Quality and Governance**  
    **a.** Product category and scale must come from predefined lists to ensure data consistency.  
    b. The invoice total must equal the sum of line totals plus shipping and tax.  
    c. Orders can’t exist without their customer and products can’t have overlapping price periods.

**Relationship**

CUSTOMER |o--|{ ORDER : places

ORDER ||--|| INVOICE : generates

ORDER ||--|{ ORDER\_LINE : contains

PRODUCT }o--|| ORDER\_LINE : "is on"

MANUFACTURER ||--|{ PRODUCT : supplies

MANUFACTURER ||--o{ ORDERS

CUSTOMER }o-- o{ PRODUCT

CUSTOMER |}--o| INVOICE

INVOICE ||--o{ PAYMENT\_TRANSACTION : includes

PRODUCT ||--o{ INVENTORY\_TRANSACTION : tracks

PRODUCT }o--o{ PROMOTION : featured in

CUSTOMER |o--o{ SUBSCRIPTION\_LIST : subscribes to

MANUFACTURER ||--o{ PURCHASE\_ORDER : fulfils

PURCHASE\_ORDER ||--|{ INVENTORY\_TRANSACTION : results in

PRODUCT ||--|{ PRICE\_HISTORY : maintains

ORDER ||--o{ SHIPMENT : ships in

SHIPMENT ||--|{ SHIPMENT\_ITEM : contains

PRODUCT ||--o{ SHIPMENT\_ITEM : included in