

RC_MODEL

Business Rules:

1) ENTITIES AND ATTRIBUTES

Based on the description, here are the entities with their primary attributes:

CUSTOMER (Cust_ID, Cust_Name, Cust_Email, Cust_Address, Cust_Phone, Cust_CreditCard, Date_Added, Customer_Type)

PRODUCT (Product_ID, Product_Name, Product_Type, Product_Scale, Unit_Price, Min_Quantity_OnHand, Min_Order_Quantity, Last_Sale_Date, Manufacturer_ID)

INVOICE (Invoice_ID, Invoice_Date, Cust_ID, Shipping_Charge, Total_Amount, Payment_Status)

INVENTORY (Product_ID, Quantity_OnHand, Reorder_Point, Last_Restock_Date)

MANUFACTURER (Manufacturer_ID, Manufacturer_Name, Manufacturer_Website, Contact_Info)

PURCHASE_ORDER (PO_ID, Manufacturer_ID, Order_Date, Total_Amount, Order_Status)

BACKORDER (Backorder_ID, Cust_ID, Product_ID, Quantity_Requested, Date_Requested, Date_Filled)

MARKETING_LIST (Marketing_ID, Cust_ID, Source, Date_Added, Contact_Status)

2) BUSINESS RULES

2. Business Rules for Relationships

Below are the business rules, written in the format your assignment specifies:

1. A **customer** may generate many **invoices**.
2. Each **invoice** is generated by only one **customer**.
3. Some customers have not (yet) generated an invoice.

4. A **customer** may place many orders.
5. Each **order** is placed by one and only one customer.
6. Each **order** may include one or more products.
7. Each **product** may appear in many orders.
8. An **invoice** must be associated with one order, but an **order** may generate one or more invoices (e.g., partial shipments).
9. A **product** is supplied by one manufacturer, but a **manufacturer** may supply many products.
10. A **product** is stored in one inventory location, and each **inventory record** corresponds to one product (1:1).
11. If an ordered product is out of stock, the **order** becomes a **backorder**.
12. Each **backorder** refers to exactly one product, but a **product** can appear in many backorders.
13. A **marketing record** is linked to one customer, but some **marketing records** may represent potential customers not yet in the customer table.
14. A **customer** can appear in multiple **marketing campaigns**, and each **marketing campaign** can include many customers (M:N via Marketing table).
15. **Inventory reorders** are automatically triggered when quantity_on_hand falls below the minimum threshold.
16. **Manufacturers** may exist without current product orders (optional participation).
17. **Backorders** are not billed until shipment occurs, linking them logically to the invoice generation process.

3) ADDITIONAL BUSINESS CONSTRAINTS (Non-Relationship Rules)

1. **Credit Card Processing:** All customer credit card charges are transmitted to CC Bank (external system - not modeled in database).

2. **Automatic Reordering:** Orders to manufacturers are automatically placed when product inventory reaches the specified minimum quantity on hand.
3. **Product Removal Rule:** If a product has not recorded a sale within four weeks of being stocked, it is removed from inventory and scrapped.
4. **Backorder Charging:** Back orders are not charged to a customer until the order is shipped.
5. **Invoice Generation:** When a customer completes a transaction, the invoice is printed and products are pulled from inventory for shipment.
6. **Order Quantity:** The number of product units ordered from manufacturers depends on the minimum order quantity specified for each product.
7. **Product Scales:** Models and decals are available in scales from 1/144 to 1/32.
8. **Payment Method:** Customers pay by credit card through the website.
9. **Manufacturer Orders:** All orders to manufacturers are placed via their websites and amounts are automatically handled through RC_Models' commercial bank account.
10. **Shipping:** Each invoice includes a shipping charge.

4) ASSUMPTIONS

1. **Customer Type:** We assume there are two types of customers:
 - Active customers (who have made purchases)
 - Prospect customers (from marketing lists who haven't purchased yet)
2. **Product Types:** Products are categorized as:
 - Plastic models (aircraft, ships, cars)
 - Decals (add-ons for models)
3. **Backorder Processing:** We assume backorders are processed on a first-come, first-served basis when inventory is replenished.
4. **Invoice Status:** Invoices can have statuses like: Pending, Paid, Shipped, Completed.
5. **Purchase Order Status:** Purchase orders can have statuses like: Pending, Ordered, Received, Partially Received.
6. **Marketing List Sources:** Sources include:
 - Direct customer registration
 - FineScale Modeler magazine subscription list
 - Product information requests
7. **Inventory Tracking:** We assume real-time inventory tracking with automatic updates when:
 - Products are sold (inventory decreased)
 - Products are received from manufacturers (inventory increased)
 - Products are scrapped (inventory removed)
8. **Unique Product Identification:** Each product has a unique identifier regardless of manufacturer.
9. **Price Tracking:** Unit prices on invoices and purchase orders are stored at the line item level to maintain historical pricing.
10. **Reorder Point Logic:** The minimum quantity on hand triggers automatic reordering, and the minimum order quantity determines how many units to order.

11. **Four-Week Sale Rule:** The "four weeks" is calculated from the date the product was last stocked (Last_Restock_Date) if no sale has been recorded.
12. **Single Manufacturer per Product:** Each product is sourced from only one manufacturer (no multiple sourcing for the same product)