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)

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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)