# Step-by-Step Guide for Building an Inventory Management System

## 1. Define Your Goal

Understand the core functionalities of the application:

- Add new products with name and quantity.
- Update the quantity of existing products.
- Remove products from the inventory.
- Calculate and display the total quantity of all products.
- Sort products alphabetically by name.
- Dynamically render the product list.

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## 2. Plan the Structure

Break the application into smaller components:

1. **Data Storage**: Use an array to store product details.
2. **Methods**: Define functions for adding, updating, removing, sorting, and rendering products, and calculating the total quantity.
3. **Event Handling**: Handle interactions like form submissions and button clicks.

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## 3. Start Writing Code

Begin with the basics and build incrementally:

### A. Set Up an Inventory Management Object

Create a JavaScript object (`inventorySystem`) to manage products and their associated actions:

- Properties:
  - `products`: Array to store product objects with attributes like `id`, `name`, and `quantity`.
- Methods:
  - `addProduct(name, quantity)`
  - `updateProductQuantity(id, newQuantity)`
  - `removeProduct(id)`
  - `calculateTotalQuantity()`
  - `sortProductsByName()`

   - `renderProducts()`
   - `resetForm()`

**B. Implement Core Methods**

Write the methods in a modular way:

- `addProduct`: Add a new product with a unique ID and specified name and quantity.
- `updateProductQuantity`: Update the quantity of a product by its ID.
- `removeProduct`: Remove a product from the list by its ID.
- `calculateTotalQuantity`: Calculate the sum of quantities for all products.
- `sortProductsByName`: Sort the products alphabetically by their name.
- `renderProducts`: Dynamically update the DOM to display the product list and total quantity.
- `resetForm`: Clear the input fields in the form.

**C. Attach Event Listeners**

Handle the interactions:

- **Form Submission**: Use `addEventListener` on the form to trigger `addProduct` for adding new products.
- **Update and Remove Buttons**: Dynamically generate buttons and attach handlers for updating and removing products.

**D. Test and Debug**

- Test each method individually in the browser console.
- Validate inputs for edge cases (e.g., empty fields, negative quantities).

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## 4. Order of Implementation

Follow this sequence:

**Initialize the Inventory Management Object**:

 const inventorySystem = { products: [] };

1. 
2. **Add Core Methods to the Object**:
   - `addProduct(name, quantity)`
   - `updateProductQuantity(id, newQuantity)`

    - `removeProduct(id)`
    - `calculateTotalQuantity()`
    - `sortProductsByName()`
    - `renderProducts()`
    - `resetForm()`
3. **Create Event Handlers**:
    - Write the logic for form submission and attach it to the "Submit" button.
    - Write the logic for update and remove actions and attach them to dynamically generated buttons.
4. **DOM Manipulation**:
    - Use `document.createElement` and `appendChild` to render products.
    - Dynamically update the DOM for product list and total quantity.
5. **Test the Flow**:
    - Add products.
    - Update and remove products.
    - Calculate the total quantity.
    - Sort products alphabetically.
    - Ensure the DOM updates correctly.

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### 5. Add Features Incrementally

Once the basics work, enhance the application:

- **Advanced Sorting**: Allow sorting by quantity in addition to name.
- **Search Functionality**: Add a search bar to filter products by name.
- **Validation**: Ensure fields are filled correctly and quantities are valid before submission.
- **Styling**: Apply CSS classes for better UI and user experience.

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### 6. Checklist for Completion

- Products are added correctly with unique IDs.
- Product quantities can be updated.
- Products can be removed from the inventory.
- The total quantity of all products is calculated and displayed.
- Products can be sorted alphabetically by name.
- The product list renders dynamically and updates after actions.

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**By following this roadmap, you will systematically build the Inventory Management System with clarity and focus.**