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1  #include <iostream>
2  #include <vector>
3  #include <iomanip>
4  #include <limits>
5  using namespace std;
6
7  class Product {
8  private:
9      string name;
10     int id;
11     int quantity;
12     double price;
13
14 public:
15     Product(string name, int id, int quantity, double price)
16         : name(name), id(id), quantity(quantity), price(price) {}
17
18     int getId() const { return id; }
19     int getQuantity() const { return quantity; }
20     double getPrice() const { return price; }
21     string getName() const { return name; }
22
23     void displayProductInfo() const {
24         cout << "Product ID: " << id << "\n"
25             << "Product Name: " << name << "\n"
26             << "Quantity: " << quantity << "\n"
27             << "Price: $" << fixed << setprecision(2) << price << "\n";
28     }
29
30     void updateQuantity(int amount) {
31         if (quantity + amount >= 0) {
32             quantity += amount;
33         } else {
34             cout << "Insufficient quantity for this update.\n";
35         }
36     }
37
38     double getTotalValue() const { return price * quantity; }
39
40     void displayProduct() const {
41         cout << setw(10) << id << setw(15) << name << setw(10) << quantity << setw(10) << price << "\n";
42     }
43 };
44
45 class Inventory {
46 private:
47     vector<Product> products;
48
49 public:
50     void addProduct() {
51         if (products.size() >= 100) {
52             cout << "Inventory limit reached. Cannot add more products.\n";
53             return;
54         }
55
56         string name;
57         int id, quantity;
58         double price;
59
60         cout << "Enter product name: ";
61         cin.ignore(); // Clear any leftover newline characters
62         getline(cin, name); // Use getline for product name to allow spaces
63
64         cout << "Enter product ID: ";
65         while (!(cin >> id) || id <= 0) {
66             cout << "Invalid input. Please enter a positive integer for ID: ";

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67         cin.clear();
68         cin.ignore(numeric_limits<streamsize>::max(), '\n');
69     }
70
71     cout << "Enter quantity: ";
72     while (!(cin >> quantity) || quantity < 0) {
73         cout << "Invalid input. Please enter a non-negative integer for quantity: ";
74         cin.clear();
75         cin.ignore(numeric_limits<streamsize>::max(), '\n');
76     }
77
78     cout << "Enter price: ";
79     while (!(cin >> price) || price < 0) {
80         cout << "Invalid input. Please enter a non-negative value for price: ";
81         cin.clear();
82         cin.ignore(numeric_limits<streamsize>::max(), '\n');
83     }
84
85     products.emplace_back(name, id, quantity, price);
86     cout << "Product added successfully!\n";
87
88     /* Example output:
89     Enter product name: Laptop
90     Enter product ID: 101
91     Enter quantity: 10
92     Enter price: 799.99
93     Product added successfully!
94     */
95 }
96
97 void displayAllProducts() const {
98     if (products.empty()) {
99         cout << "No products in inventory.\n";
100        return;
101    }
102
103     cout << setw(10) << "ID" << setw(15) << "Name" << setw(10) << "Quantity" << setw(10) << "Price\n";
104     cout << "-----\n";
105     for (const auto& product : products) {
106         product.displayProduct();
107     }
108
109     /* Example output:
110     ID      Name      Quantity  Price
111     -----
112     101     Laptop      10       799.99
113     102     Mouse       50       19.99
114     */
115 }
116
117 void updateProductQuantity() {
118     int id, changeAmount;
119     cout << "Enter product ID to update: ";
120     while (!(cin >> id) || id <= 0) {
121         cout << "Invalid input. Please enter a positive integer for ID: ";
122         cin.clear();
123         cin.ignore(numeric_limits<streamsize>::max(), '\n');
124     }
125
126     for (auto& product : products) {
127         if (product.getId() == id) {
128             cout << "Enter quantity to add/subtract (use negative for reduction): ";
129             while (!(cin >> changeAmount)) {
130                 cout << "Invalid input. Please enter an integer for quantity change: ";
131                 cin.clear();
132                 cin.ignore(numeric_limits<streamsize>::max(), '\n');

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133         }
134         product.updateQuantity(changeAmount);
135         cout << "Quantity updated successfully!\n";
136         return;
137     }
138 }
139 cout << "Product not found.\n";
140
141 /* Example output:
142     Enter product ID to update: 101
143     Enter quantity to add/subtract (use negative for reduction): 5
144     Quantity updated successfully!
145 */
146 }
147
148 void deleteProduct() {
149     int id;
150     cout << "Enter product ID to delete: ";
151     while (!(cin >> id) || id <= 0) {
152         cout << "Invalid input. Please enter a positive integer for ID: ";
153         cin.clear();
154         cin.ignore(numeric_limits<streamsize>::max(), '\n');
155     }
156
157     for (auto it = products.begin(); it != products.end(); ++it) {
158         if (it->getId() == id) {
159             products.erase(it);
160             cout << "Product deleted successfully!\n";
161             return;
162         }
163     }
164     cout << "Product not found.\n";
165
166     /* Example output:
167         Enter product ID to delete: 102
168         Product deleted successfully!
169     */
170 }
171
172 void calculateTotalInventoryValue() const {
173     double totalValue = 0;
174     for (const auto& product : products) {
175         totalValue += product.getTotalValue();
176     }
177     cout << "Total inventory value: $" << fixed << setprecision(2) << totalValue << "\n";
178
179     /* Example output:
180         Total inventory value: $11999.85
181     */
182 }
183 };
184
185 int main() {
186     Inventory inventory;
187     int choice;
188
189     while (true) {
190         cout << "\nInventory Management System\n";
191         cout << "1. Add New Product\n";
192         cout << "2. Display All Products\n";
193         cout << "3. Update Product Quantity\n";
194         cout << "4. Delete a Product\n";
195         cout << "5. Calculate Total Inventory Value\n";
196         cout << "6. Exit\n";
197         cout << "Enter your choice: ";
198         while (!(cin >> choice) || choice < 1 || choice > 6) {

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```
199         cout << "Invalid choice. Please enter a number between 1 and 6: ";
200         cin.clear();
201         cin.ignore(numeric_limits<streamsize>::max(), '\n');
202     }
203
204     switch (choice) {
205     case 1:
206         inventory.addProduct();
207         break;
208     case 2:
209         inventory.displayAllProducts();
210         break;
211     case 3:
212         inventory.updateProductQuantity();
213         break;
214     case 4:
215         inventory.deleteProduct();
216         break;
217     case 5:
218         inventory.calculateTotalInventoryValue();
219         break;
220     case 6:
221         cout << "Exiting the program.\n";
222         return 0;
223     }
224 }
225 }
```