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CST-150

Grand Canyon University

Milestone

Video: <https://youtu.be/KErL1S4Bmfc>

GitHub: <https://github.com/Omni-v/Cst-150-Workspace/tree/master/milestone>

UML



Written discussion

What I Learned:

1. Importance of Iterative Development: Going step by step through each functionality, from system setup to debugging, taught me the power of iterative development. This approach allowed me to adapt to challenges, refine the application continuously, and keep it on the right path.

2. Collaborative Problem Solving: Working collaboratively showed me the strength of different perspectives when tackling complex issues. Having an outside viewpoint allowed me to understand various approaches to solving problems.

Challenges I Faced:

1. Errors and Debugging: Debugging the application was a significant challenge. It tested my problem-solving skills, especially when errors weren't immediately apparent. Handling errors in real-time was a valuable learning experience.
2. Naming Confusions: The overlapping naming conventions I encountered highlighted the importance of clear and distinct naming in coding. This experience emphasized how proper naming can prevent confusion and improve code clarity.
3. Unit Testing: Setting up a testing environment using XUnit brought its own set of challenges. Ensuring that the tests aligned with the actual code and debugging any inconsistencies was a rewarding learning curve.

Future Improvements:

1. Code Clarity: Given more time, I would revisit the code to enhance clarity and maintainability. Clear, organized code is essential for making future updates and improvements efficiently.
2. Database Integration: Transitioning from a list-based system to a database-backed structure is a natural evolution. This enhancement would provide scalability and robustness, crucial for real-world applications.
3. User Experience: If this were a GUI application, I'd concentrate on improving the user interface to enhance intuitiveness and introduce more features.

4. Expand Testing: Expanding the testing suite to address more edge cases and possibly delving into integration testing would provide thorough coverage and ensure a more reliable application.

Application to Future Projects:

1. Code Modularity: The project reinforced the significance of writing adaptable and modular code. This principle isn't limited to inventory systems but applies universally, whether I'm developing games, mobile apps, or web services.
2. Rigorous Error Handling: Robust error handling is crucial across all projects. Ensuring users receive helpful feedback instead of facing unhandled errors is a priority in any development endeavor.
3. Emphasis on Testing: This project underscored the importance of testing. Ensuring that every aspect functions as intended is vital, and I'll carry this lesson into all my future development ventures.

Main Application:

```
public partial class InventoryApplication : Form
{
    List<InventoryItem> items = new List<InventoryItem>();

    public InventoryApplication()
    {
        InitializeComponent();
    }

    private void btnAddToInventory_Click(object sender, EventArgs e)
    {
        InventoryItem newItem;

        try
        {
            // Validate ID
            if (!int.TryParse(IdNumberTextBox.Text, out int id) || id < 0)
            {
                throw new InvalidOperationException("Please enter a valid positive ID.");
            }

            // Validate item name
            string itemName = NameTextBox.Text;
            if (string.IsNullOrEmpty(itemName))
            {
                throw new InvalidOperationException("Please enter a valid item name.");
            }

            // Validate price
            if (!double.TryParse(PriceTextBox.Text, out double price) || price < 0)
            {
                throw new InvalidOperationException("Please enter a valid positive price.");
            }

            // Validate quantity
            if (!int.TryParse(QuantityTextBox.Text, out int itemQuantity) || itemQuantity < 0)
            {
                throw new InvalidOperationException("Please enter a valid positive quantity.");
            }

            // Capture type
            string itemType = TypeTextBox.Text;

            // Create and add the new item
            newItem = new InventoryItem(id, itemName, price, itemQuantity, itemType);
            items.Add(newItem);

            MessageBox.Show($"{itemName} has been added to inventory with a quantity of {itemQuantity}.", "Item Added", MessageBoxButtons.OK, MessageBoxIcon.Information);
        }
        catch (InvalidOperationException ex)
        {
            // Handle expected exceptions (e.g., bad input)
            MessageBox.Show(ex.Message, "Input Error", MessageBoxButtons.OK, MessageBoxIcon.Error);
        }
        catch (Exception ex)
        {
            // Handle unexpected exceptions
            MessageBox.Show($"An unexpected error occurred: {ex.Message}", "Error", MessageBoxButtons.OK, MessageBoxIcon.Error);
        }
    }

    private void btnRemove_Click(object sender, EventArgs e)
    {
        try
        {
            if (!int.TryParse(IdNumberTextBox.Text, out int idToRemove))
            {
                throw new InvalidOperationException("Please enter a valid ID to remove.");
            }
        }
    }
}
```

```
82 private void btnRemove_Click(object sender, EventArgs e)
83 {
84     try
85     {
86         if (!int.TryParse(IdNumberTextBox.Text, out int idToRemove))
87         {
88             throw new InvalidOperationException("Please enter a valid ID to remove.");
89         }
90
91         var itemToRemove = items.FirstOrDefault(item => item.Id == idToRemove);
92
93         if (itemToRemove != null)
94         {
95             string itemName = itemToRemove.Name;
96             int itemQuantity = itemToRemove.Quantity;
97
98             items.Remove(itemToRemove);
99             MessageBox.Show($"{itemName} with a quantity of {itemQuantity} has been removed from the inventory.", "Item Removed", MessageBoxButtons.OK, MessageBoxIcon.Information);
100         }
101         else
102         {
103             MessageBox.Show("Item with the specified ID was not found.", "Item Not Found", MessageBoxButtons.OK, MessageBoxIcon.Warning);
104         }
105     }
106     catch (InvalidOperationException ex)
107     {
108         // Handle expected exceptions (e.g., bad input)
109         MessageBox.Show(ex.Message, "Input Error", MessageBoxButtons.OK, MessageBoxIcon.Error);
110     }
111     catch (Exception ex)
112     {
113         // Handle unexpected exceptions
114         MessageBox.Show($"An unexpected error occurred: {ex.Message}", "Error", MessageBoxButtons.OK, MessageBoxIcon.Error);
115     }
116 }
117
118 private void btnRestock_Click(object sender, EventArgs e)
119 {
120     try
121     {
122         if (!int.TryParse(QuantityTextBox.Text, out int restockAmount) || restockAmount < 0)
123         {
124             throw new InvalidOperationException("Please enter a valid positive quantity.");
125         }
126
127         foreach (var item in items)
128         {
129             item.Restock(restockAmount);
130         }
131
132         // Optionally: Refresh your UI elements here, if you have any display showing the items' quantities.
133         MessageBox.Show($"Successfully restocked all items by {restockAmount} units.", "Restocked", MessageBoxButtons.OK, MessageBoxIcon.Information);
134     }
135     catch (InvalidOperationException ex)
136     {
137         // Handle expected exceptions (e.g., bad input)
138         MessageBox.Show(ex.Message, "Input Error", MessageBoxButtons.OK, MessageBoxIcon.Error);
139     }
140     catch (Exception ex)
141     {
142         // Handle unexpected exceptions
143         MessageBox.Show($"An unexpected error occurred: {ex.Message}", "Error", MessageBoxButtons.OK, MessageBoxIcon.Error);
144     }
145 }
146
147 public List<InventoryItem> SearchItems(string query, double? minPrice = null, double? maxPrice = null)
148 {
149     return items.Where(item =>
150         (string.IsNullOrEmpty(query) ||
151          item.Name.Contains(query, StringComparison.OrdinalIgnoreCase) ||
152          item.Id.ToString().Contains(query)) ||
153         minPrice != null && item.Price >= minPrice &&
154         maxPrice != null && item.Price <= maxPrice);
155 }
```

```


1  using System;
2  using System.Collections.Generic;
3  using System.Linq;
4
5  namespace buttonClicker;
6
7
8  public class InventoryManager
9  {
10     private List<InventoryItem> items;
11
12
13
14     public InventoryManager()
15     {
16         items = new List<InventoryItem>();
17     }
18
19     public void AddItem(string idNumber, string name, double price, int quantity, string type)
20     {
21
22         var existingItem = items.FirstOrDefault(i => i.IdNumber == idNumber);
23         if (existingItem != null)
24         {
25             throw new InvalidOperationException($"Item with ID {idNumber} already exists.");
26         }
27
28         var newItem = new InventoryItem
29         {
30             IdNumber = idNumber,
31             Name = name,
32             Price = price,
33             Quantity = quantity,
34             Type = type
35         };
36         items.Add(newItem);
37     }
38
39     public bool RemoveItem(string id)
40     {
41         var itemToRemove = items.FirstOrDefault(item => item.IdNumber == id);
42         if (itemToRemove != null)
43         {
44             items.Remove(itemToRemove);
45             return true; // indicates successful removal
46         }
47         return false; // indicates item not found, so not removed
48     }
49     public List<InventoryItem> SearchItems(string query, double? minPrice = null, double? maxPrice = null)
50     {
51         return items.Where(item =>
52             (string.IsNullOrEmpty(query) ||
53              item.Name.Contains(query, StringComparison.OrdinalIgnoreCase) ||
54              item.IdNumber.Contains(query) ||
55              item.Price.ToString().Contains(query) ||
56              item.Quantity.ToString().Contains(query)) &&
57             (!minPrice.HasValue || item.Price >= minPrice) &&
58             (!maxPrice.HasValue || item.Price <= maxPrice))
59             .ToList();
60     }
61
62     public void RestockItem(string id, int quantity)
63     {
64         var itemToRestock = items.FirstOrDefault(item => item.IdNumber == id);
65         if (itemToRestock != null)
66         {
67             itemToRestock.Quantity += quantity;
68         }
69         else
70         {
71             throw new InvalidOperationException($"No item with ID {id} found to restock.");
72         }
73     }
74 }

```

```

112     {
113         // Handle unexpected exceptions
114         MessageBox.Show($"{ex.Message}", "Error", MessageBoxButtons.OK, MessageBoxIcon.Error);
115     }
116 }
117
118 private void btnRestock_Click(object sender, EventArgs e)
119 {
120     try
121     {
122         if (!int.TryParse(QuantityTextBox.Text, out int restockAmount) || restockAmount < 0)
123         {
124             throw new InvalidOperationException("Please enter a valid positive quantity.");
125         }
126
127         foreach (var item in items)
128         {
129             item.ReStock(restockAmount);
130         }
131
132         // Optionally: Refresh your UI elements here, if you have any display showing the items' quantities.
133
134         MessageBox.Show($"Successfully restocked all items by {restockAmount} units.", "Restocked", MessageBoxButtons.OK, MessageBoxIcon.Information);
135     }
136     catch (InvalidOperationException ex)
137     {
138         // Handle expected exceptions (e.g., bad input)
139         MessageBox.Show(ex.Message, "Input Error", MessageBoxButtons.OK, MessageBoxIcon.Error);
140     }
141     catch (Exception ex)
142     {
143         // Handle unexpected exceptions
144         MessageBox.Show($"{ex.Message}", "Error", MessageBoxButtons.OK, MessageBoxIcon.Error);
145     }
146 }
147
148 public List<InventoryItem> SearchItems(string query, double? minPrice = null, double? maxPrice = null)
149 {
150     return items.Where(item =>
151         (string.IsNullOrEmpty(query) ||
152          item.Name.Contains(query, StringComparison.OrdinalIgnoreCase) ||
153          item.Id.ToString().Contains(query) ||
154          item.Price.ToString().Contains(query) ||
155          item.Quantity.ToString().Contains(query)) &&
156         ((minPrice.HasValue || item.Price >= minPrice) &&
157          (maxPrice.HasValue || item.Price <= maxPrice)))
158         .ToList();
159 }
160
161 private void btnDisplayItems_Click(object sender, EventArgs e)
162 {
163     searchResultsListBox.Items.Clear();
164     foreach (var item in items)
165     {
166         searchResultsListBox.Items.Add(item.DisplayInfo());
167     }
168 }
169
170 private void exitFormButton_Click(object sender, EventArgs e)
171 {
172     // Optionally: Confirm the user's choice to exit
173     DialogResult result = MessageBox.Show("Are you sure you want to exit?", "Exit Confirmation", MessageBoxButtons.YesNo, MessageBoxIcon.Question);
174
175     if (result == DialogResult.Yes)
176     {
177         this.Close();
178     }
179 }
180
181

```

 class System.String
Represents text as a sequence of UTF-16 code units.


```

        throw new InvalidOperationException($"Item with ID {idNumber} already exists.");
    }

    var newItem = new InventoryItem
    {
        IdNumber = idNumber,
        Name = name,
        Price = price,
        Quantity = quantity,
        Type = type
    };
    items.Add(newItem);
}

public bool RemoveItem(string id)
{
    var itemToRemove = items.FirstOrDefault(item => item.IdNumber == id);
    if (itemToRemove != null)
    {
        items.Remove(itemToRemove);
        return true; // indicates successful removal
    }
    return false; // indicates item not found, so not removed
}

public List<InventoryItem> SearchItems(string query, double? minPrice = null, double? maxPrice = null)
{
    return items.Where(item =>
        (string.IsNullOrEmpty(query) ||
         item.Name.Contains(query, StringComparison.OrdinalIgnoreCase) ||
         item.IdNumber.Contains(query) ||
         item.Price.ToString().Contains(query) ||
         item.Quantity.ToString().Contains(query)) &&
        (!minPrice.HasValue || item.Price >= minPrice) &&
        (!maxPrice.HasValue || item.Price <= maxPrice))
        .ToList();
}

public void RestockItem(string id, int quantity)
{
    var itemToRestock = items.FirstOrDefault(item => item.IdNumber == id);
    if (itemToRestock != null)
    {
        itemToRestock.Quantity += quantity;
    }
    else
    {
        throw new InvalidOperationException($"No item with ID {id} found to restock.");
    }
}

public class InventoryItem
{
    public string IdNumber { get; set; }
    public string Name { get; set; }
    public double Price { get; set; }
    public int Quantity { get; set; }
    public string Type { get; set; }
}

```

Xunit test code

```
1 using System;
2 using Xunit;
3 using System.Linq;
4
5 namespace buttonClicker
6 {
7     public class InventoryManagerTests
8     {
9         [Fact]
10        public void Can_Add_New_Item_To_Inventory()
11        {
12            // Arrange
13            var inventoryManager = new InventoryManager();
14
15            // Act
16            inventoryManager.AddItem("1", "TestItem", 10.0, 5, "TestType");
17
18            var addedItems = inventoryManager.SearchItems("1");
19            var addedItem = addedItems.FirstOrDefault();
20
21            // Assert
22            Assert.NotNull(addedItem);
23            Assert.Equal("1", addedItem.IdNumber);
24            Assert.Equal("TestItem", addedItem.Name);
25            Assert.Equal(10.0, addedItem.Price);
26            Assert.Equal(5, addedItem.Quantity);
27            Assert.Equal("TestType", addedItem.Type);
28        }
29
30        [Fact]
31        public void Can_Remove_Item_From_Inventory()
32        {
33            // Arrange
34            var inventoryManager = new InventoryManager();
35            inventoryManager.AddItem("1", "TestItem", 10.0, 5, "TestType");
36
37            // Act
38            var result = inventoryManager.RemoveItem("1");
39            var searchResults = inventoryManager.SearchItems("1");
40
41            // Assert
42            Assert.True(result);
43            Assert.Empty(searchResults);
44        }
45
46        [Fact]
47        public void Can_Restock_Item_In_Inventory()
48        {
49            // Arrange
50            var inventoryManager = new InventoryManager();
51            string itemId = "1";
52            inventoryManager.AddItem(itemId, "TestItem", 10.0, 5, "TestType");
53
54            // Act
55            inventoryManager.RestockItem(itemId, 5);
56            var restockedItems = inventoryManager.SearchItems(itemId);
57            var restockedItem = restockedItems.FirstOrDefault();
58
59            // Assert
60            Assert.NotNull(restockedItem);
61            Assert.Equal(10, restockedItem.Quantity);
62        }
63    }
64 }
```

Application running:

The screenshot shows the 'inventoryApplication' window with a red background. It contains a 'Required Information' section with input fields for Item ID#, Name, price, Quantity, and Type. A list box displays '1 | Apples | \$5 | 10 units'. Search filters for max price, min price, and Name/ID#/Quantity are present, with 'apples' entered in the last. Action buttons include Add Item, Remove, Restock, Display, Search, and Exit.

Required Information

Item ID#

Name

price

Quantity

Type

1 | Apples | \$5 | 10 units

Search items by Id, name, price, quantity, or type.

max price -

min price -

Name/ ID #/ Quantity -

Add Item Remove Display Restock Search Exit

The second screenshot shows the application after several actions. The list box now contains three items: '1 | Apples | \$5 | 10 units', '2 | oranges | \$10 | 10 units', and '3 | Pineapple | \$5 | 10 units'. The 'Item ID#' field is set to '2'. A modal dialog titled 'Item Removed' is open, displaying an information icon and the message: 'oranges with a quantity of 10 has been removed from the inventory.' with an 'OK' button.

Required Information

Item ID#

Name

price

Quantity

Type

1 | Apples | \$5 | 10 units
2 | oranges | \$10 | 10 units
3 | Pineapple | \$5 | 10 units

Search items by Id, name, price, quantity, or type.

max price -

min price -

Name/ ID #/ Quantity -

Add Item Remove Display Restock Search Exit

Item Removed

oranges with a quantity of 10 has been removed from the inventory.

OK

inventoryApplication

Required Information

Item ID#

Name

price

Quantity

Type

Add Item **Remove** **Display**

Restock

1 | Apples | \$5 | 10 units
2 | oranges | \$10 | 10 units
3 | Pineapple | \$5 | 10 units

Search items by Id, name, price, quantity, or type.

max price -

min price -

Name/ ID #/ Quantity -

Search **Exit**

Input Error

Please enter a valid ID to remove.

OK

inventoryApplication

Required Information

Item ID#

Name

price

Quantity

Type

Add Item **Remove** **Display**

Restock

searchResultsListBox

Search items by Id, name, price, quantity, or type.

max price -

min price -

Name/ ID #/ Quantity -

Search **Exit**

inventoryApplication

Required Information

Item ID#

Name

price

Quantity

Type

1 | Apples | \$5 | 10 units
2 | oranges | \$10 | 10 units
3 | Pineapple | \$5 | 10 units

Search items by Id, name, price, quantity, or type.

max price -

min price -

Name/ ID #/ Quantity -

Add Item **Remove** **Display**

Restock **Search** **Exit**

inventoryApplication

Required Information

Item ID#

Name

price

Quantity

Type

Search items by Id, name, price, quantity, or type.

max price -

min price -

Name/ ID #/ Quantity -

Add Item **Remove** **Display**

Restock **Search** **Exit**

Item Added

Apples has been added to inventory with a quantity of 10.

OK

inventoryApplication

Required Information

Item ID#

3

Name

Pineapple

price

5

Quantity

10

Type

fruit

Add Item

Remove

Display

Restock

Search

Exit

Search items by Id, name, price, quantity, or type.

max price -

min price -

Name/ ID #/ Quantity -

lazer

No Results

No items match your search criteria.

OK

inventoryApplication

Required Information

Item ID#

Name

price

Quantity

Type

Add Item

Remove

Display

Restock

Search

Exit

1 | Apples | \$5 | 10 units

3 | Pineapple | \$5 | 10 units

Search items by Id, name, price, quantity, or type.

max price -

5

min price -

1

Name/ ID #/ Quantity -