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CS 260

Assignment 1 – Bag of Marbles

Some way of representing marbles:

```
6   class MarbleBag {
7   private:
8       unordered_map<string, int> marbles;
9
```

The class “MarbleBag” represents a bag of marbles, and the variable “marbles” is an unordered map which stores the count and color of each marble.

A way to add new marbles into the bag:

```
10  public:
11      // Function to add marbles to the bag.
12      void addMarbles(const string& color, int count) {
13          marbles[color] += count;
14      }
```

The “addMarbles” function takes two parameters, color(string) and count(int), and adds them to the bag.

A way to remove a marble out of the bag:

```
17      void removeMarbles(const string& color, int count) {
18          if (marbles.find(color) != marbles.end()) {
19              marbles[color] -= count;
20              if (marbles[color] <= 0)
21                  marbles.erase(color);
22          } else {
23              cout << "Marble color '" << color << "' not found in the bag." << endl;
24          }
25      }
```

The “removeMarbles” function takes the same two parameters, color(string) and count(int), and removes them from the bag. In addition, this function checks if the specified marble color exists in the bag before attempting to remove it.

A few ways that we could use to show that our implementation should be working correctly:

```
Choose an option:
1. Add marbles to the bag
2. Remove marbles from the bag
3. Display contents of the bag
4. Exit
Enter your choice:
```

This is the menu displayed in the terminal.

```
Choose an option:
1. Add marbles to the bag
2. Remove marbles from the bag
3. Display contents of the bag
4. Exit
Enter your choice: 3
The bag is empty.
```

Display the contents of an empty bag.

```
80              case 3:
81                  bag.displayContents();
82                  break;
```

```
28      void displayContents() {
29          if (marbles.empty()) {
30              cout << "The bag is empty." << endl;
31          } else {
32              cout << "Marble Bag Contents:" << endl;
33              for (const auto& pair : marbles) {
34                  cout << pair.first << ": " << pair.second << endl;
35              }
36          }
37      }
38  };
```

The “displayContents” function prints the contents of the bag. It iterates over each element in “marbles” and prints the key and mapped values.

```
Choose an option:
1. Add marbles to the bag
2. Remove marbles from the bag
3. Display contents of the bag
4. Exit
Enter your choice: 1
Enter the color of the marble to add: green
Enter the number of marbles to add: 90
```

Adding 90 green marbles to the bag.

```
Choose an option:
1. Add marbles to the bag
2. Remove marbles from the bag
3. Display contents of the bag
4. Exit
Enter your choice: 3
Marble Bag Contents:
green: 90
```

Checking the bag contents shows 90 green marbles.

```
Choose an option:
1. Add marbles to the bag
2. Remove marbles from the bag
3. Display contents of the bag
4. Exit
Enter your choice: 2
Enter the color of the marble to remove: red
Enter the number of marbles to remove: 50
Marble color 'red' not found in the bag.
```

Trying to remove marbles that are not in the bag.

```
Choose an option:
1. Add marbles to the bag
2. Remove marbles from the bag
3. Display contents of the bag
4. Exit
Enter your choice: 2
Enter the color of the marble to remove: green
Enter the number of marbles to remove: 90
```

```
Choose an option:
1. Add marbles to the bag
2. Remove marbles from the bag
3. Display contents of the bag
4. Exit
Enter your choice: 3
The bag is empty.
```

Remove the 90 green marbles from the bag.

```
Trying to remove a marble from an empty bag...
Marble color 'blue' not found in the bag.

Contents of the bag after attempting to remove from an empty bag:
The bag is empty.
```

```
47   // Attempt to remove a marble from an empty bag.
48   cout << "Trying to remove a marble from an empty bag..." << endl;
49   bag.removeMarbles("blue", 1);
50
51   // Display contents of the bag (should show that it's empty).
52   cout << "\nContents of the bag after attempting to remove from an empty bag:" << endl;
53   bag.displayContents();
```

Test output of removing marbles from an empty bag.