GIT Department Of Computer Engineering
CSE 222/505 - Spring 2020
Homework 7 Report

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PART 4

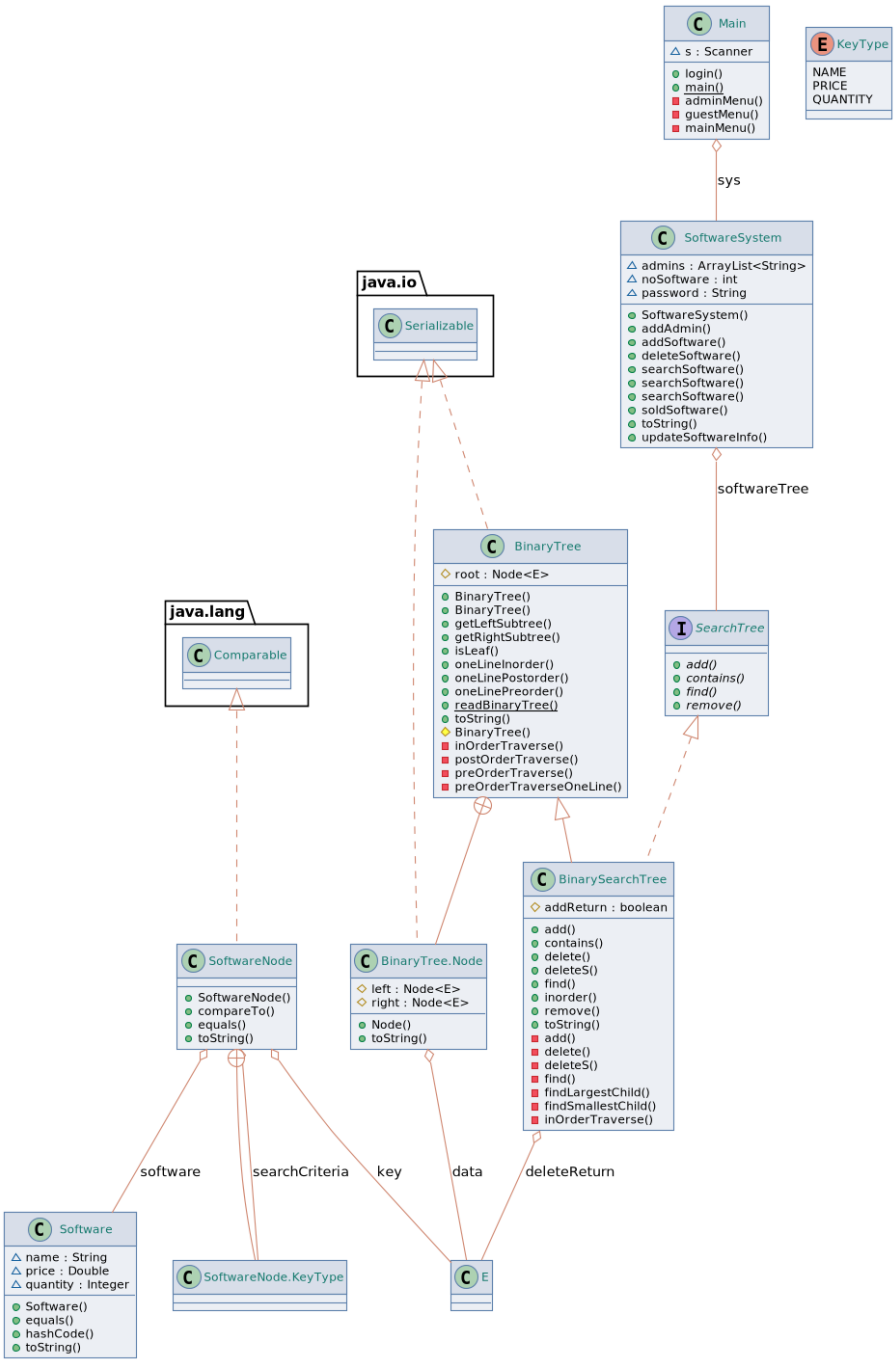
1 Problem Solution Approach

I have started by creating necessary classes. I have decided to store admins and softwares in a class called `SoftwareSystem`. The type of data structure to store software is `SearchTree` interface. I have used `BinarySearchTree` class from book, although any tree structure implements `SearchTree` interface can be used. I have implemented the menu in the `Main` class.

The program should support searching with different criteria. One way doing this was creating 3 different tree but in this case, when removing or adding a new element; changes must be applied all of the trees. Therefore I came up with another idea. I have created `SoftwareNode` class which has a key, the type of the key and reference to information of actual `Software` object. Type of *key* is generic. Therefore I can add three nodes for every software with specific keys: name, price and quantity. Since there are 3 search criteria with different types, I have overloaded `softwareSearch()` method so that it can work with different types. For this type of entities of software, I don't need the specify criteria, since they all have different data types. However, I thought its better to use enum type criteria, because of extensibility of the program.

For error handling, I consider the situation where user put unmatched search criteria. In this case it throws `IllegalArguementException()`. In menu part I haven't checked if the user put unmatched data type, since Java already handles, and throw exceptions in this case. However I have checked if software exist for `removeSoftware()` and `updateSoftwareInfo()` methods.

2 Class Diagrams



3 Test Cases

I have created some text cases for some adding and removing operations which is present on my main method as commented out.

Test Case ID	Test Scenario	Test Steps	Expected Results	Actual Results	Pass/Fail
T01	Print all software	Softwares added. System.out.println(main.sys.softwareTree);	All software printed in increasing order	As expected	Pass
T02	Search a software by name	System.out.println(main.sys.searchSoftware(SoftwareNode.KeyType.NAME, "Photoshop 6.0"));	Software found successfully	As expected	Pass
T03	Search a software by quantity	System.out.println(main.sys.searchSoftware(SoftwareNode.KeyType.QUANTITY, 1));	Software found successfully	As expected	Pass
T04	Search a software by price	System.out.println(main.sys.searchSoftware(SoftwareNode.KeyType.PRICE, 90.0));	Software found successfully	As expected	Pass
T05	Sold software	Software software = main.sys.searchSoftware(SoftwareNode.KeyType.PRICE, 90.0); System.out.println(main.sys.soldSoftware(software.name)); System.out.println(main.sys.softwareTree);	Quantitiy of software decreased by 1	As expected	Pass
T06	Delete software	System.out.println(main.sys.deleteSoftware(software)); System.out.println(main.sys.softwareTree);	Software deleted	As expected	Pass
T07	Update software info	main.sys.updateSoftwareInfo(software, new Software("updated", 12, 1.23)); System.out.println(main.sys.softwareTree);	Software updated	As expected	Pass

4 Running and Results

```
1
2  main.sys = new SoftwareSystem("pass");
3  main.sys.addSoftware(new Software("Adobe Photoshop 6.0", 3, 200.0));
4  main.sys.addSoftware(new Software("Adobe Photoshop 6.2", 2, 300.0));
5  main.sys.addSoftware(new Software("Norton 4.5", 1, 100.0));
6  main.sys.addSoftware(new Software("Norton 5.5", 3, 150.0));
7  main.sys.addSoftware(new Software("Adobe Flash 3.3", 7, 80.0));
8  main.sys.addSoftware(new Software("Adobe Flash 4.0", 3, 90.0));
9
10 main.sys.addAdmin("123");
11
12 System.out.println("T1");
13 System.out.println(main.sys.softwareTree);
14
15 System.out.println("T2");
16 System.out.println(main.sys.searchSoftware(SoftwareNode.KeyType.NAME, "Adobe Photoshop 6.0"));
17 System.out.println("T3");
18 System.out.println(main.sys.searchSoftware(SoftwareNode.KeyType.QUANTITY, 1));
19 System.out.println("T4");
20 System.out.println(main.sys.searchSoftware(SoftwareNode.KeyType.PRICE, 90.0));
21 System.out.println("T5");
22 Software software = main.sys.searchSoftware(SoftwareNode.KeyType.PRICE, 90.0);
23 System.out.println(main.sys.soldSoftware(software.name));
24 System.out.println(main.sys.softwareTree); System.out.println("T6");
25 System.out.println(main.sys.deleteSoftware(software));
26 System.out.println(main.sys.softwareTree);
27 System.out.println("T7");
28 main.sys.updateSoftwareInfo(software, new Software("updated", 12, 1.23));
29 System.out.println(main.sys.softwareTree);
30
31
32
```

Listing 1: Testing methods in main method

Output of the test cases;

```
  T1
{key=300.0, searchCriteria=PRICE, software={name='Adobe Photoshop 6.2', quantity=2, price=300.0}}
{key=200.0, searchCriteria=PRICE, software={name='Adobe Photoshop 6.0', quantity=3, price=200.0}}
{key=150.0, searchCriteria=PRICE, software={name='Norton 5.5', quantity=3, price=150.0}}
{key=100.0, searchCriteria=PRICE, software={name='Norton 4.5', quantity=1, price=100.0}}
{key=90.0, searchCriteria=PRICE, software={name='Adobe Flash 4.0', quantity=3, price=90.0}}
{key=80.0, searchCriteria=PRICE, software={name='Adobe Flash 3.3', quantity=7, price=80.0}}
{key=7, searchCriteria=QUANTITY, software={name='Adobe Flash 3.3', quantity=7, price=80.0}}
{key=3, searchCriteria=QUANTITY, software={name='Adobe Photoshop 6.0', quantity=3, price=200.0}}
{key=3, searchCriteria=QUANTITY, software={name='Norton 5.5', quantity=3, price=150.0}}
{key=3, searchCriteria=QUANTITY, software={name='Adobe Flash 4.0', quantity=3, price=90.0}}
{key=2, searchCriteria=QUANTITY, software={name='Adobe Photoshop 6.2', quantity=2, price=300.0}}
{key=1, searchCriteria=QUANTITY, software={name='Norton 4.5', quantity=1, price=100.0}}
{key=Norton 5.5, searchCriteria=NAME, software={name='Norton 5.5', quantity=3, price=150.0}}
{key=Norton 4.5, searchCriteria=NAME, software={name='Norton 4.5', quantity=1, price=100.0}}
{key=Adobe Photoshop 6.2, searchCriteria=NAME, software={name='Adobe Photoshop 6.2', quantity=2, price
    =300.0}}
{key=Adobe Photoshop 6.0, searchCriteria=NAME, software={name='Adobe Photoshop 6.0', quantity=3, price
    =200.0}}
{key=Adobe Flash 4.0, searchCriteria=NAME, software={name='Adobe Flash 4.0', quantity=3, price=90.0}}
{key=Adobe Flash 3.3, searchCriteria=NAME, software={name='Adobe Flash 3.3', quantity=7, price=80.0}}

T2
{name='Adobe Photoshop 6.0', quantity=3, price=200.0}
T3
{name='Norton 4.5', quantity=1, price=100.0}
T4
{name='Adobe Flash 4.0', quantity=3, price=90.0}
T5
{name='Adobe Flash 4.0', quantity=2, price=90.0}
{key=300.0, searchCriteria=PRICE, software={name='Adobe Photoshop 6.2', quantity=2, price=300.0}}
{key=200.0, searchCriteria=PRICE, software={name='Adobe Photoshop 6.0', quantity=3, price=200.0}}
{key=150.0, searchCriteria=PRICE, software={name='Norton 5.5', quantity=3, price=150.0}}
{key=100.0, searchCriteria=PRICE, software={name='Norton 4.5', quantity=1, price=100.0}}
{key=90.0, searchCriteria=PRICE, software={name='Adobe Flash 4.0', quantity=2, price=90.0}}
{key=80.0, searchCriteria=PRICE, software={name='Adobe Flash 3.3', quantity=7, price=80.0}}
{key=7, searchCriteria=QUANTITY, software={name='Adobe Flash 3.3', quantity=7, price=80.0}}
{key=3, searchCriteria=QUANTITY, software={name='Adobe Photoshop 6.0', quantity=3, price=200.0}}
{key=3, searchCriteria=QUANTITY, software={name='Norton 5.5', quantity=3, price=150.0}}
{key=2, searchCriteria=QUANTITY, software={name='Adobe Photoshop 6.2', quantity=2, price=300.0}}
{key=2, searchCriteria=QUANTITY, software={name='Adobe Flash 4.0', quantity=2, price=90.0}}
{key=1, searchCriteria=QUANTITY, software={name='Norton 4.5', quantity=1, price=100.0}}
{key=Norton 5.5, searchCriteria=NAME, software={name='Norton 5.5', quantity=3, price=150.0}}
{key=Norton 4.5, searchCriteria=NAME, software={name='Norton 4.5', quantity=1, price=100.0}}
{key=Adobe Photoshop 6.2, searchCriteria=NAME, software={name='Adobe Photoshop 6.2', quantity=2, price
    =300.0}}
{key=Adobe Photoshop 6.0, searchCriteria=NAME, software={name='Adobe Photoshop 6.0', quantity=3, price
    =200.0}}
{key=Adobe Flash 4.0, searchCriteria=NAME, software={name='Adobe Flash 4.0', quantity=2, price=90.0}}
{key=Adobe Flash 3.3, searchCriteria=NAME, software={name='Adobe Flash 3.3', quantity=7, price=80.0}}

T6
true
{key=300.0, searchCriteria=PRICE, software={name='Adobe Photoshop 6.2', quantity=2, price=300.0}}
{key=200.0, searchCriteria=PRICE, software={name='Adobe Photoshop 6.0', quantity=3, price=200.0}}
{key=150.0, searchCriteria=PRICE, software={name='Norton 5.5', quantity=3, price=150.0}}
{key=100.0, searchCriteria=PRICE, software={name='Norton 4.5', quantity=1, price=100.0}}
{key=80.0, searchCriteria=PRICE, software={name='Adobe Flash 3.3', quantity=7, price=80.0}}
{key=7, searchCriteria=QUANTITY, software={name='Adobe Flash 3.3', quantity=7, price=80.0}}
{key=3, searchCriteria=QUANTITY, software={name='Adobe Photoshop 6.0', quantity=3, price=200.0}}
{key=3, searchCriteria=QUANTITY, software={name='Norton 5.5', quantity=3, price=150.0}}
{key=2, searchCriteria=QUANTITY, software={name='Adobe Photoshop 6.2', quantity=2, price=300.0}}
{key=1, searchCriteria=QUANTITY, software={name='Norton 4.5', quantity=1, price=100.0}}
{key=Norton 5.5, searchCriteria=NAME, software={name='Norton 5.5', quantity=3, price=150.0}}
{key=Norton 4.5, searchCriteria=NAME, software={name='Norton 4.5', quantity=1, price=100.0}}
{key=Adobe Photoshop 6.2, searchCriteria=NAME, software={name='Adobe Photoshop 6.2', quantity=2, price
    =300.0}}
{key=Adobe Photoshop 6.0, searchCriteria=NAME, software={name='Adobe Photoshop 6.0', quantity=3, price
    =200.0}}
{key=Adobe Flash 3.3, searchCriteria=NAME, software={name='Adobe Flash 3.3', quantity=7, price=80.0}}

T7
{key=300.0, searchCriteria=PRICE, software={name='Adobe Photoshop 6.2', quantity=2, price=300.0}}
{key=200.0, searchCriteria=PRICE, software={name='Adobe Photoshop 6.0', quantity=3, price=200.0}}
{key=150.0, searchCriteria=PRICE, software={name='Norton 5.5', quantity=3, price=150.0}}
{key=100.0, searchCriteria=PRICE, software={name='Norton 4.5', quantity=1, price=100.0}}
{key=80.0, searchCriteria=PRICE, software={name='Adobe Flash 3.3', quantity=7, price=80.0}}
{key=1.23, searchCriteria=PRICE, software={name='updated', quantity=12, price=1.23}}
{key=12, searchCriteria=QUANTITY, software={name='updated', quantity=12, price=1.23}}
{key=7, searchCriteria=QUANTITY, software={name='Adobe Flash 3.3', quantity=7, price=80.0}}
{key=3, searchCriteria=QUANTITY, software={name='Adobe Photoshop 6.0', quantity=3, price=200.0}}
{key=3, searchCriteria=QUANTITY, software={name='Norton 5.5', quantity=3, price=150.0}}
{key=2, searchCriteria=QUANTITY, software={name='Adobe Photoshop 6.2', quantity=2, price=300.0}}
{key=1, searchCriteria=QUANTITY, software={name='Norton 4.5', quantity=1, price=100.0}}
{key=updated, searchCriteria=NAME, software={name='updated', quantity=12, price=1.23}}
```

```
{key=Norton 5.5, searchCriteria=NAME, software={name='Norton 5.5', quantity=3, price=150.0}}
{key=Norton 4.5, searchCriteria=NAME, software={name='Norton 4.5', quantity=1, price=100.0}}
{key=Adobe Photoshop 6.2, searchCriteria=NAME, software={name='Adobe Photoshop 6.2', quantity=2, price
    =300.0}}
{key=Adobe Photoshop 6.0, searchCriteria=NAME, software={name='Adobe Photoshop 6.0', quantity=3, price
    =200.0}}
{key=Adobe Flash 3.3, searchCriteria=NAME, software={name='Adobe Flash 3.3', quantity=7, price=80.0}}

```