



































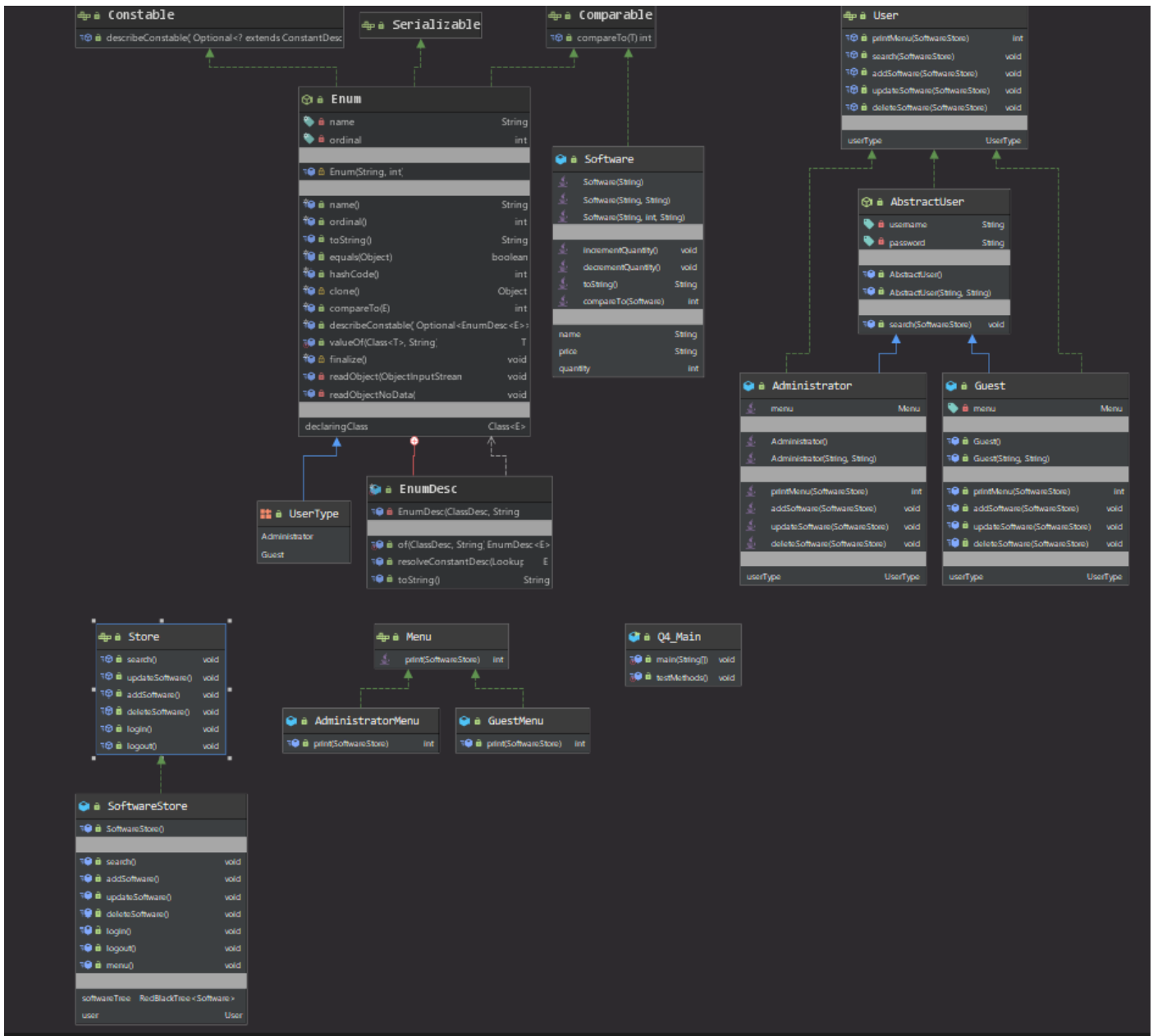
GIT Department of Computer Engineering
CSE 222/505 - Spring 2020
Homework #7 Report

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1 – Class diagrams

		Q3_TestDriver	
		binarySearchTree	BinarySearchTree<Integer>
		redBlackTreeBook	RedBlackTree<Integer>
		redBlackTreeJava	TreeSet<Integer>
		bTreeBook	BTree<Integer>
		skipListBook	SkipList<Integer>
		skipListJava	ConcurrentSkipListSet<Integer>
		verifyMethods()	void
		testMethods(int)	void
		testDeleteMethods(int, int)	void
		measureAverageOf10Times(int, int)	double
		insertElementsRandomly(int, int)	long
		insertAndDeleteElementsRandomly(int, int, int)	double
		clearAllCollections()	void

		Q3_Main	
		main(String[])	void
		testMethods()	void



2 – Problem solution approach

Q4) First, I created an enum that contains Administrator and Guest. I created an User interface and i created Administrator and Guest classes that implement this interface. Also these classes extend AbstractUser abstract class. I created an Store interface. And I created SoftwareStore class that implements this interface.

3 – Test cases

Q3)

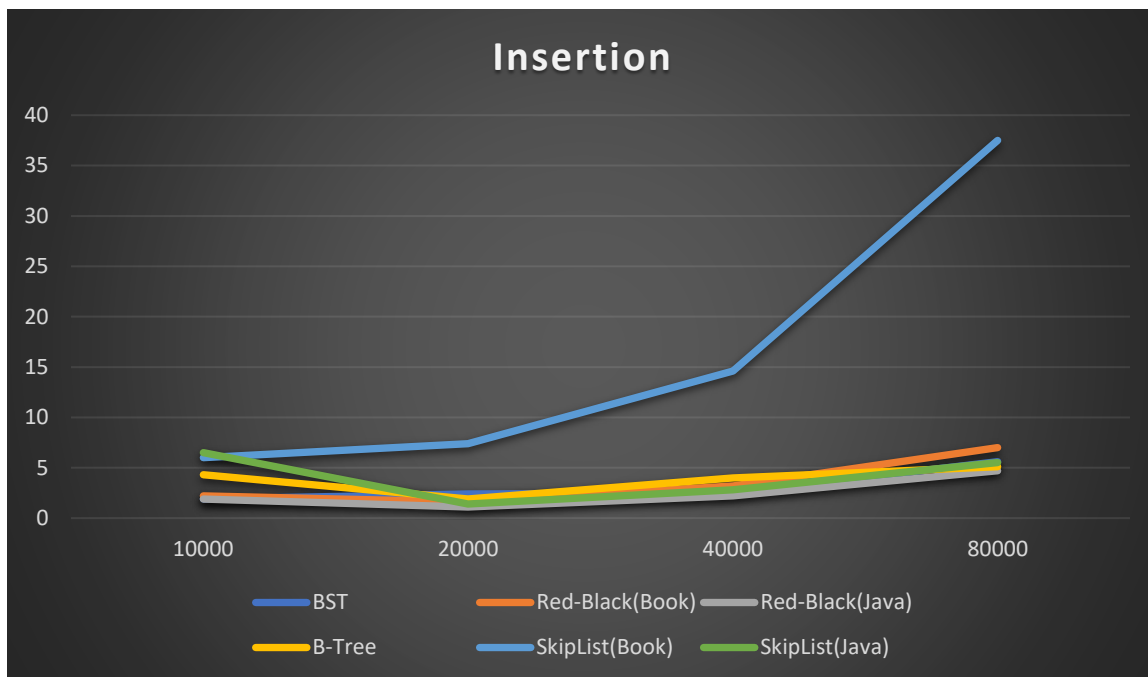
Test Scenario	Expected Results	Actual Results	Pass/Fail
Inserts randomly generated numbers(10000,20000,30000,40000)	Inserts correctly	It has inserted correctly	Pass
Verify that data structures	Verify correctly	It has verified correctly	Pass
Compare run-time performance	Compares correctly	It has compared correctly	Pass
Compare deletion times	Compares correctly	It has compared correctly	Pass

Q4)

Test Scenario	Expected Results	Actual Results	Pass/Fail
Search by name	Searchs correctly	It has searched correctly	Pass
Add a Software	Adds correctly	It has added correctly	Pass
Delete a Software	Deletes correctly	It has deleted correctly	Pass
Administrator Login	Login correctly	It has login correctly	Pass
Administrator Logout	Logout correctly	It has logout correctly	Pass

4 – Running command and results

Q3) these numbers are milisecond.



put	10000 Elements	20000 Elements	40000 Elements	80000 Elements
Regular Binary Search Tree	1,9	2,4	2,5	5,6
Red-Black Tree (Book)	2,2	1,6	3,2	7,0
Red-Black Tree (Java)	1,9	1,1	2,2	4,7
B-Tree(Order: 5)	4,3	1,9	4,0	5,1
Skip List (Book)	6,0	7,4	14,6	37,5
Skip List (Java)	6,5	1,4	2,8	5,5

```

-----
Insertion - Regular Binary search tree-(10000): 1.9
Insertion - Red-Black tree implementation in the book-(10000): 2.2
Insertion - Red Black tree implementation in java-(10000): 1.9
Insertion - B-Tree implementation(order: 5) in the book-(10000): 4.3
Insertion - Skip list implementation in the book-(10000): 6.0
Insertion - Skip list implementation in java-(10000): 6.5
-----
Insertion - Regular Binary search tree-(20000): 2.4
Insertion - Red-Black tree implementation in the book-(20000): 1.6
Insertion - Red Black tree implementation in java-(20000): 1.1
Insertion - B-Tree implementation(order: 5) in the book-(20000): 1.9
Insertion - Skip list implementation in the book-(20000): 7.4
Insertion - Skip list implementation in java-(20000): 1.4
-----
Insertion - Regular Binary search tree-(40000): 2.5
Insertion - Red-Black tree implementation in the book-(40000): 3.2
Insertion - Red Black tree implementation in java-(40000): 2.2
Insertion - B-Tree implementation(order: 5) in the book-(40000): 4.0
Insertion - Skip list implementation in the book-(40000): 14.6
Insertion - Skip list implementation in java-(40000): 2.8
-----|
Insertion - Regular Binary search tree-(80000): 5.6
Insertion - Red-Black tree implementation in the book-(80000): 7.0
Insertion - Red Black tree implementation in java-(80000): 4.7
Insertion - B-Tree implementation(order: 5) in the book-(80000): 5.1
Insertion - Skip list implementation in the book-(80000): 37.5
Insertion - Skip list implementation in java-(80000): 5.5

```

```

BinarySearchTree(inorder): 11
15
17
20
25
49
53
58
59
79

RedBlackTree(Book-inorder): Red: 1
Black: 7
Red: 36
Red: 42
Black: 51
Black: 54
Red: 63
Black: 88
Red: 96

RedBlackTree(Java-inorder): [3, 22, 32, 38, 43, 62, 65, 71, 91]
BTree(Book-inorder): BTree@1d56ce6a
Skiplist(Book-inorder): Head: 4 --> 3 |1| --> 22 |2| --> 25 |2| --> 30 |2| --> 31 |3| --> 45 |2| --> 64 |2| --> 68 |1| --> 83 |1| --> 95 |1|
Skiplist(Java-inorder): [5, 6, 16, 21, 57, 65, 84, 98]

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-----
Insertion - Regular Binary search tree-(10): 0.0
Insertion - Red-Black tree implementation in the book-(10): 0.0
Insertion - Red Black tree implementation in java-(10): 0.0
Insertion - B-Tree implementation(order: 5) in the book-(10): 0.0
Insertion - Skip list implementation in the book-(10): 0.0
Insertion - Skip list implementation in java-(10): 0.0
-----
Deletion - Regular Binary search tree-(10 deletion): 0.0
Deletion - Red-Black tree implementation in the book-(10 deletion): 0.0
Deletion - Red Black tree implementation in java-(10 deletion): 0.0
Deletion - Skip list implementation in the book-(10 deletion): 0.0
Deletion - Skip list implementation in java-(10 deletion): 0.0
-----
Deletion - Regular Binary search tree-(99999 deletion): 2.0
Deletion - Red-Black tree implementation in the book-(99999 deletion): 2.0
Deletion - Red Black tree implementation in java-(99999 deletion): 8.0
Deletion - Skip list implementation in the book-(99999 deletion): 580.0
Deletion - Skip list implementation in java-(99999 deletion): 7.0

```

Q4)

```

*****      Admin username: admin      *****
*****      Admin password: 1234      *****
-- Library Automation System Menu(Guest) --
1 - Browse the software
2 - Administrator login
(Press -1 to exit)
-----
1
Please enter of software's name(with version) to search
Adobe Photoshop 6.0
Found: Adobe Photoshop 6.0 - Quantity: 1 - Price: 15.99

-----
*****      Admin username: admin      *****
*****      Admin password: 1234      *****
-- Library Automation System Menu(Guest) --
1 - Browse the software
2 - Administrator login
(Press -1 to exit)
-----
2
Username : admin
Password : 1234
You have successfully logged in.
-----

```

```
-----  
-- Library Automation System Menu(Admin) --  
1 - Browse the software  
2 - Add Software  
3 - Update Software  
4 - Delete Software  
5 - Administrator logout  
(Press -1 to exit)  
-----
```

```
2  
Please enter of software's name(with version)  
Adobe Photoshop 7.4  
Please enter of software's price  
35.99  
Adobe Photoshop 7.4 - Quantity: 1 - Price: 35.99
```

```
-----  
-- Library Automation System Menu(Admin) --  
1 - Browse the software  
2 - Add Software  
3 - Update Software  
4 - Delete Software  
5 - Administrator logout  
(Press -1 to exit)  
-----
```

```
3  
Please enter of software's name(with version) to update  
Adobe Flash 3.3  
Which property of the software do you want to update?(-1 to exit)  
1 - Change the name  
2 - Increase quantity  
3 - Decrease quantity(Sell operation)  
4 - Change the price  
4  
Please enter new price you want  
99.9  
Successfully changed. -- New Price: 99.9  
-----
```



```
-----
-- Library Automation System Menu(Admin) --
1 - Browse the software
2 - Add Software
3 - Update Software
4 - Delete Software
5 - Administrator logout
(Press -1 to exit)
-----
```

```
1
Please enter of software's name(with version) to search
Adobe Flash 3.3
Found: Adobe Flash 3.3 - Quantity: 1 - Price: 99.9
```

```
-----
-- Library Automation System Menu(Admin) --
1 - Browse the software
2 - Add Software
3 - Update Software
4 - Delete Software
5 - Administrator logout
(Press -1 to exit)
-----
```

```
4
Please enter of software's name(with version) to delete
Adobe Photoshop 6.2
The item has been successfully deleted.
-----
```

```
-----
-- Library Automation System Menu(Admin) --
1 - Browse the software
2 - Add Software
3 - Update Software
4 - Delete Software
5 - Administrator logout
(Press -1 to exit)
-----
```

```
5
```

```
*****      Admin username: admin      *****
*****      Admin password: 1234       *****
```

```
-- Library Automation System Menu(Guest) --
1 - Browse the software
2 - Administrator login
(Press -1 to exit)
-----
```

```
-1
```