Homework 5

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Question 3

Problem-solution approach

Here, my class uses the book's BinaryTree and BinarySearchTree class. It extends the BinarySearchTree class. It keeps elements of the class AgeData inside of which there are two fields: age and count. Depending on the count the item from the tree will be removed. Removal would decrement this count filed if it is bigger than 1 or remove the element completely if the count is 1 during removal. Addition checks if the element exists and if it does its count filed is incremented by one. Find method is implemented in BinarySearchTree class since it is something much more general. The only thing needed is the overriding of the compareTo method in AgeData class so that it works by comparing ages and neglecting value of the count field. YoungerThan method traverses some nodes(its base case besides reaching null is that the current node is bigger or equal and than it would return from the recursive call and continue with the left child). OlderThan works the same way with of course the difference in the base case where when the younger element is found the method would return.

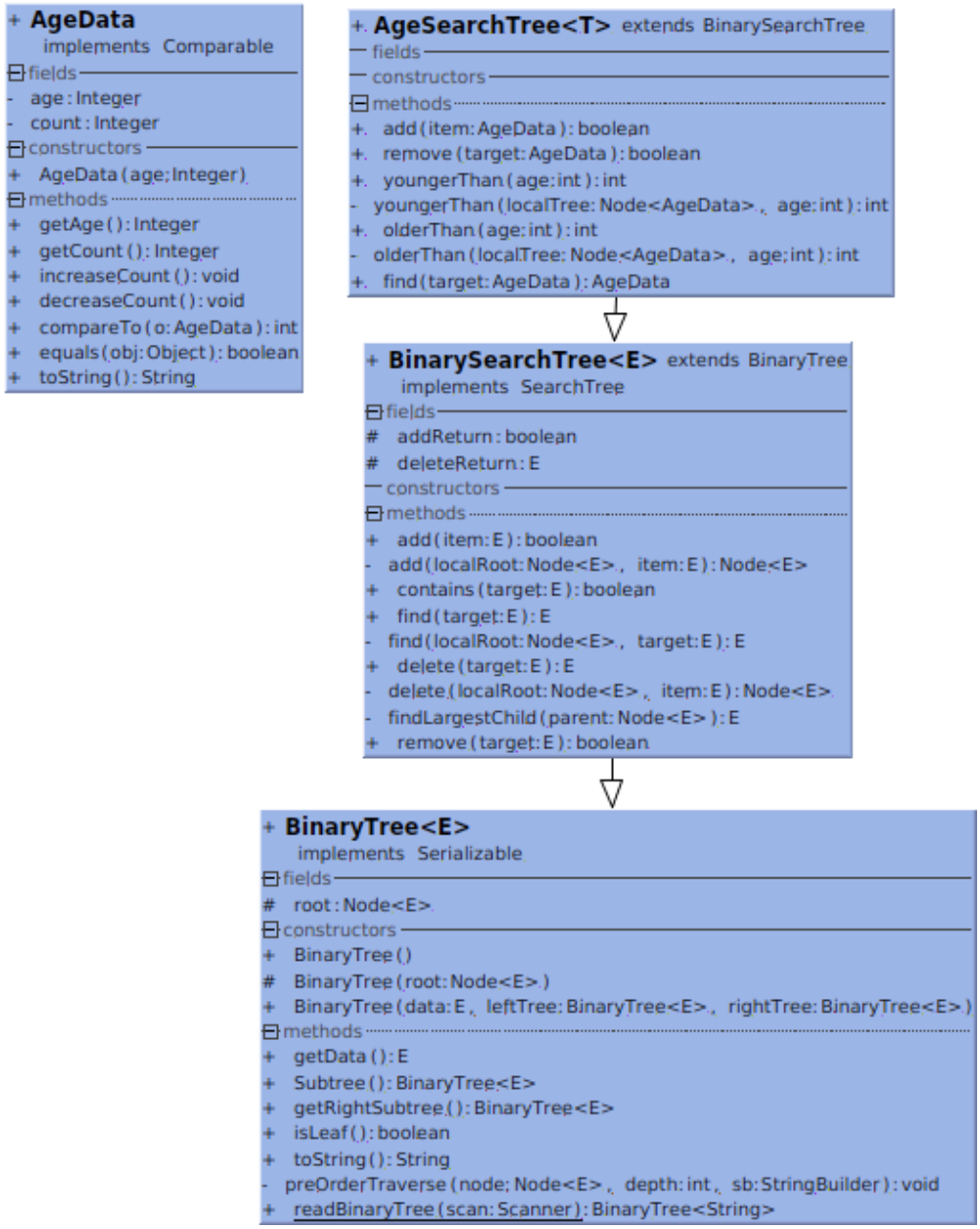
Tests cases

Test cases are run inside the virtual machine provided. Its actual results can be confirmed from the attached screenshots.

Test Scenario	Expected Results	Actual Results
Creating an ageTree and adding nodes with ages: 10,20,5,15,10 And printing it to confirm	Elements should be added and printed so that each has a count of 1 expect 10 which has count of 2	As expected
Finding number of people younger than 15	Should find 3 people younger	As expected
Finding number of people older than 15	Should 1 person	As expected
Now removing 15 from the tree and printing the tree	15 should be removed and that would be seen in the printed tree	As expected
Now removing 10 and finding number of people younger than 15	There should be 2 people younger than 15	As expected

Now removing 20 and finding number of people older than 15	There should be no people older than 15	As expected
Printing the tree after these removals	Should print only two nodes 10 and 5	As expected
Find method for age 5	Should print 5 –1	As expected
Find method for age 15	Should give null since element does not exist	As expected

Class diagram



Running command and results

Output of the code executed in the virtual machine is provided in here