

Algorithms & Data Structures (M)

Assessed Exercise (2017–18)

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Add:

1. Set *parent* to null, and set *curr* to the BST's root.
2. Repeat:
 - 2.1.If *curr* is null:
 - 2.1.1. Replace the null link from which *curr* was taken (either the BST's root or *parent*'s left child or *parent*'s right child) by a link to a newly-created leaf node with element *element*, and set *element*'s *count* to 1.
 - 2.1.2. Add BST's *size* by 1.
 - 2.1.3. Terminate.
 - 2.2.Else, if element is equal to *curr*'s element:
 - 2.2.1. Add *curr*'s element's *count* by 1.
 - 2.2.2. Add BST's *size* by 1.
 - 2.2.3. Terminate.
 - 2.3.Else, if element is less than *curr*'s element:
 - 2.3.1. Set *parent* to *curr*, and set *curr* to *curr*'s left child.
 - 2.4.Else, if element is greater than *curr*'s element:
 - 2.4.1. Set *parent* to *curr*, and set *curr* to *curr*'s right child.

Remove:

1. Set *parent* to null, and set *curr* to the BST's root.
2. While *curr* is not null:
 - 2.1.If element *element* is equal to *curr*'s element:
 - 2.1.1. If *curr*'s element's *count* is less than 1:
 - 2.1.1.1.Do nothing.
 - 2.1.2. Else, reduce *curr*'s element's *count* and BST's *size* by 1.
 - 2.1.3. Terminate.
 - 2.2.If *element* is less than *curr*'s element:
 - 2.2.1. Set *parent* to *curr*, and set *curr* to *curr*'s left child.
 - 2.3.Else, if *element* is greater than *curr*'s element:
 - 2.3.1. Set *parent* to *curr*, and set *curr* to *curr*'s right child.

Iterator:

1. Create a new `LinkedList` *track*.
2. Set *curr* to the BST's root, and repeat as *curr* is not null:
 - 2.1. Add *curr* as the top element of this stack.
 - 2.2. Set *curr* to *curr*'s left child.
3. Create a new Iterator *i*:
 - 3.1. Set *hasNext()*:
 - 3.1.1. Terminate with if *track* is empty as answer.
 - 3.2. Set element *next()*:
 - 3.2.1. Remove and return the element at the top of this stack, and set *place* to this element.
 - 3.2.2. Set *curr* to *place*'s right child, and repeat as *curr* is not null:
 - 3.2.2.1. Add *curr* as the top element of this stack.
 - 3.2.2.2. Set *curr* to *curr*'s left child.
 - 3.2.3. Set element *p* to empty.
 - 3.2.4. Add element's *element* to *p* for element's *count* times.
 - 3.2.5. Terminate with *p* as answer.
4. Terminate with *i* as answer.