

Solution 1Solution 2Solution 3

```
1 // Copyright © 2020 AlgoExpert, LLC. All rights reserved.
2
3 using namespace std;
4
5 ▾ class SpecialBST {
6     public:
7         int value;
8         int leftSubtreeSize;
9         SpecialBST *left;
10        SpecialBST *right;
11
12    ▾ SpecialBST(int value) {
13        this->value = value;
14        leftSubtreeSize = 0;
15        left = NULL;
16        right = NULL;
17    }
18
19    void insert(int value, int idx, vector<int> &rightSmallerCounts,
20    ▾        int numSmallerAtInsertTime = 0) {
21    ▾        if (value < this->value) {
22            leftSubtreeSize++;
23    ▾            if (left == NULL) {
24                left = new SpecialBST(value);
25                rightSmallerCounts[idx] = numSmallerAtInsertTime;
26    ▾            } else {
27                left->insert(value, idx, rightSmallerCounts, numSmallerAtInsertTime);
28            }
29    ▾        } else {
30            numSmallerAtInsertTime += leftSubtreeSize;
31            if (value > this->value)
32                numSmallerAtInsertTime++;
33    ▾            if (right == NULL) {
34                right = new SpecialBST(value);
35                rightSmallerCounts[idx] = numSmallerAtInsertTime;
36    ▾            } else {
37                right->insert(value, idx, rightSmallerCounts, numSmallerAtInsertTime);
38            }
39        }
40    }
41 };
42
43 // Average case: when the created BST is balanced
44 // O(nlog(n)) time | O(n) space - where n is the length of the array
45 // ---
46 // Worst case: when the the created BST is like a linked list
47 // O(n^2) time | O(n) space
48 ▾ vector<int> rightSmallerThan(vector<int> array) {
49     if (array.size() == 0)
50         return {};
51
52     vector<int> rightSmallerCounts = array;
53     int lastIdx = array.size() - 1;
54     SpecialBST *bst = new SpecialBST(array[lastIdx]);
55     rightSmallerCounts[lastIdx] = 0;
56    ▾ for (int i = array.size() - 2; i >= 0; i--) {
57        bst->insert(array[i], i, rightSmallerCounts);
58    }
59
60     return rightSmallerCounts;
61 }
```

