

Solution 1

```
1 // Copyright © 2020 AlgoExpert, LLC. All rights reserved.
2
3 import java.util.*;
4
5 class Program {
6     // O(b + s) time | O(b + s) space - where b is the length of the big
7     // input string and s is the length of the small input string
8     public static String smallestSubstringContaining(String bigString, String smallString) {
9         Map<Character, Integer> targetCharCounts = getCharCounts(smallString);
10        List<Integer> substringBounds = getSubstringBounds(bigString, targetCharCounts);
11        return getStringFromBounds(bigString, substringBounds);
12    }
13
14    public static Map<Character, Integer> getCharCounts(String string) {
15        Map<Character, Integer> charCounts = new HashMap<Character, Integer>();
16        for (int i = 0; i < string.length(); i++) {
17            increaseCharCount(string.charAt(i), charCounts);
18        }
19        return charCounts;
20    }
21
22    public static List<Integer> getSubstringBounds(
23        String string, Map<Character, Integer> targetCharCounts) {
24        List<Integer> substringBounds = new ArrayList<Integer>(Arrays.asList(0, Integer.MAX_VALUE));
25        Map<Character, Integer> substringCharCounts = new HashMap<Character, Integer>();
26        int numUniqueChars = targetCharCounts.size();
27        int numUniqueCharsDone = 0;
28        int leftIdx = 0;
29        int rightIdx = 0;
30        // Move the rightIdx to the right in the string until you've counted
31        // all of the target characters enough times.
32        while (rightIdx < string.length()) {
33            char rightChar = string.charAt(rightIdx);
34            if (!targetCharCounts.containsKey(rightChar)) {
35                rightIdx++;
36                continue;
37            }
38            increaseCharCount(rightChar, substringCharCounts);
39            if (substringCharCounts.get(rightChar) == targetCharCounts.get(rightChar)) {
40                numUniqueCharsDone++;
41            }
42            // Move the leftIdx to the right in the string until you no longer
43            // have enough of the target characters in between the leftIdx and
44            // the rightIdx. Update the substringBounds accordingly.
45            while (numUniqueCharsDone == numUniqueChars && leftIdx <= rightIdx) {
46                substringBounds =
47                    getCloserBounds(leftIdx, rightIdx, substringBounds.get(0), substringBounds.get(1));
48                char leftChar = string.charAt(leftIdx);
49                if (!targetCharCounts.containsKey(leftChar)) {
50                    leftIdx++;
51                    continue;
52                }
53                if (substringCharCounts.get(leftChar) == targetCharCounts.get(leftChar)) {
54                    numUniqueCharsDone--;
55                }
56                decreaseCharCount(leftChar, substringCharCounts);
57                leftIdx++;
58            }
59            rightIdx++;
60        }
61        return substringBounds;
62    }
63
64    public static List<Integer> getCloserBounds(int idx1, int idx2, int idx3, int idx4) {
65        return idx2 - idx1 < idx4 - idx3
66            ? new ArrayList<Integer>(Arrays.asList(idx1, idx2))
67            : new ArrayList<Integer>(Arrays.asList(idx3, idx4));
68    }
69
70    public static String getStringFromBounds(String string, List<Integer> bounds) {
71        int start = bounds.get(0);
72        int end = bounds.get(1);
73        if (end == Integer.MAX_VALUE) return "";
74        return string.substring(start, end + 1);
75    }
76
77    public static void increaseCharCount(char c, Map<Character, Integer> charCounts) {
78        if (!charCounts.containsKey(c)) {
79            charCounts.put(c, 1);
80        } else {
81            charCounts.put(c, charCounts.get(c) + 1);
82        }
83    }
84
85    public static void decreaseCharCount(char c, Map<Character, Integer> charCounts) {
86        charCounts.put(c, charCounts.get(c) - 1);
87    }
88 }
89
```

