

Solution 1

```
1 // Copyright © 2020 AlgoExpert, LLC. All rights reserved.
2
3 package main
4
5 import "math"
6
7 // O(b + s) time | O(b + s) space - where b is the length of the big
8 // input string and s is the length of the small input string
9 func SmallestSubstringContaining(bigString, smallString string) string {
10     targetCharCounts := getCharCounts(smallString)
11     substringBounds := getSubstringBounds(bigString, targetCharCounts)
12     return getStringFromBounds(bigString, substringBounds)
13 }
14
15 func getCharCounts(str string) map[byte]int {
16     charCounts := map[byte]int{}
17     for _, char := range str {
18         increaseCharCount(byte(char), charCounts)
19     }
20     return charCounts
21 }
22
23 func getSubstringBounds(str string, targetCharCounts map[byte]int) []int {
24     substringBounds := []int{0, math.MaxInt32}
25     substringCharCounts := map[byte]int{}
26     numUniqueChars := len(targetCharCounts)
27     numUniqueCharsDone := 0
28     leftIdx := 0
29     rightIdx := 0
30
31     // Move the rightIdx to the right in the string until you've counted
32     // all of the target characters enough times.
33     for rightIdx < len(str) {
34         rightChar := str[rightIdx]
35         if _, found := targetCharCounts[rightChar]; !found {
36             rightIdx++
37             continue
38         }
39         increaseCharCount(rightChar, substringCharCounts)
40         if substringCharCounts[rightChar] == targetCharCounts[rightChar] {
41             numUniqueCharsDone++
42         }
43
44         // Move the leftIdx to the right in the string until you no longer
45         // have enough of the target characters in between the leftIdx and
46         // the rightIdx. Update the substringBounds accordingly.
47         for numUniqueCharsDone == numUniqueChars && leftIdx <= rightIdx {
48             substringBounds = getCloserBounds(
49                 leftIdx, rightIdx, substringBounds[0], substringBounds[1],
50             )
51             leftChar := str[leftIdx]
52             if _, found := targetCharCounts[leftChar]; !found {
53                 leftIdx++
54                 continue
55             }
56             if substringCharCounts[leftChar] == targetCharCounts[leftChar] {
57                 numUniqueCharsDone--
58             }
59             decreaseCharCount(leftChar, substringCharCounts)
60             leftIdx++
61         }
62         rightIdx++
63     }
64     return substringBounds
65 }
66
67 func getCloserBounds(idx1, idx2, idx3, idx4 int) []int {
68     if idx2-idx1 < idx4-idx3 {
69         return []int{idx1, idx2}
70     }
71     return []int{idx3, idx4}
72 }
73
74 func getStringFromBounds(str string, bounds []int) string {
75     start, end := bounds[0], bounds[1]
76     if end == math.MaxInt32 {
77         return ""
78     }
79     return str[start : end+1]
80 }
81
82 func increaseCharCount(char byte, charCounts map[byte]int) {
83     charCounts[char]++
84 }
85
86 func decreaseCharCount(char byte, charCounts map[byte]int) {
87     charCounts[char]--
88 }
89
```

