GIT Department of Computer Engineering
CSE 222/505 - Spring 2022
Homework 4 Report

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1. SYSTEM REQUIREMENTS

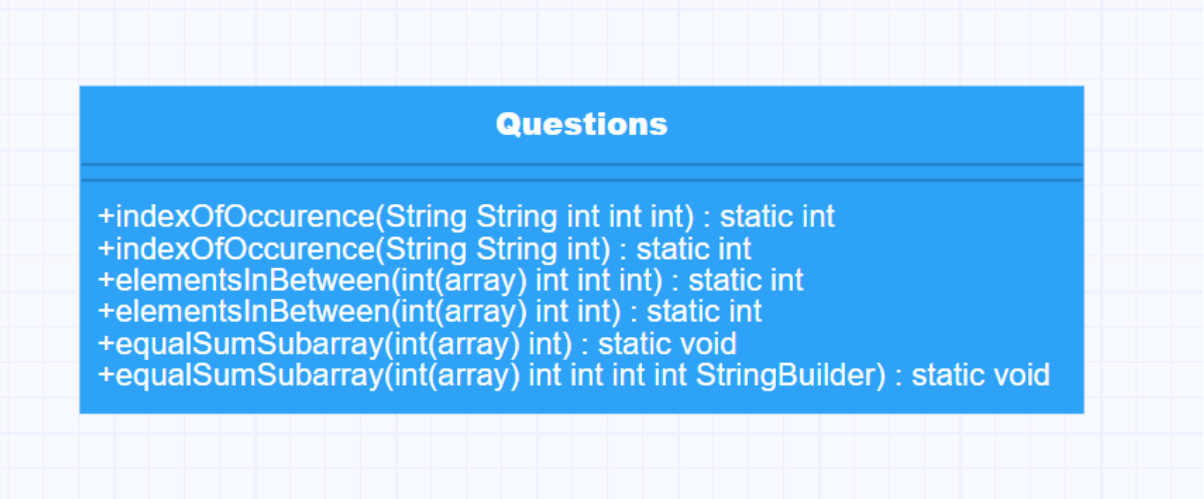
There are three different methods to solve 3 special cases in the system.

The first method (indexOfOccurence) gets two string and 1 integer for parameters. Parameters must be entered correctly for this method to work properly. For example, any of the strings cannot be null to make search on it or the zeroth or negative occurrence of a thing cannot be found so occurrence must be positive value.

The second method (elementsInBetween) gets one integer array, and two integers as parameters. The array parameter cannot be null to make search on it.

The third method (equalSumSubarray) gets one integer array, and one integer as parameters. The array parameter cannot be null to make search on it.

2. USE CASE AND CLASS DIAGRAMS



Note: The "[]" sign is not working in the diagram creator environment. So I defined arrays as (array).

3. PROBLEM SOLUTION APPROACH

For Question 1)

Finding a String in a String

To find a String in a String, characters of the string must be compared one by one. Instead of comparing all elements of key String with all elements of main String, first element of the key String must be compared the elements of main String until it found an equal character to reduce number of operations. For example, if main String is "ABCDZFGDE" and key String is "DE", the character E will not be compared with any of the element of the main String until the character D of the key String compared with the

character of D of the main String. After this next character of the key String will be compared next character of the main String. If they are not equal, key String first element will be compared the remain elements of main String. If all element of the key String is found on the main String sequentially, the key String is found on main String.

Finding ith occurrence of a String

To find ith occurrence of a String in a String, above method should be used by decreasing i by one every time. By finding ith occurrence of a String some problems may occur. For example, let main String = “AAACDEFGHAA”, key string = “AA” and occurrence = 2, the first occurrence will be in index 0. After the first occurrence is found, second occurrence will start to be searched. If the key String start to be compared with main String from the beginning of the main String, index will be 0 again because same occurrence is found. To avoid this problem, index must be increased by one after a String found.

For Question 2)

Finding Index of a Number

To find the index of a number, binary search algorithm is used. But some problem may occur while searching a number. For example, if the number is not in the array, binary search algorithm returns -1. To avoid this problem, the method searches the number in the array to find where it must be instead of where it is. Such as, let array = {1, 2, 4, 5, 6, 7, 8}, number = 3. In this case, binary search algorithm returns -1, but the algorithm of this method returns 2.

Finding Number of Elements Between Two Numbers

To find the numbers of elements between two numbers, calls above algorithm for both numbers. The algorithm will return their index. The number of elements between two numbers is equal to subtraction of their index because the array is a sorted array.

For Question 3)

Finding Subarrays Which Sum of Their Element Equals to Contiguous Sum of an Array

The subarray of an array is contiguous elements of the array. For example, let array = {1, 2, 3}, the subarray of it will be {1}, {1, 2}, {1, 2, 3}, {2}, {2, 3}, {3]. The sum of the element of a subarray must be compared with contiguous sum, if they are equal, subarray must be printed.

4. RUNNING AND RESULTS

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*****QUESTION 1 TESTING*****
Main string is: CSE222 Homework 4 at 01.04.2022
Key string is: 22
The index of first ocurrence of 22 is: 3
The index of second ocurrence of 22 is: 4
The index of third ocurrence of 22 is: 29
The index of fourth ocurrence of 22 is: -1
Key string is changed to 56
The index of first ocurrence of 56 is: -1
*****QUESTION 2 TESTING*****
The array is: {1, 2, 3, 4, 5, 6, 7, 8, 9, 10}
The array2 is: {1, 3, 4, 5, 6, 7, 8, 9, 10}
The array3 is: {1, 2, 3, 4, 5, 6, 7, 8, 10}
The array4 is: {2, 3, 4, 5, 7, 8, 9, 10}
The number of elements in between 3-7 in array is: 4
The number of elements in between 2-7 in array2 is: 4
The number of elements in between 1-9 in array3 is: 8
The number of elements in between 0-6 in array4 is: 4
The number elements in between 11-13 in array is: 0
*****QUESTION 3 TESTING*****
The array is: {2, 2, 2, 3, 4, 5, 6}
The list of subarrays which sum of all elements of it is equal to 6 in the array is:
{2,2,2}
{6}
The list of subarrays which sum of all elements of it is equal to 17 in the array is:
The list of subarrays which sum of all elements of it is equal to 18 in the array is:
{2,2,2,3,4,5}
{3,4,5,6}
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