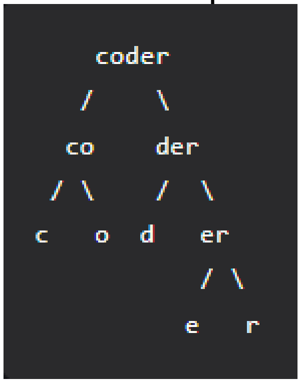
28th Jan 2023

First:-

Scrambled String : : Hard

Given two strings **S1** and **S2** of equal length, the task is to determine if S2 is a scrambled form of S1.

Scrambled string: Given string **str**, we can represent it as a binary tree by partitioning it into two non-empty substrings recursively.
Below is one possible representation of str = **coder:**



```
      coder
     /    \
    co     der
   / \    /  \
  c   o  d    er
             / \
            e   r
```

To scramble the string, we may choose any non-leaf node and swap its two children.
Suppose, we choose the node **co** and swap its two children, it produces a scrambled string **ocder**.
Similarly, if we continue to swap the children of nodes **der** and **er**, it produces a scrambled string **ocred**.

Note: Scrambled string is not the same as an Anagram.

Print "Yes" if S2 is a scrambled form of S1 otherwise print "No".

Example 1:

```
Input: S1="coder", S2="ocder"
Output: Yes
Explanation: ocder is a scrambled
form of coder.
```

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```
    ocder
   /    \
  oc    der
 / \
o   c

As "ocder" can represent it
as a binary tree by partitioning
it into two non-empty substrings.
We just have to swap 'o' and 'c'
to get "coder".
```

Example 2:

```
Input: S1="abcde", S2="caebd"
Output: No
Explanation: caebd is not a
scrambled form of abcde.
```

Your Task:
You don't need to read input or print anything. You only need to complete the function **isScramble()** which takes two strings S1 and S2 as input and returns a boolean value.

Expected Time Complexity: O(N^2)
Expected Auxiliary Space: O(N^2)

Constrains:

- S1.length = S2.length
- S1.length<=31
- S1 and S2 consist of lower-case English letters

Code section:-

```
class Solution
{
```

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```cpp
public:
    unordered_map<string, int> t;
    bool check(string s1, string s2)
    {
        if (s1 == s2)
        {
            return true;
        }
        if (s1.length() <= 1)
        {
            return false;
        }
        int n = s1.length();
        bool flag = false;
        for (int i = 1; i <= n - 1; i++)
        {
            string key = s1 + "_" + s2;
            if (t.find(key) != t.end())
            {
                return t[key];
            }
            // condition 1
            if (check(s1.substr(0, i), s2.substr(0, i)) &&
check(s1.substr(i, n - i), s2.substr(i, n - i)))
            {
                flag = true;
                break;
            }
            // condition 2
            if (check(s1.substr(0, i), s2.substr(n - i, i)) &&
check(s1.substr(i, n - i), s2.substr(0, n - i)))
            {
                flag = true;
                break;
            }
        }
        string k = s1 + "_" + s2;
        t[k] = flag;
        return flag;
    }
    bool isScramble(string S1, string S2)
    {
        // code here
        return check(S1, S2);
    }
};
```

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