Experiment-4

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Subject Name: Advanced Programming Lab - 2 **Subject Code:** 22CSP-351

1. Aim:

1. Problem: 1.4.1: Rotate String. Given two strings s and goal, return true if and only if s can become goal after some number of shifts on s. A shift on s consists of moving the leftmost character of s to the rightmost position.
2. Problem: 1.4.2: Find the Index of the First Occurrence in a String. Given two strings needle and haystack, return the index of the first occurrence of needle in haystack, or -1 if needle is not part of haystack.

2. Objective:

1. Problem 1.4.1: Determine if one string can be transformed into another by performing a series of left-to-right rotations.
2. Problem 1.3.2: Find the index of the first occurrence of a substring (needle) in a given string (haystack) or return -1 if the substring is not found.

3. Implementation/Code:

1.)

```
#include <iostream>
#include <string>

using namespace std;

bool rotateString(string s, string goal)
{
    if (s.length() != goal.length())
```

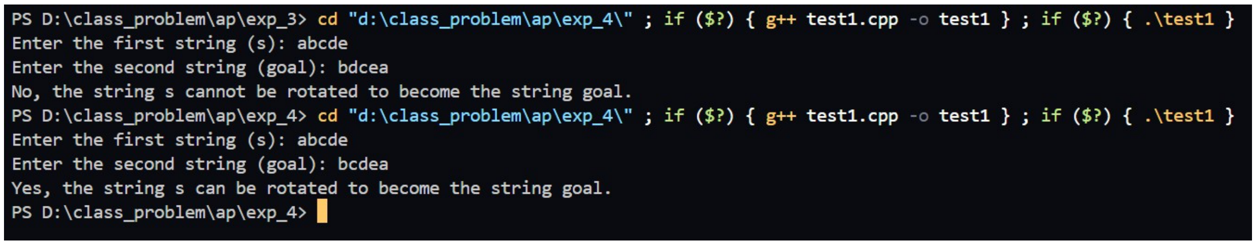
```
        return false;

    s += s;
    return s.find(goal) != string::npos;
}

int main()
{
    string s, goal;

    cout << "Enter the first string (s): ";
    cin >> s;

    cout << "Enter the second string (goal): ";
    cin >> goal;

    if (rotateString(s, goal))
    {
        cout << "Yes, the string s can be rotated to become the string goal." <<
endl;
    }
    else
    {
        cout << "No, the string s cannot be rotated to become the string goal." <<
endl;
    }

    return 0;
}
```

2.)

```
#include <iostream>
#include <string>
using namespace std;

int strStr(string haystack, string needle)
{
    if (needle.empty())
        return 0;
    for (int i = 0; i <= haystack.size() - needle.size(); i++)
    {
        if (haystack.substr(i, needle.size()) == needle)
        {
            return i;
        }
    }
    return -1;
}

int main()
{
    string haystack, needle;
    cout << "Enter the haystack string: ";
    cin >> haystack;
    cout << "Enter the needle string: ";
    cin >> needle;

    int index = strStr(haystack, needle);

    if (index != -1)
    {
        cout << "The first occurrence of \"" << needle << "\" in \"" << haystack <<
"\" is at index: " << index << endl;
    }
    else
    {
        cout << "The substring \"" << needle << "\" is not found in \"" << haystack
<< "\"." << endl;
    }

    return 0;
}
```

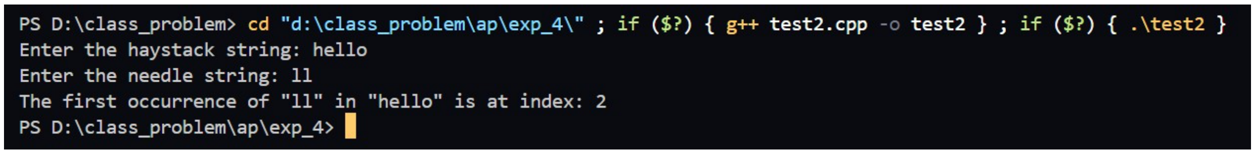
4. Output:

1.



```
PS D:\class_problem\ap\exp_3> cd "d:\class_problem\ap\exp_4\" ; if ($?) { g++ test1.cpp -o test1 } ; if ($?) { .\test1 }
Enter the first string (s): abcde
Enter the second string (goal): bdcea
No, the string s cannot be rotated to become the string goal.
PS D:\class_problem\ap\exp_4> cd "d:\class_problem\ap\exp_4\" ; if ($?) { g++ test1.cpp -o test1 } ; if ($?) { .\test1 }
Enter the first string (s): abcde
Enter the second string (goal): bcdea
Yes, the string s can be rotated to become the string goal.
PS D:\class_problem\ap\exp_4>
```

2.



```
PS D:\class_problem> cd "d:\class_problem\ap\exp_4\" ; if ($?) { g++ test2.cpp -o test2 } ; if ($?) { .\test2 }
Enter the haystack string: hello
Enter the needle string: ll
The first occurrence of "ll" in "hello" is at index: 2
PS D:\class_problem\ap\exp_4>
```

5. Time Complexity:

1. O(n+m)
2. O(n-m+1)

6. Space Complexity:

1. O(n)
2. O(1)

7. Learning Outcome:

1. Understand string manipulations and rotations.
2. Learn how to check for substrings efficiently.
3. Develop problem-solving skills for string-related algorithms.
4. Gain knowledge of substring search techniques.
5. Practice using loops and conditionals for string traversal.
6. Enhance skills in optimizing string operations.