K L UNIVERSITY

FRESHMAN ENGINEERING DEPARTMENT

A Project Based Lab Report

On

FIBONACCI STRINGS

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CERTIFICATE

This is to certify that the project based laboratory report entitled "<TITLE>" submitted by Mr./Ms**. JLVS.HARSHITHA, K.RAGA SRI LAKSHMI, K.LAKSHMIPRIYA,K.ANUHYA**bearingRegd.No.**2000030388,2000030426,2000030534,2000030535** to the **Department of Basic Engineering Sciences, KL University** in partial fulfillment of the requirements for the completion of a project based Laboratory in "Technical Skills-I(Coding)" course in I B Tech I Semester, is a bonafide record of the work carried out by him/her under my supervision during the academic year 2019 – 2020.

PROJECT SUPERVISOR — HEAD OF THE DEPARTMENT

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ACKNOWLEDGEMENTS

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I express my sincere thanks to our project supervisor <name> for his/her novel association of ideas, encouragement, appreciation and intellectual zeal which motivated us to venture this project successfully.

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ABSTRACT

You are given a Fibonacci string and n strings (like queries). For each query , you have to find the number of times it occurs in the given Fibonacci string as a substring.

To do this project we are using concepts like:

- **String functions**
  - To copy and concatenate the strings (strcpy(), strcat())
  - Here we are copy and concatenating the strings to get Fibonacci strings sequence
  - Ex: 'a' , 'b', 'ba', 'bab', 'babba', 'babbabab'.
- **Conditional statements**
  - We are using if-else conditions whether the condition is correct or wrong
- **Loops**
  - We are using for loops to count the occurrence of queries as substring in a Fibonacci string.
- **2D Arrays**
  - We are using 2 dimensional arrays to read the strings
  - EX: x[100][100],y[100][100].

Fibonacci strings are defined as follows: f1 = «a» f2 = «b» fn = fn - 1 fn - 2, n > 2 Thus, the first five Fibonacci strings are: "a", "b", "ba", "bab", "babba". You are given a Fibonacci string and m strings si. For each string si, find the number of times it occurs in the given Fibonacci string as a substring.

Input Format:

The first line contains two space-separated integers k and m — the number of a Fibonacci string and the number of queries, correspondingly. Next m lines contain strings si that correspond to the queries. It is guaranteed that strings si aren't empty and consist only of characters "a" and "b". The input limitations for getting 30 points are: 1 ≤ k ≤ 3000 1 ≤ m ≤ 3000 The total length of strings si doesn't exceed 3000 The input limitations for getting 100 points are: 1 ≤ k ≤ 1018 1 ≤ m ≤ 104 The total length of strings si doesn't exceed 105 Please do not use the %lld specifier to read or write 64-bit integers in C++. It is preferred to use cin, cout streams or the %I64d specifier.

Output Format:

For each string si print the number of times it occurs in the given Fibonacci string as a substring. Since the numbers can be large enough, print them modulo 1000000007 (109 + 7). Print the answers for the strings in the order in which they are given in the input.

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INTRODUCTION

Fibonacci strings are defined as follows: f1 = «a» f2 = «b» fn = fn - 1 fn - 2, n > 2 Thus, the first five Fibonacci strings are: "a", "b", "ba", "bab", "babba". You are given a Fibonacci string and m strings si. For each string si, find the number of times it occurs in the given Fibonacci string as a substring.

AIM OF THE PROJECT

To find the count of queries that occurs in the given Fibonacci string as a substring

Advantages

1. It Forces You To Choose "More Or Less":

In addition to building in uncertainty for increased time spans, the Fibonacci sequence also forces your team to make a choice. When faced with a larger task, "is it a, 8, a 13 or a 21?", there is no in-between. This helps your team group and differentiate the size of tasks.

Another aspect of the Fibonacci sequence is the distance between points. 3 to 5 is a difference of 2, but 5 to 8 is a difference of 3. This allows your brain to intuitively distinguish between the numbers of the Fibonacci scale as different magnitudes.

2.It's Non-Linear:

Finally, the nonlinear nature of the Fibonacci scales reduces over-analysis. 4 out of the 6 numbers used are prime numbers, reducing your ability to evenly break down or compare tasks. Large tasks are not squarely related to one another (that's twice as long as that), and the numbers don't give the impression that if you just had multiple people work on it, the task would be twice as fast. This helps reduce over-analysis

Disadvantages

1. It is fixed size.

2. It is less intuitive notation for library feature.

3. Primitive c arrays do not track their own size.

Future enhancements

i) Adding permanent memory to the system.

ii) For that compiler is going store all the data in memory.

iii) When we give any name to the compiler, if it is already stored in the memory it will correct our name according to the given instructions.

SYSTEM REQUIREMENTS

- **SOFTWARE REQUIREMENTS:**

The major software requirements of the project are as follows:

Language : Turbo-C

Operating system**:** Windows Xp or later.

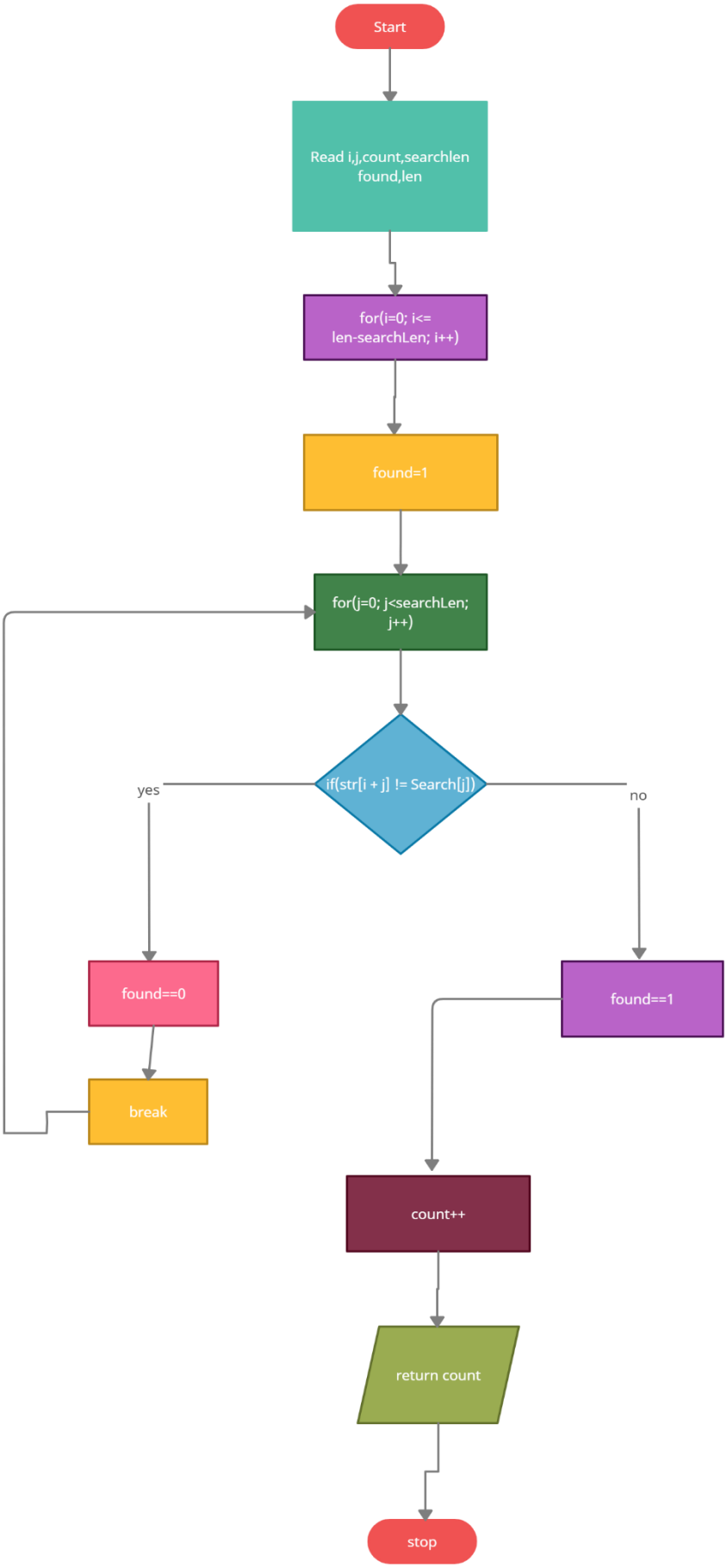
- **HARDWARE REQUIREMENTS:**

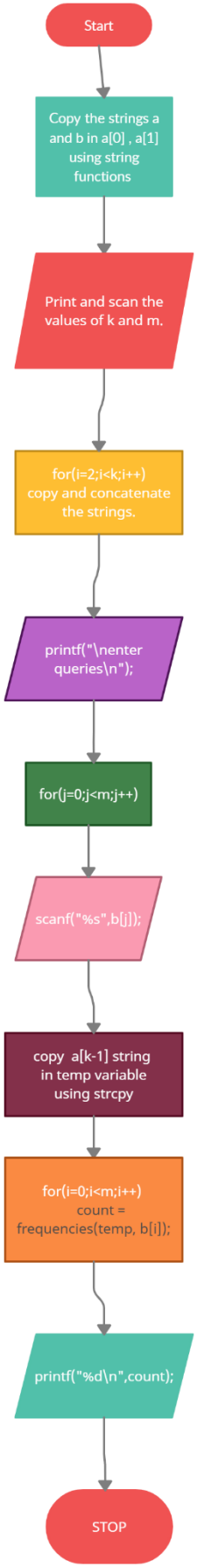
The hardware requirements that map towards the software are as follows:

RAM : 512MB

Processor : INTEL CORE I5

DATA FLOW DIAGRAM


Start
Read i,j,count,searchlen found,len
for(i=0; i<= len-searchLen; i++)
found=1
for(j=0; j<searchLen; j++)
if(str[i + j] != Search[j])
yes
no
found==0
break
found==1
count++
return count
stop


Start
Copy the strings a and b in a[0] , a[1] using string functions
Print and scan the values of k and m.
for(i=2;i<k;i++) copy and concatenate the strings.
printf("\nenter queries\n");
for(j=0;j<m;j++)
scanf("%s",b[j]);
copy a[k-1] string in temp variable using strcpy
for(i=0;i<m;i++) count = frequencies(temp, b[i]);
printf("%d\n",count);
STOP

ALGORITHM

STEP1: Start

STEP2: Read Strcpy(a[0],"a")

STEP3: Read Strcpy(a[i],"b")

STEP4: enter k,m values

STEP5: Int i=2

STEP6: if i<k

6(a):if it is true Go to step7

6(b):if it is false Go to step8

STEP7: Strcpy(a[i],a[i-1])

7(a):Strcat(a[i],a[i-2])

7(b):Increment i++

7(c):And again Go to step16

STEP8: Print quieries

8(a):j=0

STEP9: if j<m

9(a):if it is true Go to step10

9(b):if it is false Go to step11

STEP10: gets b[j]

10(a):Increment j++

10(b):And again Go to step9

STEP11: Strcpy(temp,a[k-1])

11(a):int i=0

STEP12: if i<m

12(a):if it is true Go to step13

12(b):if it is false Go to step24

STEP13: count frequencies(temp,b[i])

13(a):stringlen=strlen(str)

13(b):searchlen=strlen(search)

STEP14: count=0

14(a):int i=0

STEP15: if i<str_lenscaler

15(a):if it is true Go to step16

15(b):if it is true Go to step21

STEP16: found=1

16(a):int i=0

STEP17: if j <searchlen

17(a):if it is true Go to step18

17(b):if it is true Go to step20

STEP18: Str[i+j]!=search[j]

18(a):found=0

18(b):break

STEP19: Increment j++

19(a):And again Go to step17

STEP20: found==1

20(a):count++

20(b):Increment i++

20(c):And again Go to step15

STEP21: return count

STEP22: Go to step13

STEP23: Print count

23(a):Increment i++

23(b):And again Go to step12

STEP24:Stop

IMPLEMENTATION

```
#include<stdio.h>
#include<conio.h>
#include<string.h>
int frequencies(char* str, char *Search);
int main()
{
char a[1000][500],b[1000][500],temp[400];

 int k,m,i,j,count;
strcpy(a[0],"a");
strcpy(a[1],"b");
printf("enter k,m\n");
scanf("%d%d",&k,&m);
for(i=2;i<k;i++)
{
   strcpy(a[i],a[i-1]);
   strcat(a[i],a[i-2]);


}
printf("\nenter queries\n");
for(j=0;j<m;j++)
{
```

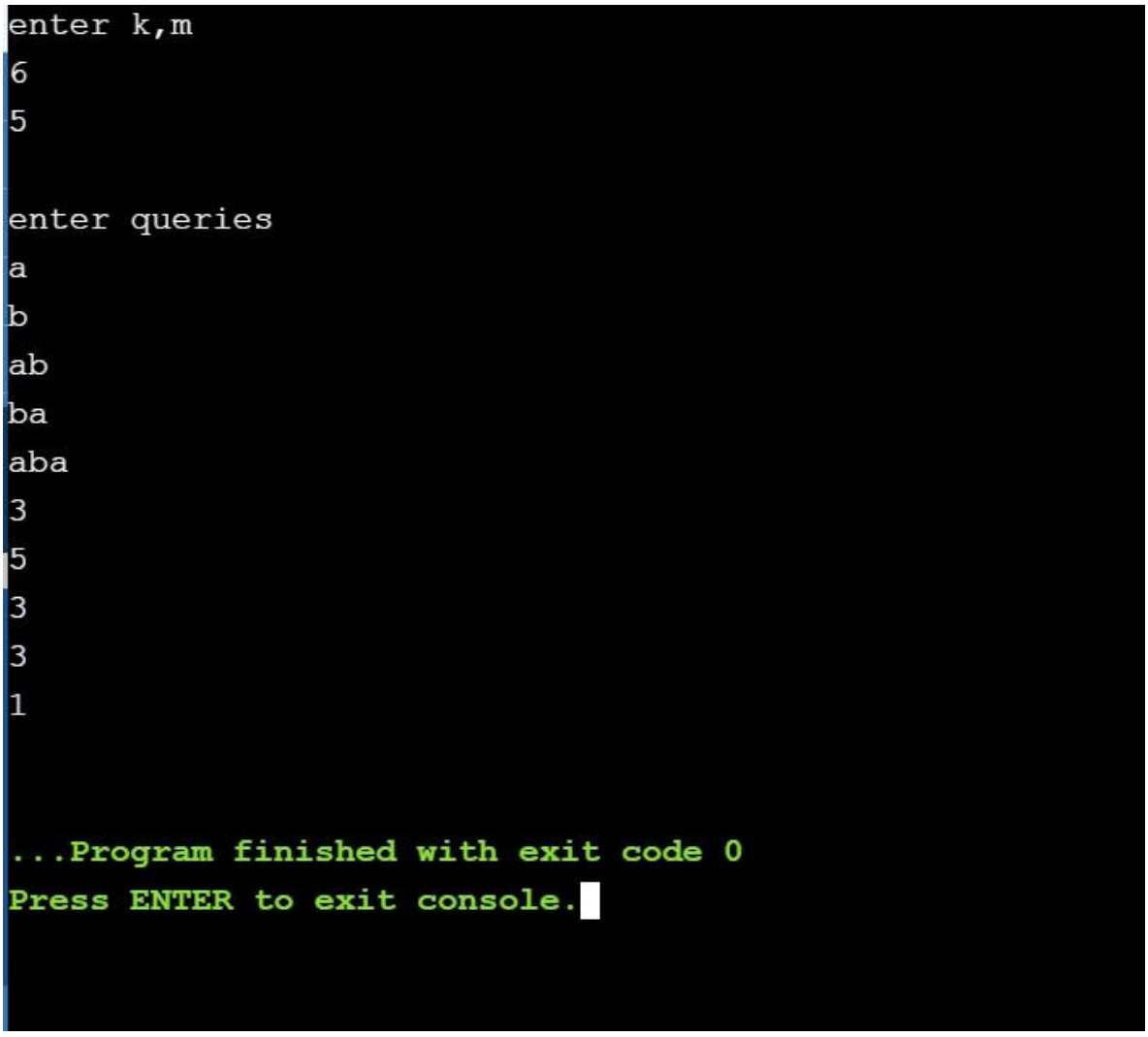
```
   scanf("%s",b[j]);


}
strcpy(temp,a[k-1]);
for(i=0;i<m;i++)
{
   count = frequencies(temp, b[i]);
   printf("%d\n",count);


}
return 0;


}
int frequencies(char * str, char * Search)
{
   int i, j, found, count;
   int len, searchLen;
   len = strlen(str);
   searchLen = strlen(Search);
   count = 0;
   for(i=0; i<= len-searchLen; i++)
   {
      found= 1;
      for(j=0; j<searchLen; j++)
```

```
        {
        if(str[i + j] != Search[j])
        {
           found= 0;
            break;


        }


    }
    if(found == 1)
    {
       count++;


    }


  }
  return count;

}
```

INTEGRATION AND SYSTEM TESTING

OUTPUTS

Screen Shots:



```
enter k,m
5
3

enter queries
a
b
ab
2
3
1


...Program finished with exit code 0
Press ENTER to exit console.
```

CONCLUSION

We have successfully completed the project on "FIBONACCI STRINGS. And all test cases and passed.