K-GOODNESS STRING

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Abstract:

A collaborative project to learn open-source applications and implement them.

K-goodness String is an interactive coding question that we have used to analyse it and use it as an aid to learn other open-source applications such as git and GitHub.

We have also used other open-source applications such as vim and libre office to complete this project.

Collaborate together as a team using git and GitHub towards solving the above problem.

Problem:

Charles defines the goodness score of a string as the number of indices i such that Si≠SN−i+1 where 1≤i≤N/2 (1-indexed). For example, the string CABABC has a goodness score of 2 since S2≠S5 and S3≠S4.

Charles gave Ada a string S of length N, consisting of uppercase letters and asked her to convert it into a string with a goodness score of K. In one operation, Ada can change any character in the string to any uppercase letter. Could you help Ada find the minimum number of operations required to transform the given string into a string with goodness score equal to K?

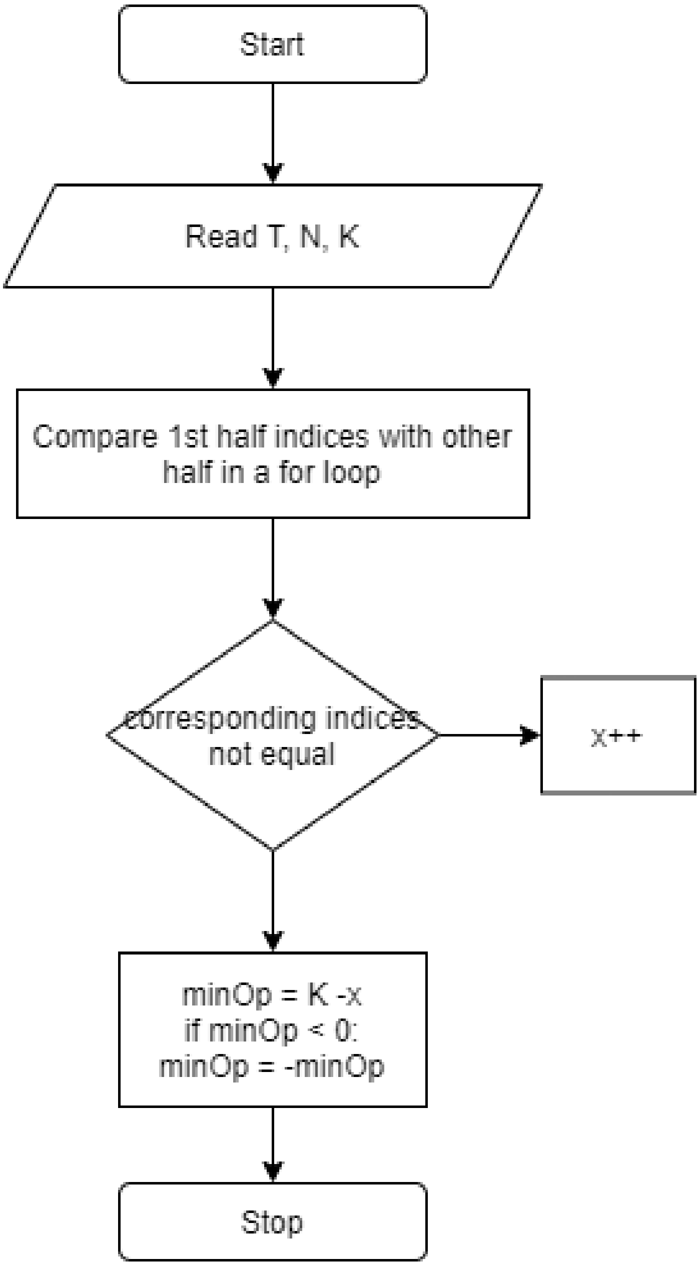
Input
The first line of the input gives the number of test cases, T. T test cases follow.

The first line of each test case contains two integers N and K. The second line of each test case contains a string S of length N, consisting of uppercase letters.

Output
For each test case, output one line containing Case #x: y, where x is the test case number (starting from 1) and y is the minimum number of operations required to transform the given string S into a string with goodness score equal to K.

Limits
Memory limit: 1 GB.
1≤T≤100.
0≤K≤N/2.
Test Set 1
Time limit: 20 seconds.
1≤N≤100.
Test Set 2
Time limit: 40 seconds.
1≤N≤2×105 for at most 10 test cases.
For the remaining cases, 1≤N≤100.

Flowchart:


Start
Read T, N, K
Compare 1st half indices with other half in a for loop
corresponding indices not equal
x++
minOp = K -x
if minOp < 0:
minOp = -minOp
Stop

Sample Input/Output

Sample Input

```
2
5 1
ABCAA
4 2
ABAA
```

Sample Output

```
Case #1: 0
Case #2: 1
```

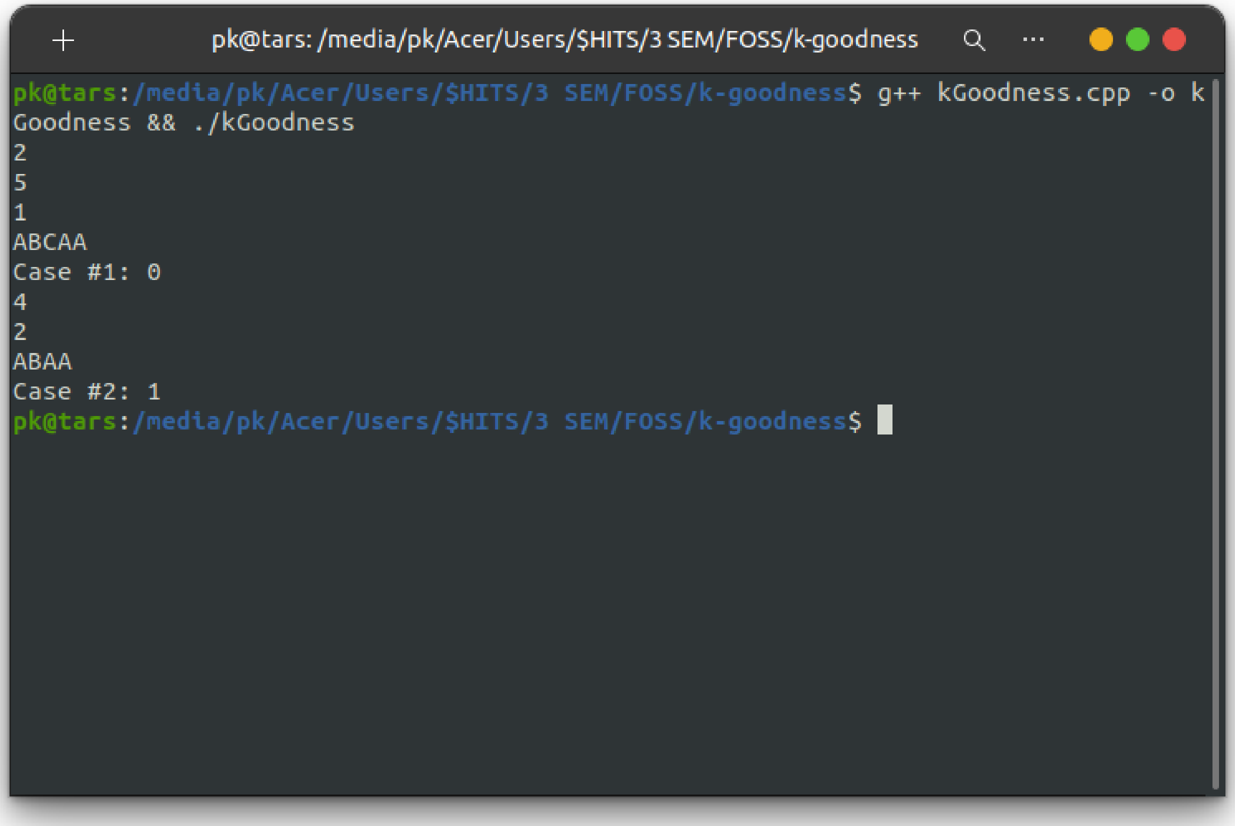
In Sample Case #1, the given string already has a goodness score of 1. Therefore, the minimum number of operations required is 0.

In Sample Case #2, one option is to change the character at index 1 to B in order to have a goodness score of 2. Therefore, the minimum number of operations required is 1.

Program:

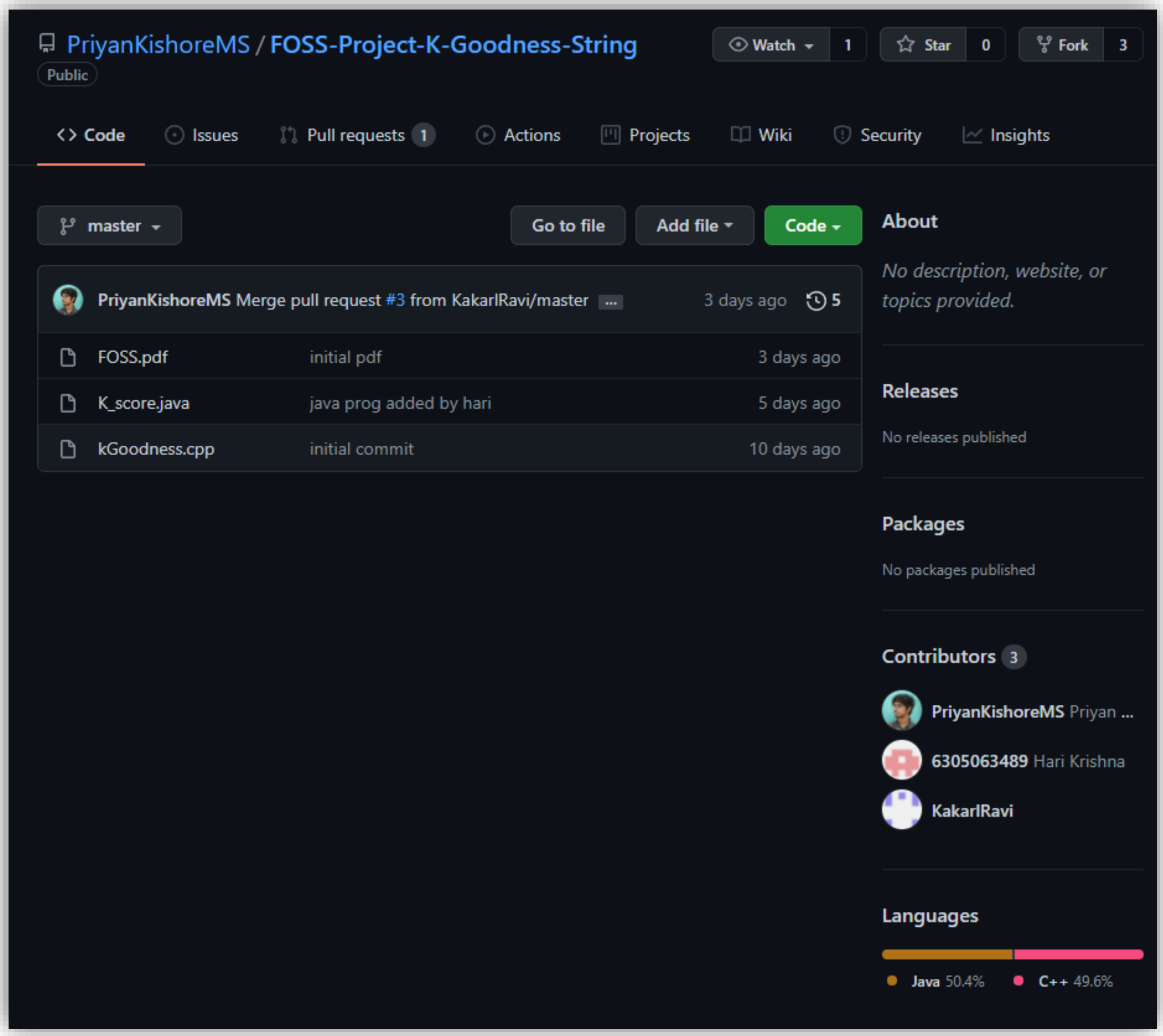
```cpp
#include <iostream>
#include <string>
using namespace std;

int main()
{
    int T; //No. of test cases
    string s;

    cin >> T;
    for (int i = 1; i <= T; i++)
    {
        int N, K; //Length of string and goodness score
        cin >> N >> K;
        cin >> s;
        int x = 0;
        for (int i = 0; i < N / 2; i++) //Checking indices from first half with the other half of the stiring
        {
            if (s[i] != s[N - i - 1]) //if the corresponding indices are not equal, x is increased by 1
                x++;
        }
        /*
        Case 1: X=K,
        The string already has a goodness score of K. Therefore number of operations required is 0.

        Case 2: X>K,
        The string has a goodness score of X which is greater than K, so the minimum operations to change the string with
        goodness score of K is X - K.

        Case 3: X<K,
        The string has a goodness score of X which is lesser than K, so the minimum operations to change the string with
        goodness score of K is K - X.
        */
        int minOp = K - x;
        if (minOp < 0)
            minOp = -minOp;
        printf("Case #%d: %d\n", i, minOp);
    }
    return 0;
}
```

Output:



```
pk@tars:/media/pk/Acer/Users/$HITS/3 SEM/FOSS/k-goodness$ g++ kGoodness.cpp -o k
Goodness && ./kGoodness
2
5
1
ABCAA
Case #1: 0
4
2
ABAA
Case #2: 1
pk@tars:/media/pk/Acer/Users/$HITS/3 SEM/FOSS/k-goodness$ 
```

GitHub:



PriyanKishoreMS Merge pull request #3 from KakarlRavi/master ... 3 days ago 5

FOSS.pdf	initial pdf	3 days ago
K_score.java	java prog added by hari	5 days ago
kGoodness.cpp	initial commit	10 days ago

No description, website, or topics provided.

No releases published

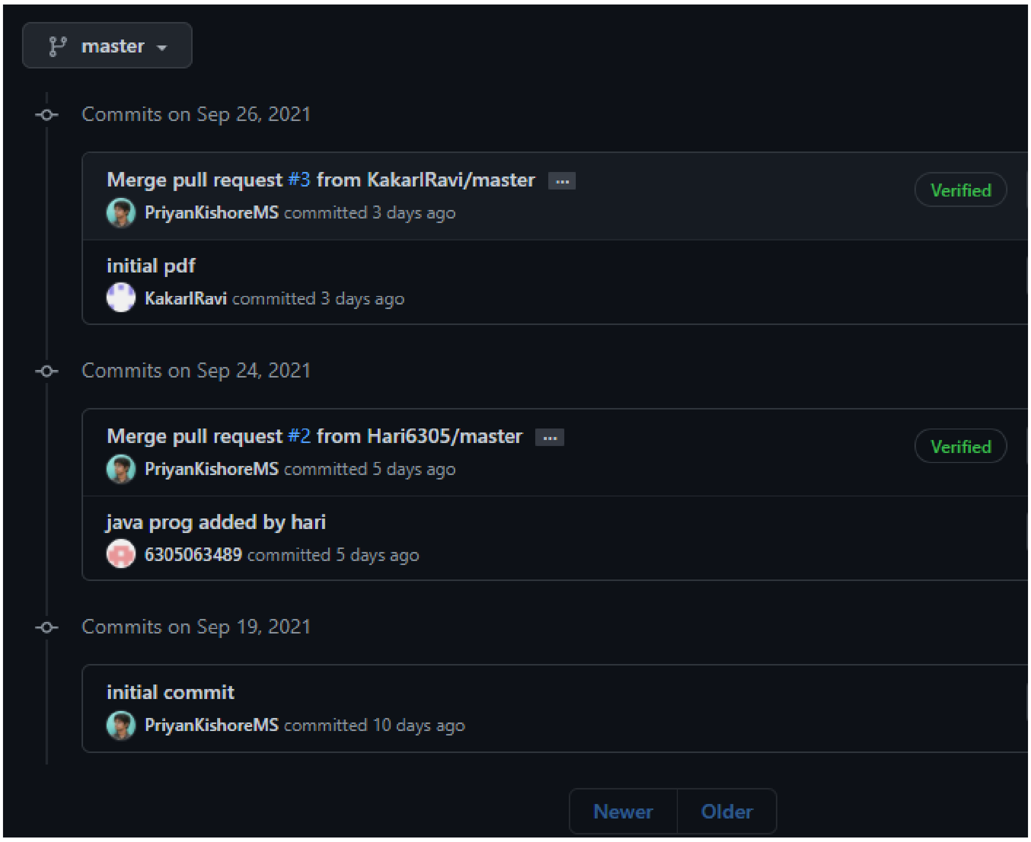
No packages published

PriyanKishoreMS Priyan ...

6305063489 Hari Krishna

KakarlRavi

● Java 50.4% ● C++ 49.6%



master

Commits on Sep 26, 2021

Merge pull request #3 from KakarlRavi/master ...
PriyanKishoreMS committed 3 days ago — Verified

initial pdf
KakarlRavi committed 3 days ago

Commits on Sep 24, 2021

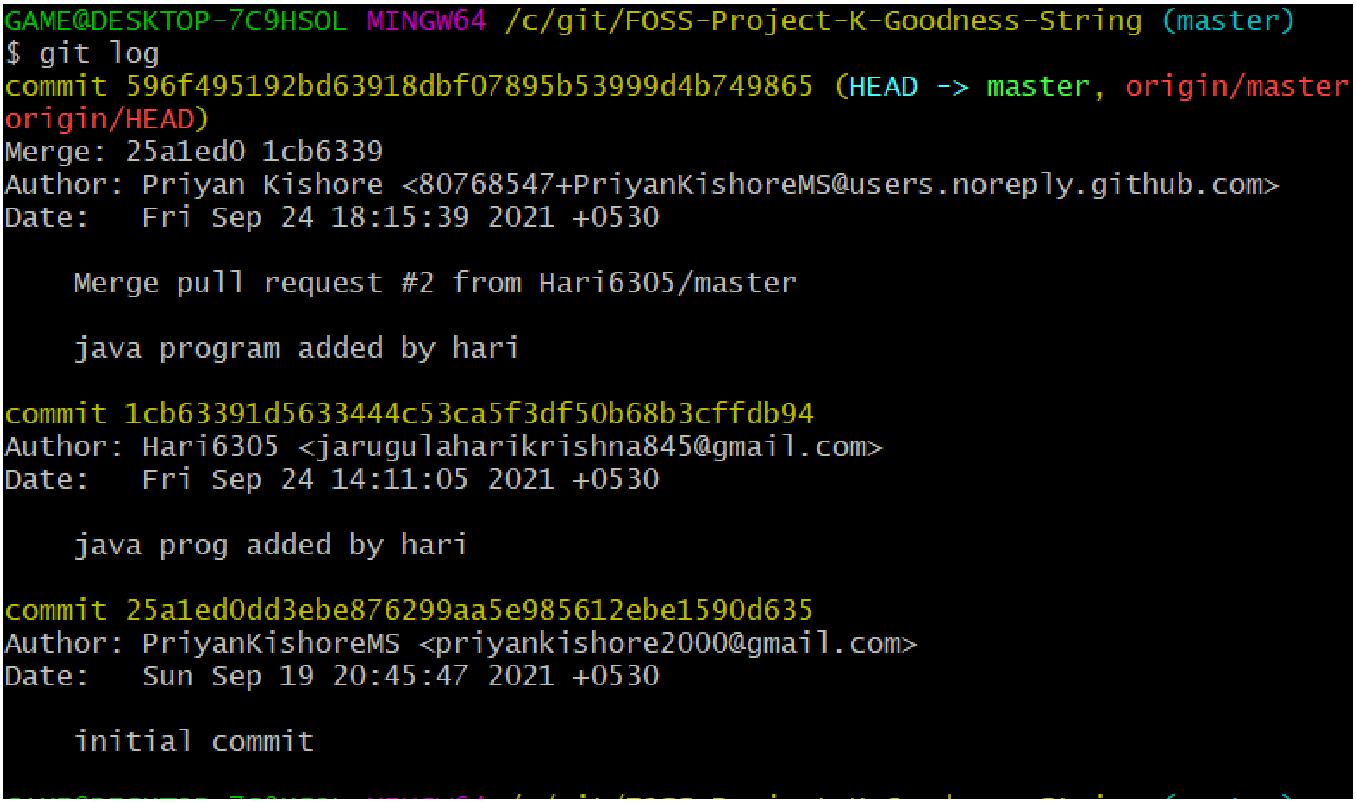
Merge pull request #2 from Hari6305/master ...
PriyanKishoreMS committed 5 days ago — Verified

java prog added by hari
6305063489 committed 5 days ago

Commits on Sep 19, 2021

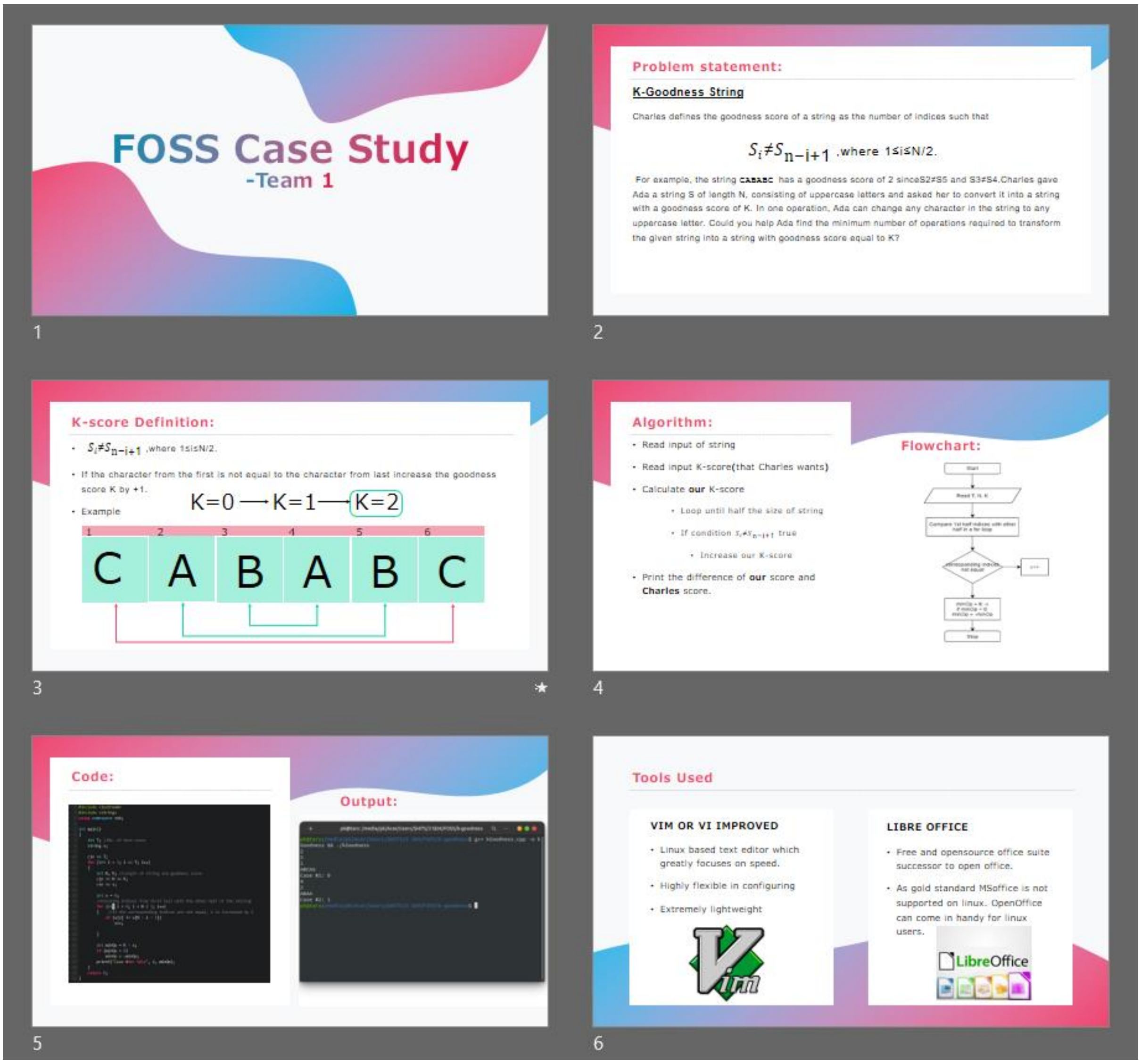
initial commit
PriyanKishoreMS committed 10 days ago

Git Log:



```
GAME@DESKTOP-7C9HSOL MINGW64 /c/git/FOSS-Project-K-Goodness-String (master)
$ git log
commit 596f495192bd63918dbf07895b53999d4b749865 (HEAD -> master, origin/master
origin/HEAD)
Merge: 25a1ed0 1cb6339
Author: Priyan Kishore <80768547+PriyanKishoreMS@users.noreply.github.com>
Date:   Fri Sep 24 18:15:39 2021 +0530

    Merge pull request #2 from Hari6305/master

    java program added by hari

commit 1cb63391d5633444c53ca5f3df50b68b3cffdb94
Author: Hari6305 <jarugulaharikrishna845@gmail.com>
Date:   Fri Sep 24 14:11:05 2021 +0530

    java prog added by hari

commit 25a1ed0dd3ebe876299aa5e985612ebe1590d635
Author: PriyanKishoreMS <priyankishore2000@gmail.com>
Date:   Sun Sep 19 20:45:47 2021 +0530

    initial commit
```

PPT Slide Sorter view:



FOSS Case Study

-Team 1

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Problem statement:

K-Goodness String

Charles defines the goodness score of a string as the number of indices such that

$$S_i \neq S_{n-i+1}$$,where 1≤i≤N/2.

For example, the string CABABC has a goodness score of 2 sinceS2≠S5 and S3≠S4.Charles gave Ada a string S of length N, consisting of uppercase letters and asked her to convert it into a string with a goodness score of K. In one operation, Ada can change any character in the string to any uppercase letter. Could you help Ada find the minimum number of operations required to transform the given string into a string with goodness score equal to K?

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K-score Definition:

- $S_i \neq S_{n-i+1}$,where 1≤i≤N/2.
- If the character from the first is not equal to the character from last increase the goodness score K by +1.
- Example

$K=0 \longrightarrow K=1 \longrightarrow \boxed{K=2}$

1	2	3	4	5	6
C	A	B	A	B	C

3 ★

Algorithm:

- Read input of string
- Read input K-score(that Charles wants)
- Calculate **our** K-score
    - Loop until half the size of string
    - If condition $S_i \neq S_{n-i+1}$ true
        - Increase our K-score
- Print the difference of **our** score and **Charles** score.

Flowchart:

Start
Read T, N, K
Compare 1st half indices with other half in a for loop
Corresponding indices not equal
Stop

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Code:

Output:

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Tools Used

VIM OR VI IMPROVED

- Linux based text editor which greatly focuses on speed.
- Highly flexible in configuring
- Extremely lightweight

LIBRE OFFICE

- Free and opensource office suite successor to open office.
- As gold standard MSoffice is not supported on linux. OpenOffice can come in handy for linux users.

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thank you