Assignment -4

CSP Problem :

#include <iostream>

#include <vector>

using namespace std;

vector<int> duplicate(10);

struct table

{

char letter;

int value;

};

int isValid(table \*charlist, const int totalcount, string str1, string str2, string str3)

{

int num1 = 0, num2 = 0, num3 = 0, x = 1, j, i;

for (i = str1.length() - 1; i >= 0; i--)

{ // find number for first string

char ch = str1[i];

for (j = 0; j < totalcount; j++)

if (charlist[j].letter == ch) // when ch is present, break the

break;

num1 += x \* charlist[j].value;

x \*= 10;

}

x = 1;

for (i = str2.length() - 1; i >= 0; i--)

{ // find number for second string

char ch = str2[i];

for (j = 0; j < totalcount; j++)

if (charlist[j].letter == ch)

break;

num2 += x \* charlist[j].value;

x \*= 10;

}

x = 1;

for (i = str3.length() - 1; i >= 0; i--)

{ // find number for third string

char ch = str3[i];

for (j = 0; j < totalcount; j++)

if (charlist[j].letter == ch)

break;

num3 += x \* charlist[j].value;

x \*= 10;

}

if (num3 == (num1 + num2)) // check whether the sum of first and second string is same as 3rd string or not

return 1;

return 0;

}

bool csp(int totalcount, table \*charlist, int n, string str1, string str2,string str3)

{

if (n == totalcount - 1)

{ // when values are assigned for all characters

for (int i = 0; i < 10; i++)

{

if (duplicate[i] == 0)

{

charlist[n].value = i;

if (isValid(charlist, totalcount, str1, str2, str3) == 1)

{ // checkvalidation

cout << "Values : "<<endl;

for (int j = 0; j < totalcount; j++)

cout << " " << charlist[j].letter << " = " <<

charlist[j].value<<endl;

return true;

}

}

}

return false;

}

for (int i = 0; i < 10; i++)

{

if (duplicate[i] == 0)

{

charlist[n].value = i;

duplicate[i] = 1;

if (csp(totalcount, charlist, n + 1, str1, str2, str3))

return true;

duplicate[i] = 0;

}

}

return false;

}

bool solvecrpit(string str1, string str2, string str3)

{

int totalchar = 0;

//Counting length of strings

int l1 = str1.length();

int l2 = str2.length();

int l3 = str3.length();

//array for calculating frequency of each character

vector<int> frequency(26);

//calculating frequency of character

for (int i = 0; i < l1; i++)

++frequency[str1[i] - 'A'];

for (int i = 0; i < l2; i++)

++frequency[str2[i] - 'A'];//

for (int i = 0; i < l3; i++)

++frequency[str3[i] - 'A'];

//calculating unique character / Total count

for (int i = 0; i < 26; i++)

if (frequency[i] > 0)

totalchar++;

// As per question total count of character should be less then equal to 10.

if (totalchar > 10)//not in 0-9 range

{

cout << "Invalid strings";

return 0;

}

//add the unique char to the charlist

table charlist[totalchar];

for (int i = 0, j = 0; i < 26; i++)//i index count from 0 to 25 and j is used to count the unique letters

{ //i is the ascii value

if (frequency[i] > 0)

{

charlist[j].letter = char(i + 'A');//If a letter appears at least once in the word, it's added to the charlist

j++;

}

}

return csp(totalchar, charlist, 0, str1, str2, str3);

}

int main()

{

/\*

F A C E

+

B O O K

---------

R E A D

\*/

string str1 = "FACE";

string str2 = "BOOK";

string str3 = "READ";

if (solvecrpit(str1, str2, str3) == false)

cout << "No solution Found.";

}