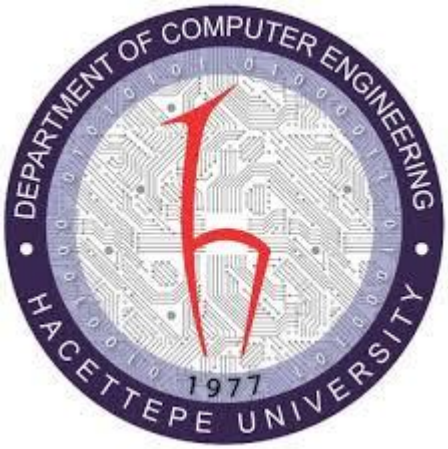

HACETTEPE UNIVERSITY

DEPARTMENT OF COMPUTER ENGINEERING

BBM203 PROGRAMMING LAB.

ASSIGNMENT 1

Subject : *Data Structures and Algorithms*

Submission Date : *22.10.2018*

Deadline : *04.11.2018 23:59:59*

Programming Language : *C*

Advisor : *R.A. Alaettin UÇAN*

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INTRODUCTION / AIM:

In this experiment we are expected to gain knowledge on C language including read-write files,arrays,matrices,recursion and dynamic memory allocation.

PROBLEM DEFINITION:

In this experiment we are expected to find the hidden treasure in the treasure map desinged as matrix with the key provided to us.This key will move around the map and will give us ideas to find the treasure by pointing the next stop.

How Program Starts?:

My program starts with taking comment line arguments and stores them into their expected format.The program takes the size of map and the size of key and stores them into integer variables. After that program opens input files in read mode to get the map and key and creates an output file to store expected center indexes and sums.

How do I store things?

I use dynamic memory allocation to store my map and my key.They are both two dimensional matrices and they have their integer pointer pointing at them.I use integer variables to store my map size,key size,center indexes,sum of dot product,final value and also some variables just to use in loop.

My Functions:

First i read map and key sizes from the command line.Than i use my createMap function which is:

(int **createMap(int len1,int len2); // creating dynamic matrix for key and map)

to create one matrix for map and another one for key.Than i call my setMatrix which loads given inputs to map and key matrix.

void setMatrix(FILE *mapinput,int **map,int row,int column); // my function to load data to matrix

After this code calls my recursive function which searchs the treasure by the clues given by the key.Here is my recursive function:

void searchTreasure(int **map,int **key,int x,int y,int z,int row,int column,FILE *f); // my recursive search treasure function

While searching, my function sums the all dot products of the matrix and takes mod five of it and gets a final value and finds another submatrix due to final value.(one is up,two is down,three is right,four is left).After finding the treasure my code calls free function which frees all the dynamic allocated memory and ends there.My free function:

void freefile(int **map,int len1); // my free function

My Detailed Algorithm

My program starts with getting command line arguments.First splits the first command which is two integer and there is a x between them.So my program splits from x than transform these chars into integer values and stores them into integer variables.Than transform the keysize into integer and then takes the input and output file names and opens these files.Than the first function call comes which is createMap, it takes the first two integer we get from the command line and allucates dynamic memory for that memory and creates my map.After that same process for keymatrix. It takes keysize and creates dynamic square matrix with given size.After that my setMap and setKey functions do their job and they set the matrixes with the input files.It takes my dynamic matrix,input file and a char

pointer to get the line from the input file and it splits the line from empty spaces and assign them into my map,key.After that my program is ready for the recursive searchTreasure function.My program calls this function with my both dynamic map and key array,first index of our submatrix,column and row size of my map,and file pointer to print into output file.At first we must find the dot products of submatrix and key.To do this i use two for loop first one is for rows second is for columns.But after first call their index will be different(key center will always be 1,1 but map center can be changed) this is why we must use different approach because we have 2 different indexes.This is why i have two integers.One of them increases when row is changed but the other is increases when column changes and when the columns end i reset the second integer to zero because it is going to target first index in the other row.After the multiplication we get some values and we sum these values in one value.After that problem wants mod five of our sum because it is going to show the direction we are going to head.And i have 5 different if caluses for every number we can get from the mod five.If key shows the go up case,i just increase our row value by keysize but we also check that it is not bigger or equal to our array lenght.If is , we decrease our row calue by keysize and take the next submatrix.The function calls itself , writes index points,final values and until we find the treasure it repeats these steps.After finding the treasure we just simply free our allucated memory, close our files and our program is complete and ready to find the next treasure to come.