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Course	**:**	BBM203 Software Laboratory II
Experiment	**:**	Assignment 1
Subject	**:**	Data Structures and Alghoritms
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1. SOFTWARE DESIGN NOTES

1.1 Definition Of The Problem

The aim of this program is to find a treasure in a map where the treasure is hidden and can only find by using an matrix named the keymatrix. It is also needed to use dynamic memory allocation while loading the map from the file. And the problem which is finding the treasure should be solved by using an recursive alghorithm.

First of all the map must be readen form the file and get loaded to my programs memory which should be dynamicly allocated.

Then the program must move the key above the map and do the specific mission due to the value which is gain by multiplying the key and the current map piece. And in each step it should output a string to the output.txt file which stores information about the center of cell and the evaluated value. And that process should be implemented as recursive.

1.2 Solution

First of all we have to read text from the mapmatrix and the keymatrix files and load them to an 2D array. For that we gonna write a function called readfile2Darr() which gets the filename and the address where we want to store the 2D Array.

For that I am going to use getline function for reading text from the file line by line and then I gonna spilt it by using strtok function. Then it going to be ready to process our main function.

I gonna allocate memory at wanted size and fill them by using readfile2Darr.

Now we are ready to process our data.

We have to implement a function named findtreasure() which can be recursively worked , to process our data. It has to get the MAP and KEY , their sizes(col,row) and which part of the MAP to process by giving starting point coordinates.

In the function we dot product the SUBMAP and the KEY. While dot producting we also increase the col and row numbers to give a new location to them. Sum of the dot product will be stored in an integer value named result.
Then we detect the middle point of the processed SUBMAP and assign them to (curcolpos,currowpos).
Then for the mod to 5 of the result;

if 0:
print data and return 1;
if 1:
print data and call findtreasure by passing upper SUBMAP while checking if there is any boundaryoverflow
if 2:
print data and call findtreasure by passing downer SUBMAP while checking if there is any boundaryoverflow
if 3:
print data and call findtreasure by passing righter SUBMAP while checking if there is any boundaryoverflow
if 4:
print data and call findtreasure by passing lefter SUBMAP while checking if there is any boundaryoverflow

So our aim will be existed.

2. Functions

2.1 *findtreasure( )*

```
int findtreasure(int  ** KEY, int ** MAP,int keyColSize,int keyRowSize,int mapColSize,int mapRowSize, int col, int row)
```

Inputs:
int ** KEY : KEY matrix;
int ** MAP : MAP matrix;
int keyColSize : column size of the KEY matrix;
int keyRowSize : row size of the KEY matrix;
int mapColSize : column size of the MAP matrix;
int mapRowSize : row size of the MAP matrix;
int col : current position of the col cursor;
int row : current position of the row cursor;

Goal:
Goal of that function is to find treasure while moving around a MAP matrix at the directions which can be finded as dot producting the KEY matrix and the sub matrix of MAP matrix. If the result is equal to zero it will return 1 and finish to execute it.

Returns:
1 if it founded the location of the treasure

2.2 *readfile2Darr( )*

```
void readfile2Darr(int ** MAP,char * filename)
```

Inputs:

int ** MAP : MAP matrix that will be loaden form text file;
char * filename: name of the text file

Goal:

Goal of that function is to read a text and convert it to 2D Array

Returns:

void