Computing The Sum of Diagonal Elements of a Matrix

ITP
Assignment-1

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Problem Statement

Given a square matrix of size n, write a C program to find the sum of major and minor diagonal elements.

Introduction

We are given the size of a square matrix and elements of the same, using this we have to compute the sum of the major and minor diagonals of the matrix using the C programming language.

We will be using the 2-Dimensional array to store the elements of the given matrix and nested for loops to traverse through the array.

Procedure

- First we have to declare an integer ‘n’ and take input from the user.
- Now we declare a 2D array of size n x n, i.e n rows and n columns.
- The next step would be take the elements of this array as input from the user.
- Now declare two integers for sum of major diagonal elements and sum of minor diagonal elements and initialize them to zero.
- Now using a for loop traverse through the array and take the sum of major diagonal elements and add the sum to the respective variable.
- Repeat the above step to update the sum of minor diagonal elements as well.


Algorithm
Explanation of Code

Step 1

As you can see in the snippet, we are declaring an ‘int n’ and taking input using ‘scanf’.

z

```c
#include <stdio.h>

int main(){
    int n;
    printf("Enter the size of the Matrix: ");
    scanf("%d", &n);
```

Step 2

Here we are declaring a 2d array of size n and taking input using nested ‘for’ loop.

```
int matrix[n][n];
printf("\nEnter the elements of the Matrix:\n");
for(int i = 0; i < n; i++){
    for(int j = 0; j < n; j++){
        scanf("%d", &matrix[i][j]);
    }
}
```

Step 3

Now we declare a variable of data type int. Using a loop we iterate through the major diagonal elements and add it to the variable.

```
int sum_of_major_diagonal_elements = 0;
for(int i = 0; i < n; i++){
    sum_of_major_diagonal_elements += matrix[i][i]
    // arr[0][0] + arr[1][1] and so on..
}
```

Step 4

Similarly, we declare a variable for storing the sum of minor diagonal elements. We iterate through the matrix and add the respective elements to the variable.

```
int sum_of_minor_diagonal_elements = 0;
for(int i = 0; i < n; i++){
    sum_of_minor_diagonal_elements += matrix[i][n - 1 - i];
    // arr[0][n-1] + arr[1][n-2] and so on..
}
```

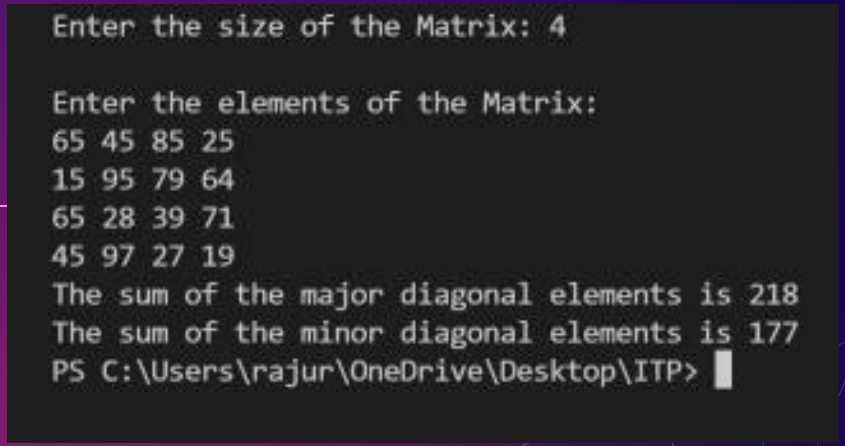
Step 5

Now we print the respective results using the ‘printf’ statements as shown in the snippet.

```
    printf("The sum of the major diagonal elements is %d\n",
    sum_of_major_diagonal_elements);
    printf("The sum of the minor diagonal elements is %d",
    sum_of_minor_diagonal_elements);
    return 0;
}
```

Code Output

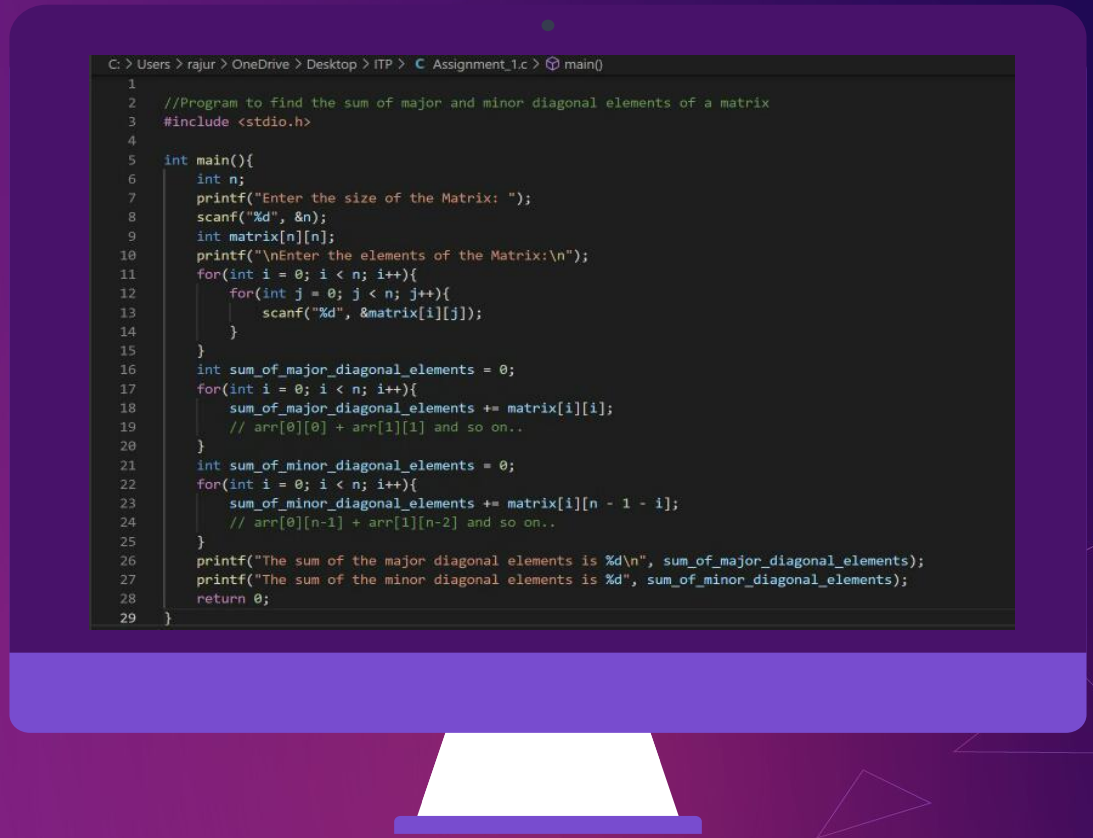
The output will be displayed as shown in the following snippet.



References

- https://www.geeksforgeeks.org/multidimensional-arrays-c-cpp/
- https://www.geeksforgeeks.org/loops-in-c-and-cpp/?ref=gcse
- https://www.geeksforgeeks.org/nested-loops-in-c-with-examples/
- https://www.geeksforgeeks.org/array-data-structure/

Final Code


C: > Users > rajur > OneDrive > Desktop > ITP > Assignment_1.c > main()
1
2 //Program to find the sum of major and minor diagonal elements of a matrix
3 #include <stdio.h>
4
5 int main(){
6 int n;
7 printf("Enter the size of the Matrix: ");
8 scanf("%d", &n);
9 int matrix[n][n];
10 printf("\nEnter the elements of the Matrix:\n");
11 for(int i = 0; i < n; i++){
12 for(int j = 0; j < n; j++){
13 scanf("%d", &matrix[i][j]);
14 }
15 }
16 int sum_of_major_diagonal_elements = 0;
17 for(int i = 0; i < n; i++){
18 sum_of_major_diagonal_elements += matrix[i][i];
19 // arr[0][0] + arr[1][1] and so on..
20 }
21 int sum_of_minor_diagonal_elements = 0;
22 for(int i = 0; i < n; i++){
23 sum_of_minor_diagonal_elements += matrix[i][n - 1 - i];
24 // arr[0][n-1] + arr[1][n-2] and so on..
25 }
26 printf("The sum of the major diagonal elements is %d\n", sum_of_major_diagonal_elements);
27 printf("The sum of the minor diagonal elements is %d", sum_of_minor_diagonal_elements);
28 return 0;
29 }

THANK YOU !