Heaven's Light is Our Guide

Rajshahi University of Engineering and Technology

Department of Computer Science and Engineering

Course No: CSE.2104

Course Title: Sessional based on CSE.2104 (Numerical Methods)

Lab Report On: Triangular Matrices

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CHAPTER 1

Title 1: Implementation of Numerical Linear Algebra to Find whether a Non-Singular Square Matrix is Triangular or Not.

1.1 Objective

- Gathering knowledge about Triangular Matrix.
- Implementing the Knowledge in C++.

1.2 Methodology

- Take input of n, of a n*n square matrix.
- Load the matrix from .txt file.
- Find out whether the matrix is lower or upper or non-triangular matrix -
  - Lower If the elements above the main diagonal are zero.
  - Upper If the elements below the main diagonal are zero.
  - Otherwise the matrix is a non-triangular matrix.

1.3 Implementation

I have implemented Numerical Linear Algebra to find the matrix is lower or upper or non-triangular, according to the above Pseudocode. I have taken the matrix from a text file. The tools I used here are :

- C++
- Text File
- Editor: CodeBlocks

1.3.1 Code

```
// This code checks whether a given
// non-singular square matrix is
// Lower Triangular
// Upper Triangular
// or Non-Triangular.

#include<bits/stdc++.h>
using namespace std;

double x[51][51];
int n;

void input(){
   cout<<"\n\tEnter N*N Matrix's N: ";
   cin>>n;

   int v;

   freopen("Matrix.txt","r",stdin);

   for(int i=0;i<n;i++){
      for(int j=0;j<n;j++){
         cin>>v;
         x[i][j]=v;
      }
   }
}

void show(){
   cout<<"\n\tThe Matrix is :"<<endl;
   for(int i=0;i<n;i++){
      cout<<"\t";
      for(int j=0;j<n;j++){
         cout<<"  "<<x[i][j];
      }
      cout<<endl;
   }
}

int islow(){
   int z=1;
```

```
   for(int i=0;i<n;i++){
      for(int j=i+1;j<n;j++){
         if(x[i][j]!=0){
            z=0;
            break;
         }
      }
      if(!z){
         break;
      }
   }
   return z;
}

int isup(){
   int z=1;
   for(int i=0;i<n;i++){
      for(int j=i+1;j<n;j++){
         if(x[j][i]!=0){
            z=0;
            break;
         }
      }
      if(!z){
         break;
      }
   }
   return z;
}

void check(){
   int low,up;

   low=islow();
   up=isup();

   if(low||up){
      if(low&&up){
         cout<<"\n\tBoth Lower & Upper Triangular Matrix"<<endl;
      }
      else if(low){
         cout<<"\n\tLower Triangular Matrix"<<endl;
      }
      else if(up){
         cout<<"\n\tUpper Triangular Matrix"<<endl;
      }
```

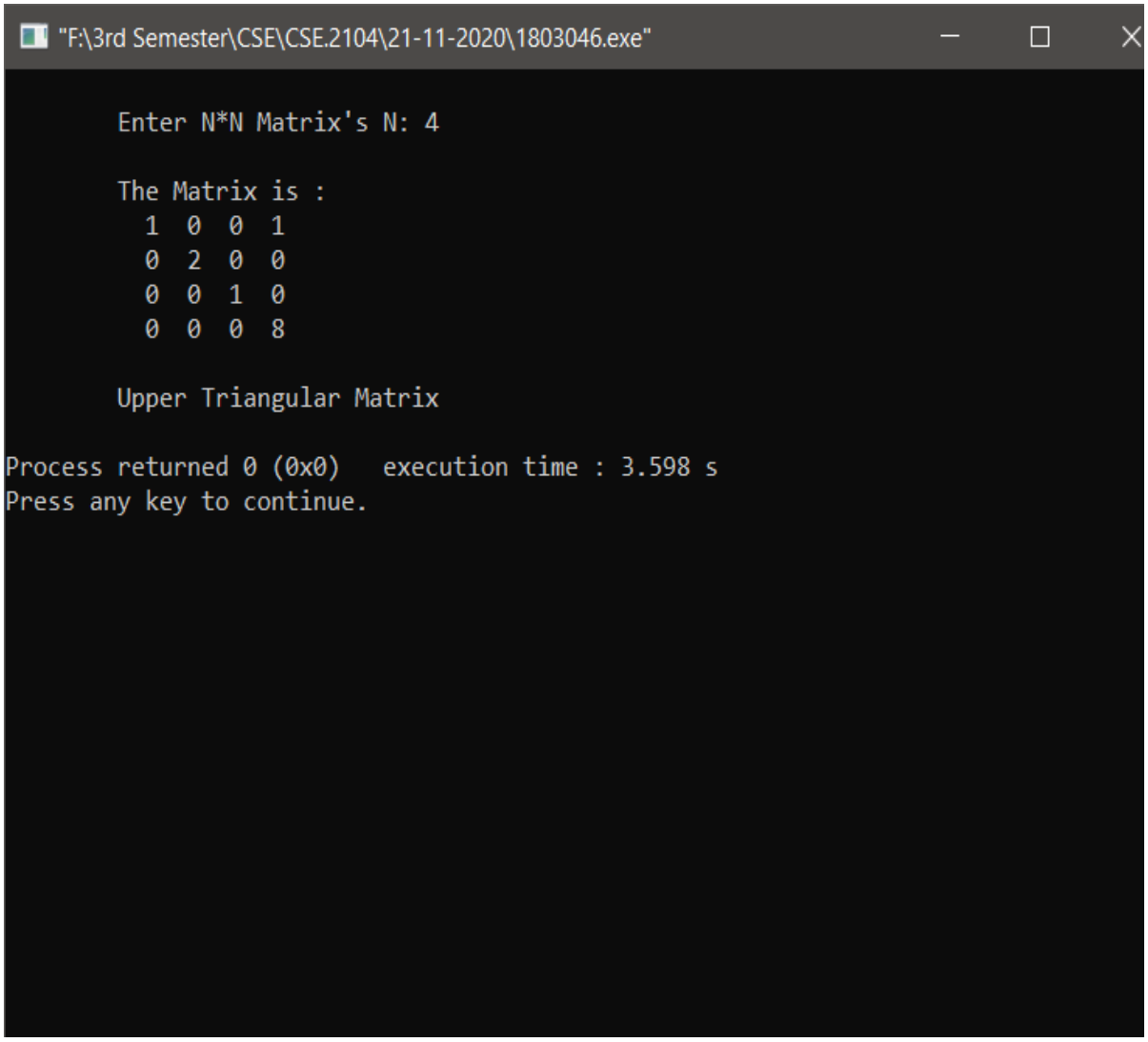
```
    }
    else{
        cout<<"\n\tNon-Triangular Matrix"<<endl;
    }

}

int main(){

    input();
    show();
    check();


    return 0;
}
```

1.4 Output

I had used the following matrix in the implementation:

1	**0**	**0**	**1**
0	**2**	**0**	**0**
0	**0**	**1**	**0**
0	**0**	**0**	**8**

And my output was like below:



 # End #