

There are two folder having the same exact program.

VectorMatrix_with_Cmake : This program is built with CMake and the compiler is MinGW (g++) with Visula studio as the project generator.

VectorMatrix_with_VS: This program is built with Visual Studio.

Note: Output is at the end Section.

Program is implemented on windows 10.

Note: It is not tested on Linux system, However, the program with CMake should run on Linux as well.

There are three files.

Main.cpp: This file contains the 'main' function. Program execution begins and ends there.

VectorMatrix.cpp: This file contains the definition of Matrix and Vector class

VectorMatrix.h: This file contains the body declaration for Matrix and Vector class

The program is so simple and self-explanatory.

Matrix Class:

void initializeMatrix(std::vector<std::vector<double> >&, int, int); => It used to declare and initialize the Matrix

void printMatrix(const std::vector<std::vector<double> >&); => It used to print the elements of the Matrix

Vector Class:

void initializeVector(std::vector<double>&, int); => It used to declare and initialize the Vector

void printVector(const std::vector<double>&); => It used to print the elements of the Vector

Operation Class:

void matMulVect(const std::vector<std::vector<double> >&, const std::vector<double>&); => Matrix Multiplication with Vector

void scalarmulmat(std::vector<std::vector<double> >&, int); =>Scalar Multiply with Matrix

void scalaraddmat(std::vector<std::vector<double> >&, int); =>Scalar Addition with Matrix

void scalarmulvec(std::vector<double>&, int); =>Scalar Multiply with Vector

void scalaraddvec(std::vector<double>&, int); =>Scalar Addition with Vector

void mataddmat(std::vector<std::vector<double> >& matr, std::vector<std::vector<double> >& matr2);=>Two Matrix Addition

void vectaddvect(std::vector<double>&, std::vector<double>&); T=>wo vector Addition

Few algorithm used for the operation purposes.

/*

Algorithm:Matrix - Vector Multiplication

- Simply a series of dot products

Input : Matrix mat[m][n]

Vector vec[n]

Output : out[m]

for (i = 0; i < m; i++)

{

out[i] = 0;

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

out[i] += mat[i][j] * vec[j];

}

=====
Algorithm:Matrix - Scalar Multiplication

Input : Matrix mat[m][n]

```
        scalar
    Output : out[m]
    for (i = 0; i < m; i++)
    {
        for (j = 0; j < n; j++)
            mat[i][j] *= scalar;
    }
```

=====
Algorithm:Matrix - Scalar Addition

Input : Matrix mat[m][n]

```
        scalar
    Output : out[m]
    for (i = 0; i < m; i++)
    {
        for (j = 0; j < n; j++)
            mat[i][j] += scalar;
    }
```

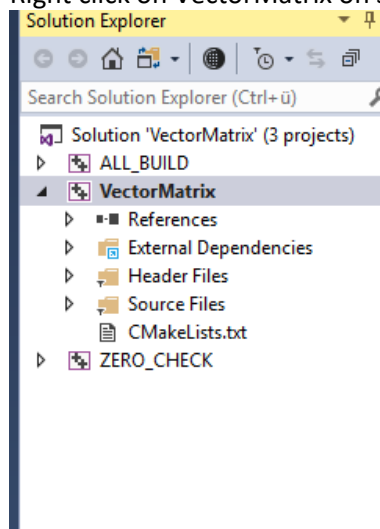
*/

=====
O/P:

To run the VectorMatrix_with_Cmake:

Go to build folder of this program and double click on VectorMatrix.sln to run on Visual studio.

Right click on VectorMatrix on Solution Explorer and choose the set as startup project .



After this step, right click again on VectorMatrix and chose the rebuild. And once the rebuild is done, run the program.

To run the VectorMatrix_with_VS: Goto the program folder and run the VectorMatrix.sln
o/p: There are various operation. Just showing two output:

Case 1:

Matrix Multiplication with Vector

```
Microsoft Visual Studio Debug Console
Enter the number of rows for matrix
2
Enter the number of columns for matrix
3
From Initialize method of Matrix
Enter the 6 elements for matrix
1
2
3
4
5
6
From print method of Matrix
Matrix elements are:
1 2 3
4 5 6
Enter the number of elements for vector
3
From Initialize method of Vector
Enter the 3 elements in the vector:
4
5
6
From print method of Vector
Vector elements are:
4
5
6
Please enter the choice for different operation for Matrix and Vector
Please enter your choice in Integer number:
(1) Matrix Multiplication with Vector
(2) Scalar Multiply with Matrix
(3) Scalar Addition with Matrix
(4) Scalar Multiply with Vector
(5) Scalar Addition with Vector
(6) Two Matrix Addition
(7) Two vector Addition
(8) Do not want to perform any operations and please terminate the program
1
From the matMulVect method
Matrix columns size : 3
Vector size: 3
Matrix Vector multiplication is possible:
the elements Matrix*Vector:
From print method of Vector
Vector elements are:
32
77
C:\Users\ssah\Documents\MyWork\Learning during Altran\programming material\C++, Cmake\Matrix and Vector_interview question\VectorMatrix\VectorMatrix_with_Cmake\build\Debug\VectorMatrix.exe (process 2580) exited with code 0.
```

Case 2: Scalar Multiplication with Matrix

```
Microsoft Visual Studio Debug Console
Enter the number of rows for matrix
2
Enter the number of columns for matrix
2
From Initialize method of Matrix
Enter the 4 elements for matrix
1
2
3
4
From print method of Matrix
Matrix elements are:
1 2
3 4
Enter the number of elements for vector
2
From Initialize method of Vector
Enter the 2 elements in the vector:
4
5
From print method of Vector
Vector elements are:
4
5
Please enter the choice for different operation for Matrix and Vector
Please enter your choice in Integer number:
1) Matrix Multiplication with Vector
2) Scalar Multiply with Matrix
3) Scalar Addition with Matrix
4) Scalar Multiply with Vector
5) Scalar Addition with Vector
6) Two Matrix Addition
7) Two vector Addition
8) Do not want to perform any operations and please terminate the program
2
You choose the Scalar elements for multiplying with Matrix
10
From the scalarmulmat method
Scalar Matrix multiplication size
Matrix elements after scalar mat mul :
From print method of Matrix
Matrix elements are:
10 20
30 40

C:\Users\ssah\Documents\MyWork\Learning during Altran\programming material\C++, Cmake\Matrix and Vector_interview_questi
on\VectorMatrix\VectorMatrix_with_Cmake\build\Debug\VectorMatrix.exe (process 18136) exited with code 0.
```