Ex. No. 1	Row major and Column Major Address Calculation
05-07-2017	

Question:

Create a M x N Matrix. Write function for calculating address of a cell in that matrix which is stored in row-major and column-major.

Algorithm:

1. Start.
2. Create a 2-dimensional array, then create a pointer array to calculate the address and another pointer array to store the base address.
3. Get input from the user for number of rows and columns.
4. Then, initialize two for loops one for rows and another for columns. Also, calculate the address by row major as:

   array[i][j]= base address + (i*column size + j);

5. Also, calculate the column major by initializing two for loops as:

   Array[i][j]= base address + (j*row size + i);

6. Then, display the address.
7. End.

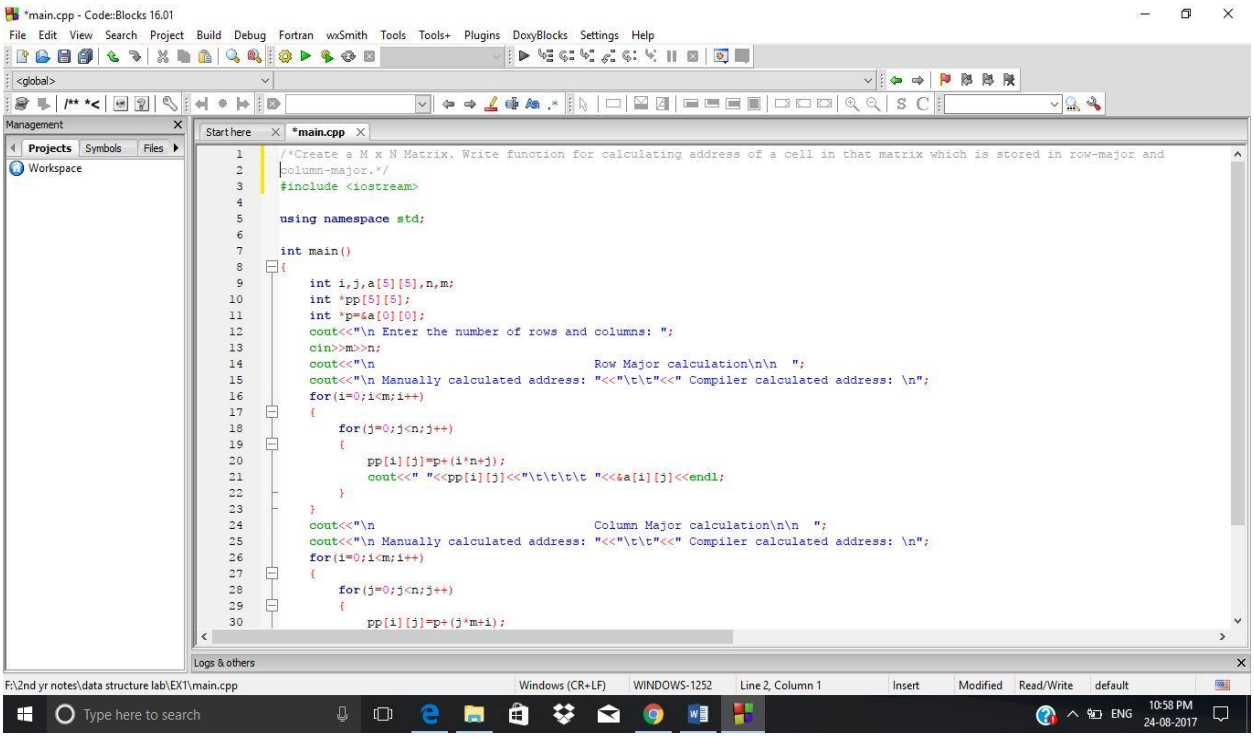
Program:

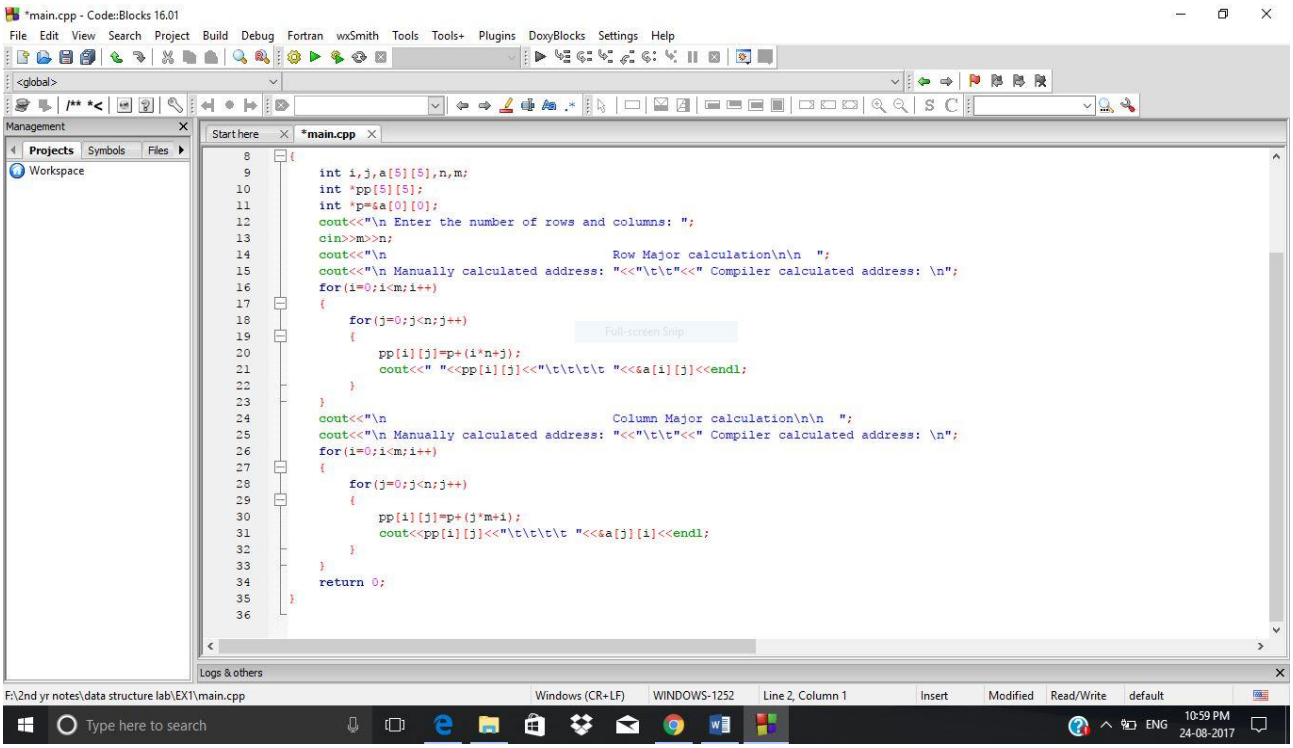
```
#include <iostream>

using namespace std;

int main()

{
```

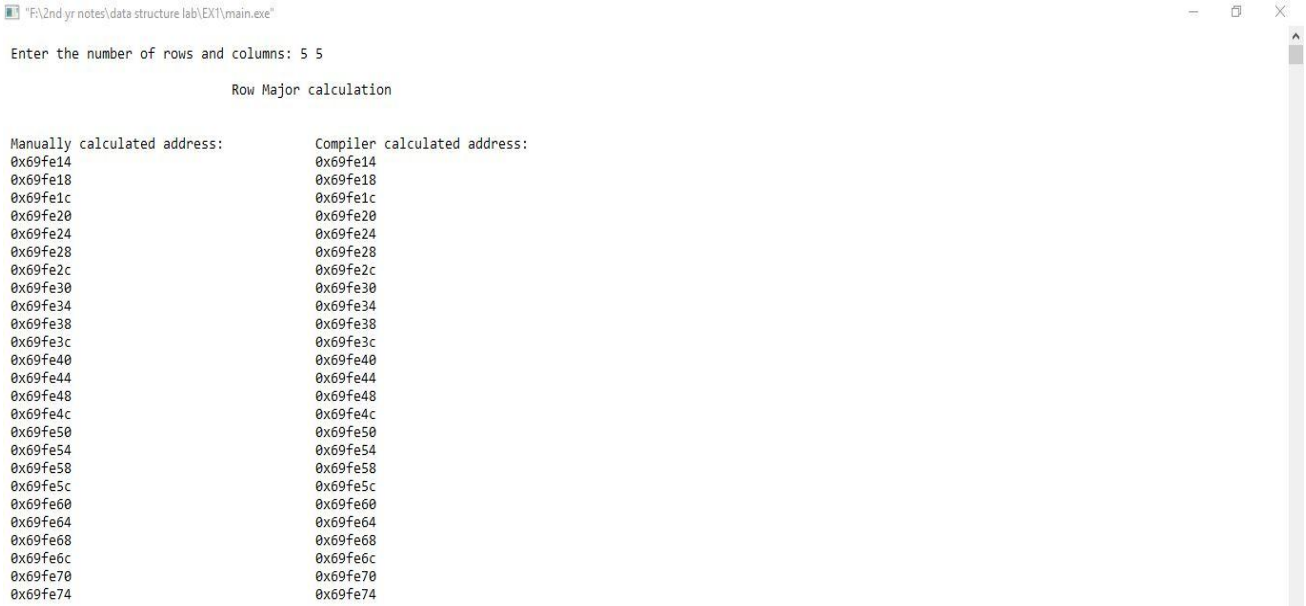
```
int i, j, a[5][5], n, m;
int *pp[5][5];
int *p=&a[0][0];
cout<<"\n Enter the number of rows and columns: ";
cin>>m>>n;
cout<<"\n                    Row Major calculation\n\n  ";
cout<<"\n Manually calculated address: "<<"\t\t"<<" Compiler calculated address: \n";
for(i=0;i<m;i++)
{
   for(j=0;j<n;j++)
   {
      pp[i][j]=p+(i*n+j);
      cout<<" "<<pp[i][j]<<"\t\t\t\t "<<&a[i][j]<<endl;
   }
}
cout<<"\n                    Column Major calculation\n\n  ";
cout<<"\n Manually calculated address: "<<"\t\t"<<" Compiler calculated address: \n";
for(i=0;i<m;i++)
{
   for(j=0;j<n;j++)
   {
```

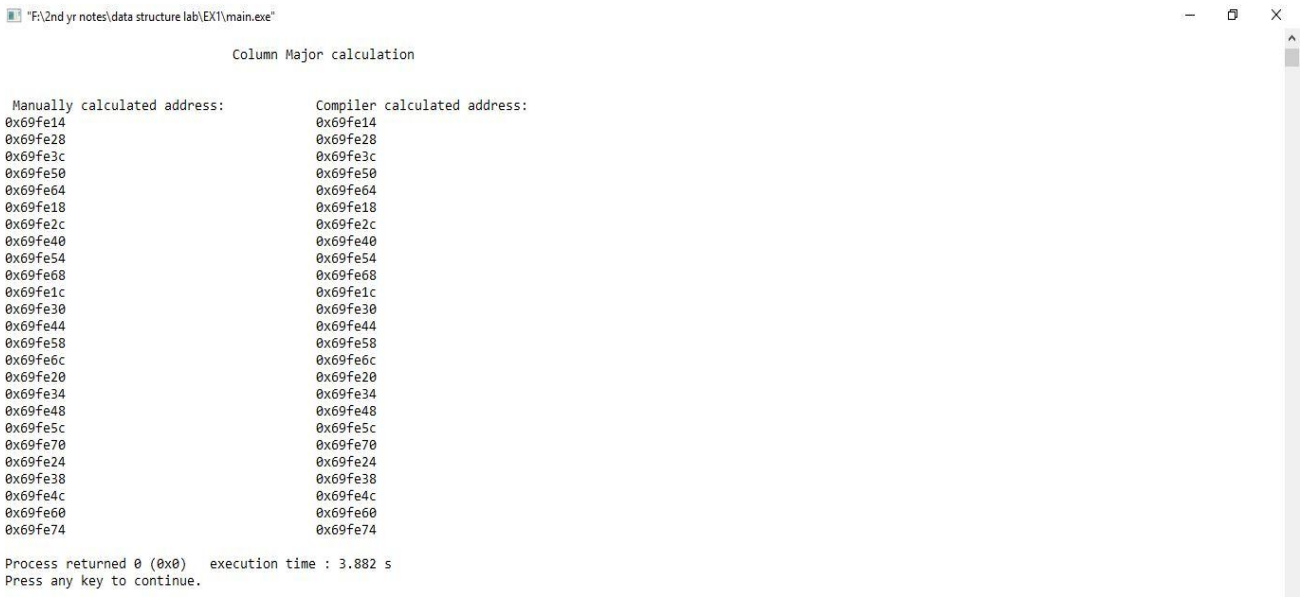
```
            pp[i][j]=p+(j*m+i);
            cout<<pp[i][j]<<"\t\t\t\t "<<&a[j][i]<<endl;
        }
    }
    return 0;
}
```

Output:




*main.cpp - Code::Blocks 16.01
File Edit View Search Project Build Debug Fortran wxSmith Tools Tools+ Plugins DoxyBlocks Settings Help
Management
Projects Symbols Files
Workspace
Start here
*main.cpp
{
int i,j,a[5][5],n,m;
int *pp[5][5];
int *p=&a[0][0];
cout<<"\n Enter the number of rows and columns: ";
cin>>m>>n;
cout<<"\n Row Major calculation\n\n ";
cout<<"\n Manually calculated address: "<<"\t\t"<<" Compiler calculated address: \n";
for(i=0;i<m;i++)
{
for(j=0;j<n;j++)
{
pp[i][j]=p+(i*n+j);
cout<<" "<<pp[i][j]<<"\t\t\t\t "<<&a[i][j]<<endl;
}
}
cout<<"\n Column Major calculation\n\n ";
cout<<"\n Manually calculated address: "<<"\t\t"<<" Compiler calculated address: \n";
for(i=0;i<m;i++)
{
for(j=0;j<n;j++)
{
pp[i][j]=p+(j*m+i);
cout<<pp[i][j]<<"\t\t\t\t "<<&a[j][i]<<endl;
}
}
return 0;
}
Logs & others
F:\2nd yr notes\data structure lab\EX1\main.cpp
Windows (CR+LF)
WINDOWS-1252
Line 2, Column 1
Insert
Modified
Read/Write
default
Type here to search
ENG
10:59 PM
24-08-2017


"F:\2nd yr notes\data structure lab\EX1\main.exe"
Enter the number of rows and columns: 5 5
Row Major calculation
Manually calculated address: Compiler calculated address:
0x69fe14 0x69fe14
0x69fe18 0x69fe18
0x69fe1c 0x69fe1c
0x69fe20 0x69fe20
0x69fe24 0x69fe24
0x69fe28 0x69fe28
0x69fe2c 0x69fe2c
0x69fe30 0x69fe30
0x69fe34 0x69fe34
0x69fe38 0x69fe38
0x69fe3c 0x69fe3c
0x69fe40 0x69fe40
0x69fe44 0x69fe44
0x69fe48 0x69fe48
0x69fe4c 0x69fe4c
0x69fe50 0x69fe50
0x69fe54 0x69fe54
0x69fe58 0x69fe58
0x69fe5c 0x69fe5c
0x69fe60 0x69fe60
0x69fe64 0x69fe64
0x69fe68 0x69fe68
0x69fe6c 0x69fe6c
0x69fe70 0x69fe70
0x69fe74 0x69fe74



VIDEO URL:

https://youtu.be/2BUm0T8RPzA

RESULT:

The program to calculate address in row major and column major is implemented successfully and the output is verified.