BIL105E

Introduction to Scientific and Engineering Computing

2014 Spring

Report of HW3

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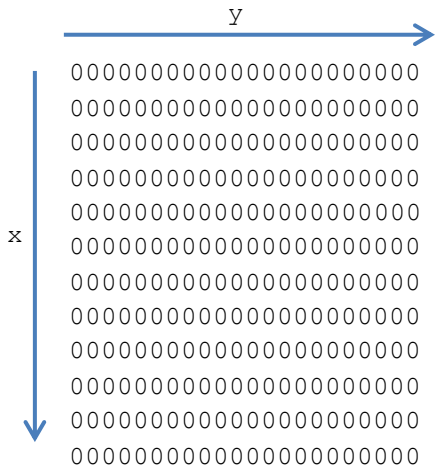
1- Introduction

In this project, corner nodes from composition of some rectangles, which are taken from a file, are determined. A matrix is initialized with zeros firstly and necessary points are changed as one, with the information from the file. The array has a fixed size and the zeroth column and row are left as blank, in order to determine corner nodes at limits ((0,0) or (x_{max},y_{max})) if any exists.

Corner node determination depends on the selected point and the other eight points, surrounding the selected point. If the total number of ones is 4 or 8 in the nine-sized block, and the selected point is one, that node is a corner node. Program starts to scan from the first node of the composite shape.

Determined corner nodes are written to file “outline.txt” one by one inside the a function. Also, an arbitrary drawing function is used to print the shape to “hw3_draw.txt” and to screen.

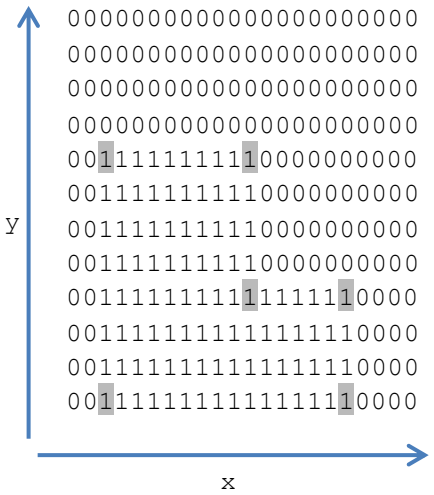


Matrix[x][y]

0	0	0
0	1	1
0	1	1

1	1	0
1	1	1
1	1	1

Corner node examples



Drawed shape from a sample

2-Development and Operating Environments

Ubuntu 12.04

Codeblocks IDE has been used to write the source code, compile and run the program. The source code has been tested with the GNU C Compiler. The following is the commands used:

To compile : **gcc –o hw3 hw3.c**

To run : **./hw3**

MS Windows

To compile : **gcc –o hw3.exe hw3.c**

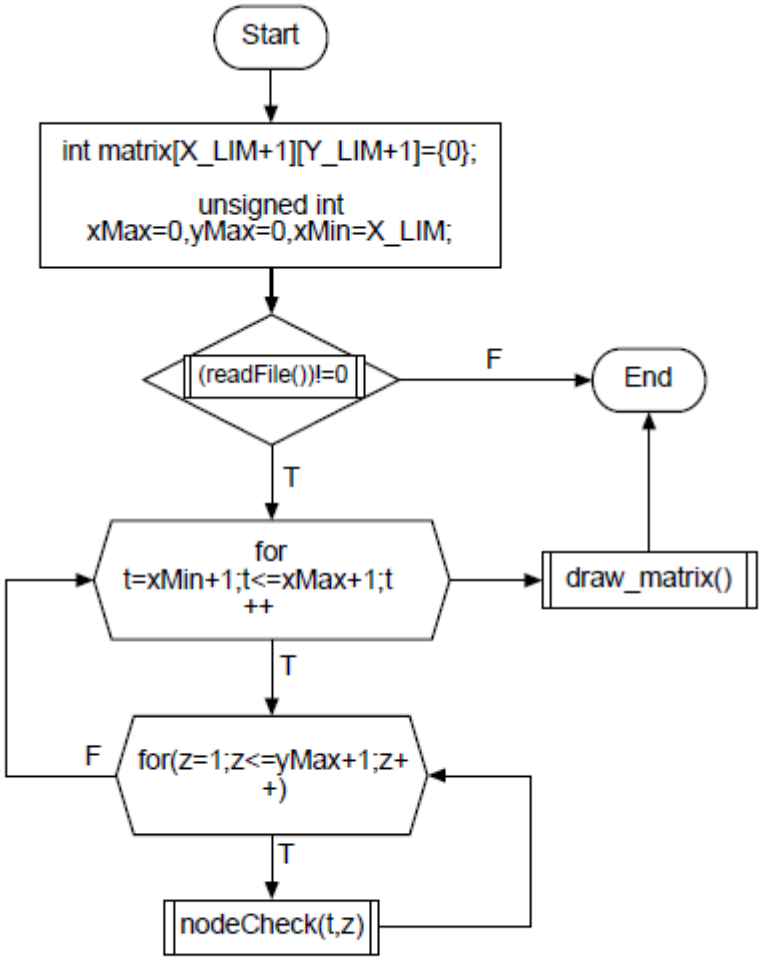
To run : **./hw3.exe**

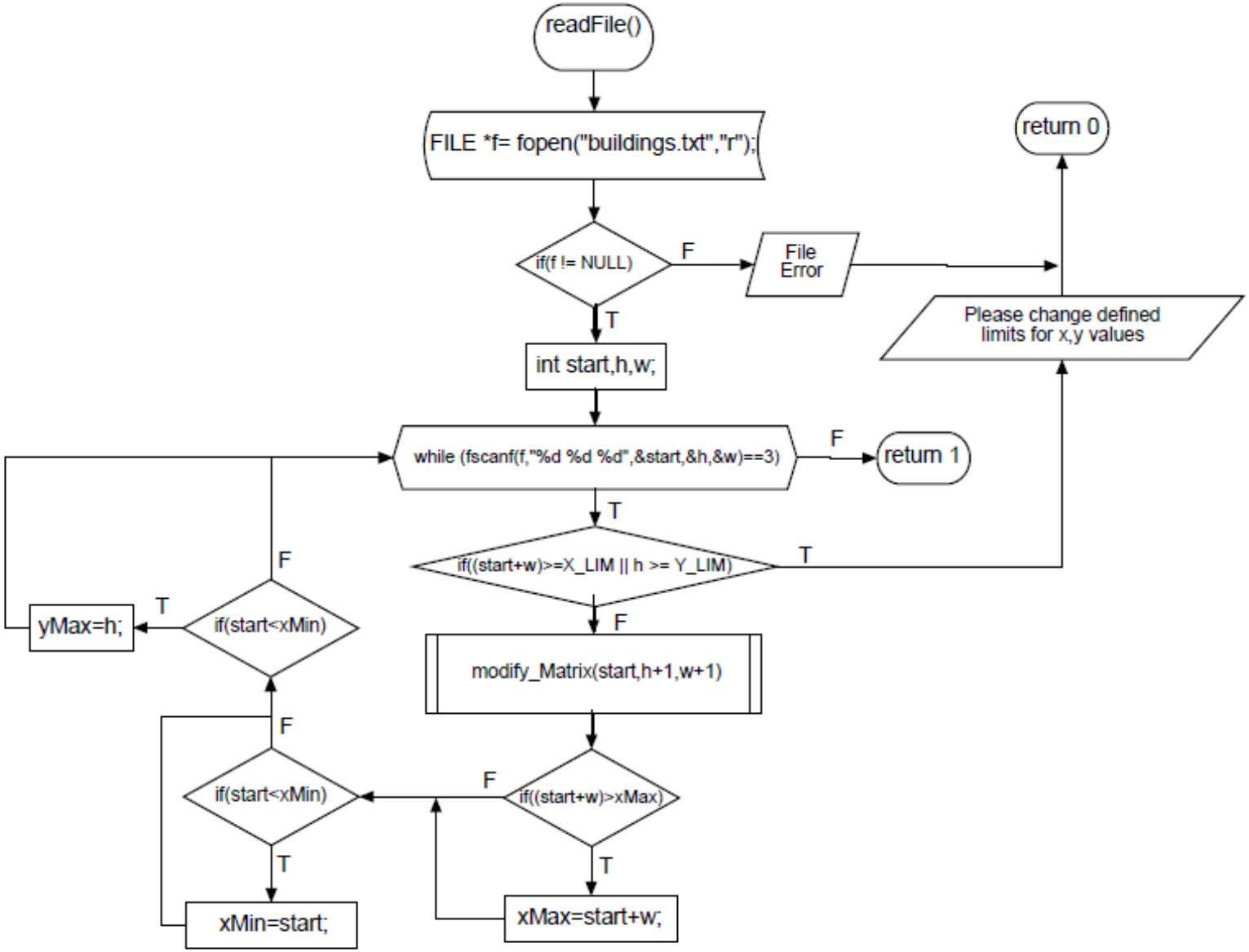
3- Data Structures and Variables

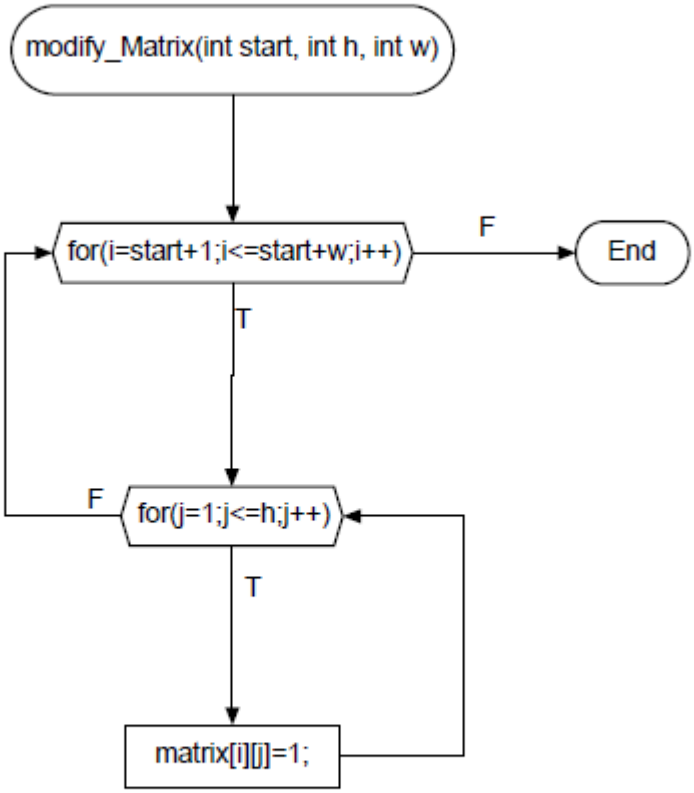
No data structures were used in this program. The followings are the variables and their initial values:

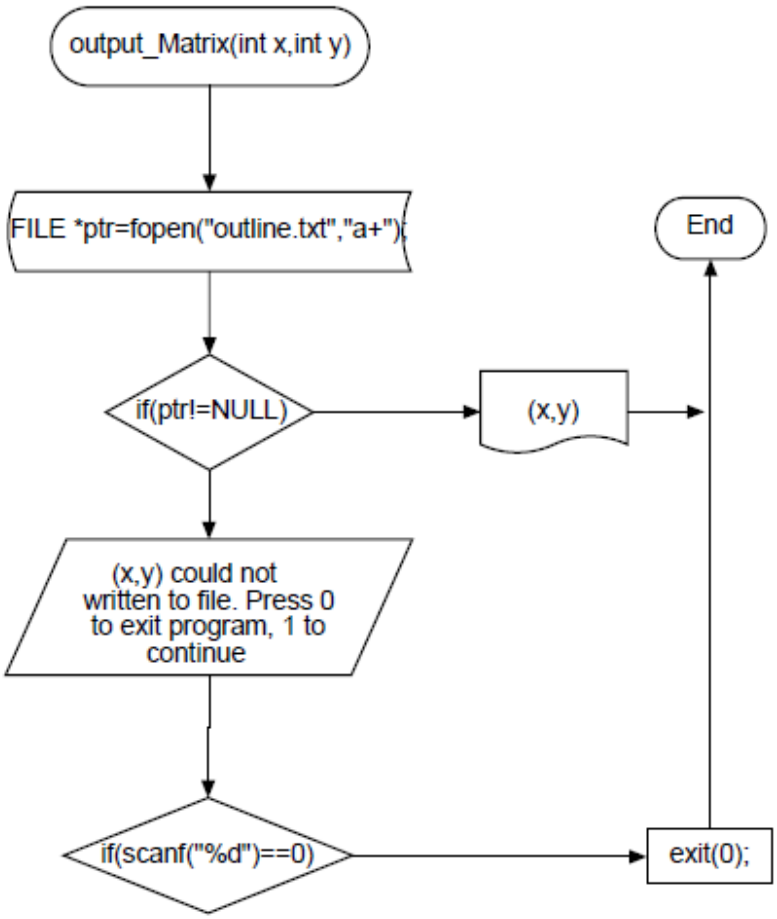
```
#define X_LIM 60                        // Max x value of matrix
#define Y_LIM 30                        // Max y value of matrix

int matrix[X_LIM+1][Y_LIM+1]={0};       // Matrix initialized with 0

unsigned int xMax=0,yMax=0,xMin=X_LIM;  // For drawing limits (yMin is always 0)

FILE *ptr, *f;                          // Read from/write to file

int start,h,w;                          // Integers from "buildings.txt"

size_t i,j,t,z;                         // For loops
int i,j;                                // For loops with negative numbers

int count_1=0;                          // Counter for cells with value 1

int x,y;                                // Functions input parameters
```

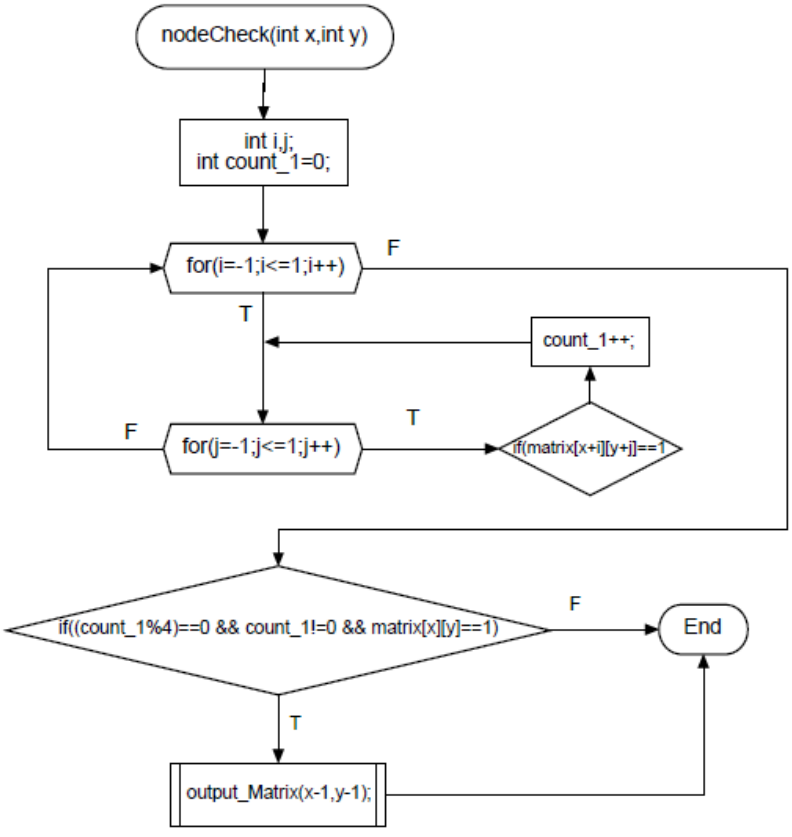
4- Program Flow

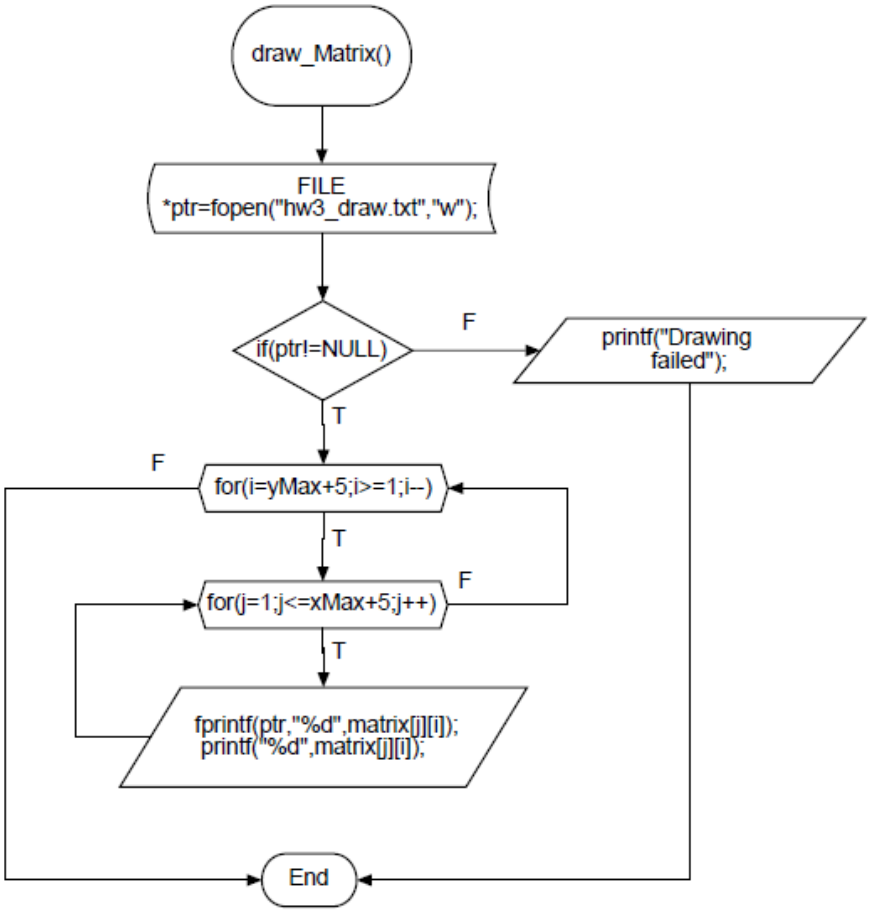



readFile()
FILE *f= fopen("buildings.txt","r");
if(f != NULL)
F
File Error
return 0
T
Please change defined limits for x,y values
int start,h,w;
while (fscanf(f,"%d %d %d",&start,&h,&w)==3)
F
return 1
T
if((start+w)>=X_LIM || h >= Y_LIM)
T
F
modify_Matrix(start,h+1,w+1)
if((start+w)>xMax)
F
T
xMax=start+w;
if(start<xMin)
F
T
xMin=start;
if(start<xMin)
F
T
yMax=h;


modify_Matrix(int start, int h, int w)
for(i=start+1;i<=start+w;i++)
F
End
T
F
for(j=1;j<=h;j++)
T
matrix[i][j]=1;


output_Matrix(int x,int y)
FILE *ptr=fopen("outline.txt","a+");
End
if(ptr!=NULL)
(x,y)
(x,y) could not written to file. Press 0 to exit program, 1 to continue
if(scanf("%d")==0)
exit(0);


nodeCheck(int x,int y)
int i,j;
int count_1=0;
for(i=-1;i<=1;i++)
F
T
count_1++;
F
for(j=-1;j<=1;j++)
T
if(matrix[x+i][y+j]==1
if((count_1%4)==0 && count_1!=0 && matrix[x][y]==1)
F
End
T
output_Matrix(x-1,y-1);



5- Conclusion

It was an inspiring and creative question.