

Department of Computer Science and Engineering

SHRI MADHWA VADIRAJA INSTITUTE OF TECHNOLOGY AND MANAGEMENT

A Unit of Shri Sode Vadiraja Mutt Education Trust® Udupi
(Affiliated to Visvesvaraya Technological University, Belagavi)
Vishwothama Nagar, Bantakal – 574 115, Udupi District, Karnataka, INDIA



Lab 5:

Clip a lines using Cohen-Sutherland algorithm.

```
//lab5-CS Clipping
#include <stdio.h>
#include <GL/glut.h>
double xmin = 50, ymin = 50, xmax = 100, ymax = 100; //window coordinates
double xvmin = 200, yvmin = 200, xvmax = 300, yvmax = 300; //viewport coordinates
const int LEFT = 1; // assuming code words for LEFT, RIGHT, BOTTOM & TOP.
const int RIGHT = 2;
const int BOTTOM = 4;
const int TOP = 8;
int ComputeOutCode (double x, double y)
{
    int code = 0;
    if (y > ymax) //above the clip window
        code |= TOP;
    else if (y < ymin) //below the clip window
        code |= BOTTOM;
    if (x > xmax) //to the right of clip window
        code |= RIGHT;
    else if (x < xmin) //to the left of clip window
        code |= LEFT;
    return code; //return the calculated code
}
void CohenSutherland(double x0, double y0, double x1, double y1)
{
    int outcode0, outcode1, outcodeOut;
    bool accept = false, done = false;
    outcode0 = ComputeOutCode (x0, y0); //calculate the region of 1st point
    outcode1 = ComputeOutCode (x1, y1); //calculate the region of 2nd point
    do
    {
        if ( ! (outcode0 | outcode1))
        {
            accept = true; //both the points are inside the window
            done = true;
        }
        else if (outcode0 & outcode1)
            done = true; //both are outside
    }
    else
    {

```

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```
double x, y;
double m = (y1 - y0) / (x1 - x0);
outcodeOut = outcode0 ? outcode0: outcode1;
if (outcodeOut & TOP)
{
    x = x0 + (1/m) * (ymax - y0);
    y = ymax;
}
else if (outcodeOut & BOTTOM)
{
    x = x0 + (1/m) * (ymin - y0);
    y = ymin;
}
else if (outcodeOut & RIGHT)
{
    y = y0 + m * (xmax - x0);
    x = xmax;
}
else
{
    y = y0 + m * (xmin - x0);
    x = xmin;
}
/* Intersection calculations are done,
go ahead and mark the clipped line */
if (outcodeOut == outcode0)
{
    x0 = x;
    y0 = y;
    outcode0 = ComputeOutCode (x0, y0);
}
else
{
    x1 = x;
    y1 = y;
    outcode1 = ComputeOutCode (x1, y1);
}
}
}
while (!done);
if (accept)
{
    double sx = (xvmax - xvmin) / (xmax - xmin);
```

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```
double sy = (yvmax - yvmin) / (ymax - ymin);
double vx0 = xvmin + (x0 - xmin) * sx;
double vy0 = yvmin + (y0 - ymin) * sy;
double vx1 = xvmin + (x1 - xmin) * sx;
double vy1 = yvmin + (y1 - ymin) * sy;
glColor3f(1.0, 0.0, 0.0); //draw a red colored viewport
glBegin(GL_LINE_LOOP); // draw the zoomed rectangle
glVertex2f (xvmin, yvmin);
glVertex2f (xvmax, yvmin);
glVertex2f (xvmax, yvmax);
glVertex2f (xvmin, yvmax);
glEnd();
glColor3f(0.0,0.0,1.0); // draw blue colored clipped line
glBegin(GL_LINES); // draw the zoomed clipped line
glVertex2d (vx0, vy0);
glVertex2d (vx1, vy1);
glEnd();
}
}
void display()
{
double x0 = 60, y0 = 20, x1 = 80, y1 = 120; // the line coordinates
glClear (GL_COLOR_BUFFER_BIT);
glColor3f(1.0,0.0,0.0); //draw the line with red color
glBegin (GL_LINES);
glVertex2d (x0, y0); // draw the line that has to be clipped
glVertex2d (x1, y1);
glEnd ();
glColor3f(0.0, 0.0, 1.0); //draw a blue colored window
glBegin (GL_LINE_LOOP); // draw the clipping / viewing rectangle window
glVertex2f (xmin, ymin);
glVertex2f (xmax, ymin);
glVertex2f (xmax, ymax);
glVertex2f (xmin, ymax);
glEnd ();
CohenSutherland (x0, y0, x1, y1); // call the algorithm
glFlush (); // show the output
}
void init()
{
glClearColor (1, 1, 1, 1); //white background colour
gluOrtho2D (0, 500, 0, 500);
}
```

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```
int main(int argc, char **argv)
{
    glutInit (&argc,argv);
    glutInitDisplayMode (GLUT_SINGLE|GLUT_RGB);
    glutInitWindowSize (500, 500);
    glutInitWindowPosition (0, 0);
    glutCreateWindow ("Cohen Sutherland Line Clipping Algorithm");
    init();
    glutDisplayFunc(display);
    glutMainLoop();
}
```

Output

