Cohen-Sutherland Algorithm

CMSC 161: Interactive Computer Graphics

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Institute of Computer Science

University of the Philippines – Los Baños

Lecture by James Carlo Plaras

Cohen-Sutherland Algorithm

Get outcodes of P_1 and P_2 of line

$P_1 \rightarrow o_1$ and $P_2 \rightarrow o_2$

Cohen-Sutherland Algorithm

Check what case is the outcodes under

Case 1: Accept

Case 2: Reject

Case 3: Fix

Cohen-Sutherland Algorithm

Case 1: Both outcodes are 0000 (o_1| o_2)

Accept Line (Stop Testing)

Cohen-Sutherland Algorithm

Case 2: Both outside ($o_1 \& o_2 \; ! = 0000$)

Reject Line (Stop Testing)

Cohen-Sutherland Algorithm

Case 3 - $(o_1 \& o_2 == 0000)$

Select one point with non-0000 outcode

Find the intersection point of outside point

depending on its outcode

Cohen-Sutherland Algorithm

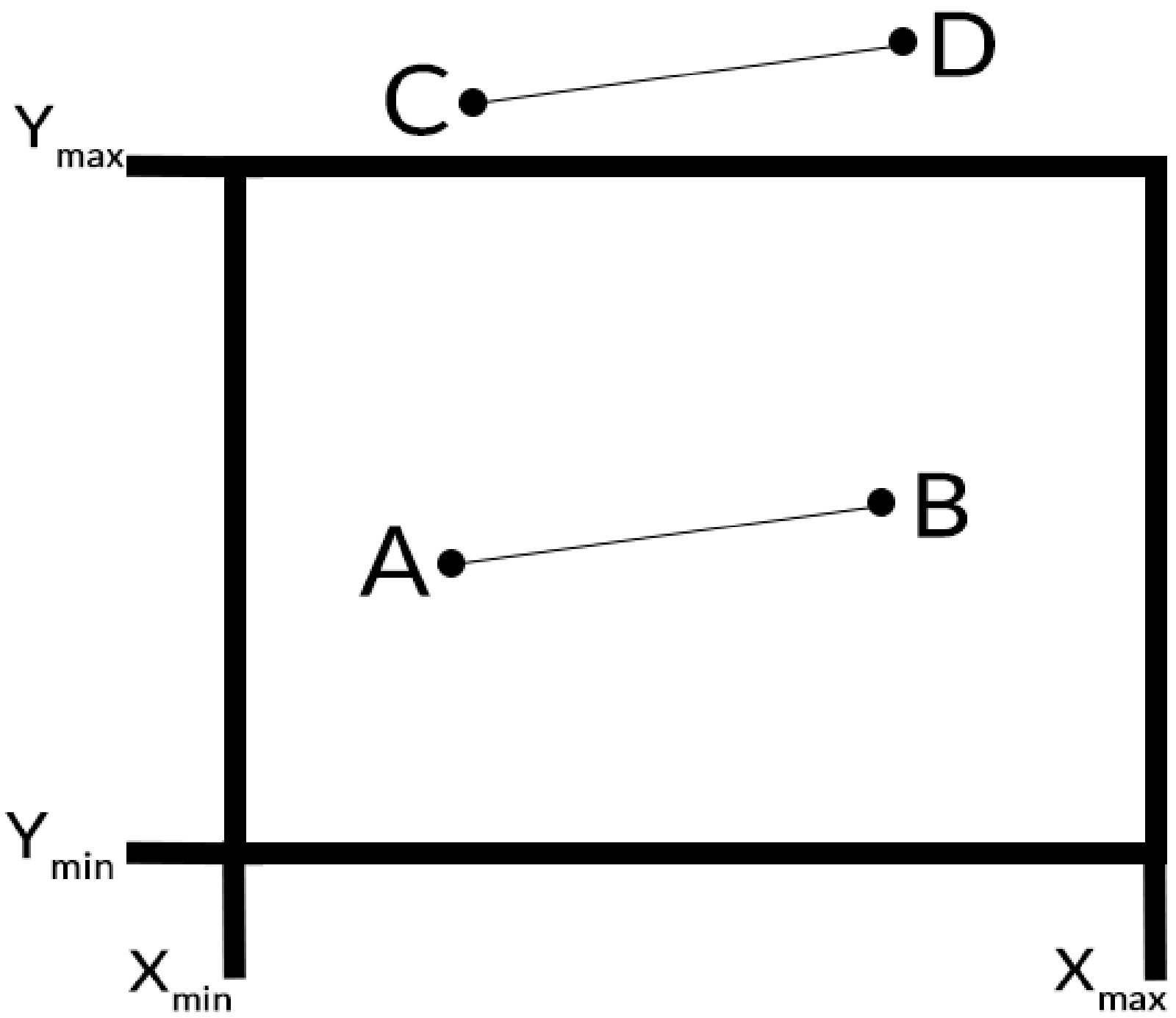
Case 3 - $(o_1 \& o_2 == 0000)$

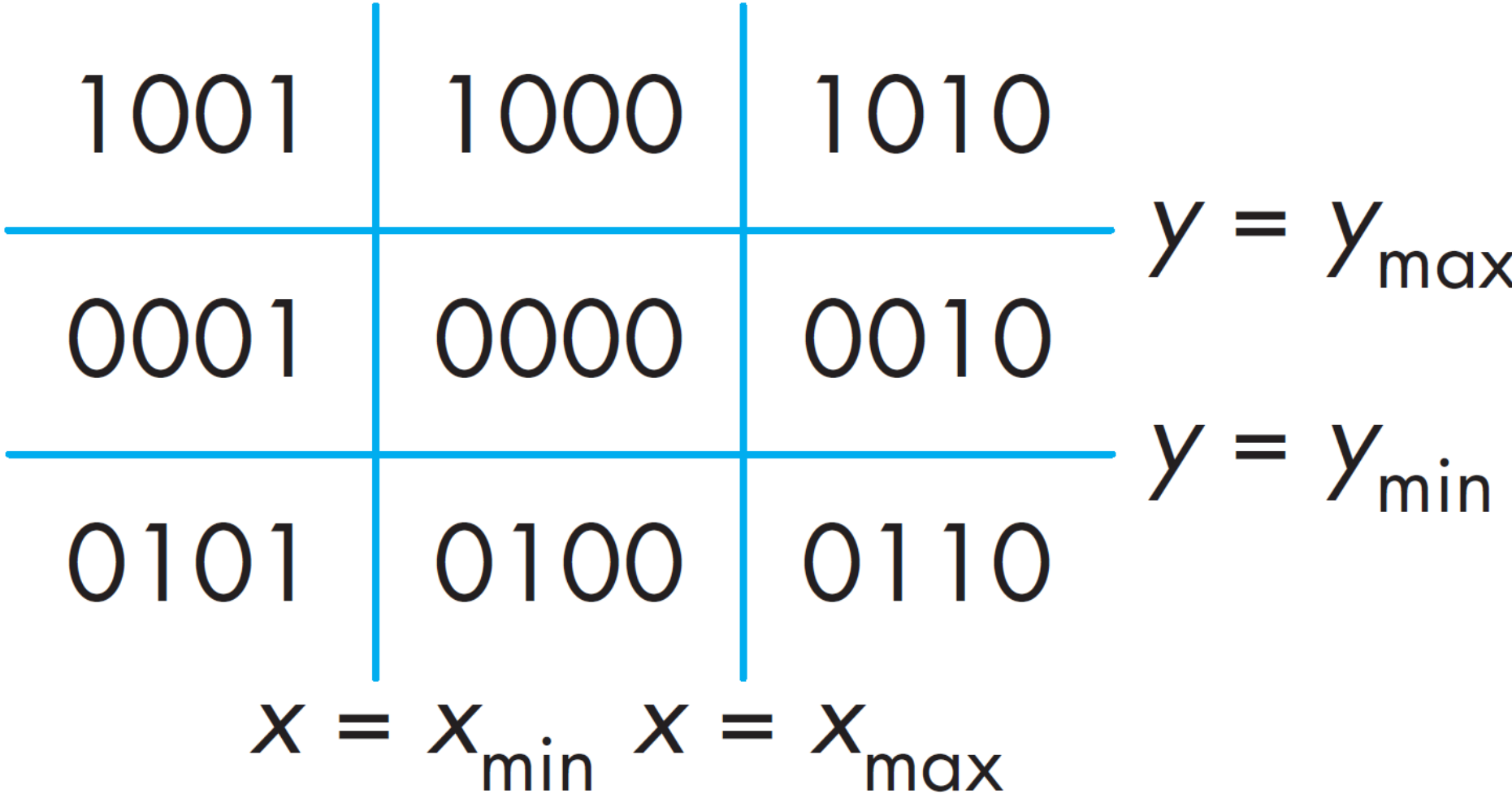
The computed intersection point will replace the selected point

Update the new point's outcode

Repeat Algorithm

EXAMPLES


C
D
Y_{max}
A
B
Y_{min}
X_{min}
X_{max}


1001
1000
1010
0001
0000
0010
0101
0100
0110
y = y_max
y = y_min
x = x_min
x = x_max

Cohen-Sutherland Algorithm

P(x,y) $\rightarrow$ [Top Bottom Right Left]

P(x,y) $\rightarrow$ [T B R L]

$$T = (Y > Y_{max})$$

$$B = (Y < Y_{min})$$

$$R = (X > X_{max})$$

$$L = (X < X_{min})$$

Cohen-Sutherland Example

$$Y_{max} = 1$$

$$Y_{min} = -1$$

$$X_{max} = 1$$

$$X_{min} = -1$$

Cohen-Sutherland Example

$$A = (0.75, 0.35)$$

$$B = (0.2, 0.195)$$

Check if line $\overline{AB}$ is accepted, rejected or fixed.

Cohen-Sutherland Example

Line $\overline{AB}$ falls under

Case 1: Accept

Both outcodes are 0000

Cohen-Sutherland Example

$$A = (0.75, 1.35)$$

$$B = (0.2, 2.7)$$

Check if line $\overline{AB}$ is accepted, rejected or fixed.

Cohen-Sutherland Example

Line $\overline{AB}$ falls under

Case 2: Reject

$o_1 \& o_2 \; ! = 0000$

Cohen-Sutherland Example

$$A = (1.7, 1.35)$$

$$B = (-3.5, 2.7)$$

Check if line $\overline{AB}$ is accepted, rejected or fixed.

Cohen-Sutherland Example

Line $\overline{AB}$ falls under

Case 2: Reject

$o_1 \& o_2 \; ! = 0000$

Cohen-Sutherland Example

$$A = (0.7, 1.35)$$

$$B = (0.5, 0.5)$$

Check if line $\overline{AB}$ is accepted, rejected or fixed.

Cohen-Sutherland Example

Line $\overline{AB}$ falls under

Case 3: Fix

$o_1 \& o_2 == 0000$

Cohen-Sutherland Example

$$A = (0.7, 1.35)$$

$$B = (0.5, -1.5)$$

Check if line $\overline{AB}$ is accepted, rejected or fixed.

Cohen-Sutherland Example

Line $\overline{AB}$ falls under

???????