CGI

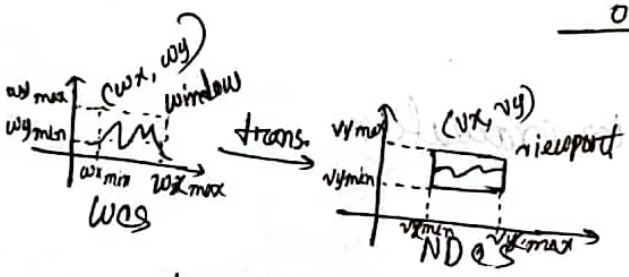
Date: 22-04-2024

Chapter-5

2D transformation viewing & clipping

i) WCS: ~~window সাইজ~~
ii) window
iii) NDCS
iv) viewport
v) clipping

trans.



~~Transformati~~ Transformation:

$$N = T_{wi} \cdot S_{sx,sy} \cdot T_{-wi}$$

$$\frac{v_x - v_{x\,min}}{v_{x\,max} - v_{x\,min}} = \frac{w_x - w_{x\,min}}{w_{x\,max} - w_{x\,min}}$$

$$\therefore v_x = \frac{(v_{x\,max} - v_{x\,min})(w_x - w_{x\,min})}{w_{x\,max} - w_{x\,min}} + v_{x\,min}$$

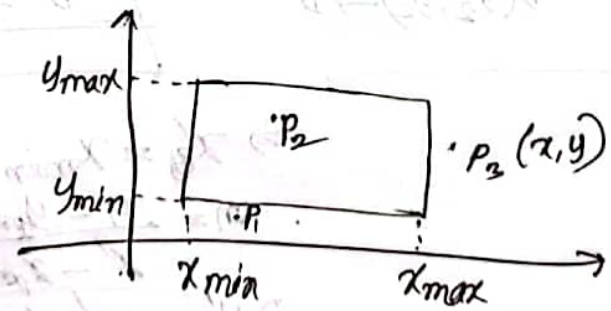
$$= \frac{v_{x\max} - v_{x\min}}{w_{x\max} - w_{x\min}} (w_x - w_{x\min}) + v_{x\min}$$

$$= S_{sx} \cdot (w_x - w_{x\min}) + v_{x\min}$$

$$\therefore N = T_v \cdot S_{sx,sy} \cdot T_{-w}$$

$$= \begin{pmatrix} 1 & 0 & v_{x\min} \\ 0 & 1 & v_{y\min} \\ 0 & 0 & 1 \end{pmatrix} \cdot \begin{pmatrix} \frac{v_{x\max} - v_{x\min}}{w_{x\max} - w_{x\min}} & 0 & 0 \\ 0 & \frac{v_{y\max} - v_{y\min}}{w_{y\max} - w_{y\min}} & 0 \\ 0 & 0 & 1 \end{pmatrix} \cdot \begin{pmatrix} 1 & 0 & -w_{x\min} \\ 0 & 1 & -w_{y\min} \\ 0 & 0 & 1 \end{pmatrix}$$

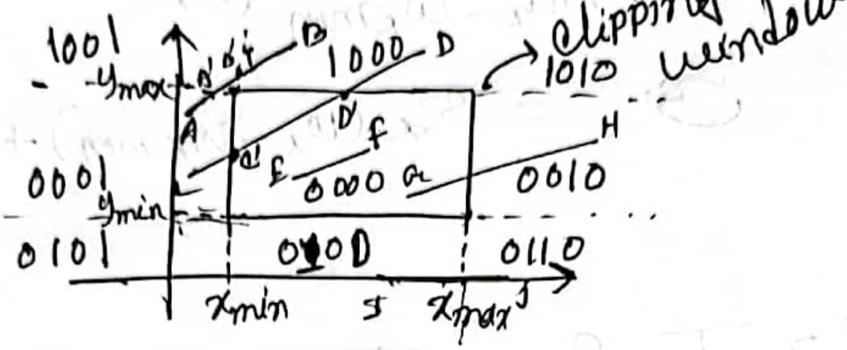
Point clipping



$x_{min} \le x \le x_{max}$

& $y_{min} \le y \le y_{max}$

Line clipping



Cohen–Sutheland Algo:

TBRL

i) visible (EF)

ii) Not visible (AB)

iii) Clipping Cand. (CD, GH)

i) E = 0000
F = 0000 } V

ii) I = 0100
J = 0110

0100 } not V

bitwise and করতে হবে

iii) C = 0001
D = 1000

0000

Partialley V

$C(x_1, y_1) \rightarrow C'$

$D(x_2, y_2) \rightarrow D'$

$\Rightarrow x'_C = x_{min}$

$m = \frac{y' - y_1}{x' - x_1}$; $C' = (x', y')$

$\Rightarrow y' = m(x' - x_1) + y_1$

$A' = 1001$

$B' = 1001$

1001 } not visible (clipping cond.)

$0001 \quad x = x_{min}$

$0010 \quad x = x_{max}$