$$\text{target} = T \cdot \overbrace{D}^{\text{lengths}} \qquad \text{start} = S \qquad (\text{INPUTS})$$

$$\text{right} = R \cdot W \qquad \text{end} = E$$

$$\text{up} = \underbrace{U,}_{\text{unit vectors}} \cdot H$$

$$N = \pm \frac{[U \times R]}{\|[U \times R]\|} \qquad (N \cdot T) > 0 \qquad (\text{Room } 3)$$

→ normal to U, R-plane

→ direction closest to T

initial matrix applied to P yields:

$$x = \frac{D \boxed{\varphi}}{2W} R \cdot P \qquad \varphi = (T \cdot N)$$

$$y = -\frac{D \boxed{\varphi}}{2H} U \cdot P$$

$$z = \boxed{N} \cdot P \qquad \text{(divisor for } x, y)$$

$$w = \frac{E-S}{\|E-S\|^2} \cdot P - S \cdot \frac{E-S}{\|E-S\|^2} = \frac{(E-S)\cdot(P-S)}{(E-S)\cdot(E-S)}$$

then adjust x, y:

$$x \mathrel{+}= \alpha z \qquad \alpha \ (\text{ofs})$$

$$y \mathrel{+}= \beta z \qquad \beta \ (\text{ofs})$$

such that:

$$\text{target} \longrightarrow \left(\underset{x}{\overset{\shortparallel}{\tfrac{1}{2}}}, \underset{y}{\overset{\shortparallel}{\tfrac{1}{2}}}\right)$$

full transform in 3 steps:

$$\underbrace{\begin{pmatrix} x \\ y \\ z \end{pmatrix}}_{\text{result (2D)}} = \underbrace{\begin{bmatrix} 1 & 0 & \alpha \\ 0 & 1 & \beta \\ 0 & 0 & 1 \end{bmatrix}}_{\text{shift III}} \underbrace{\left[\begin{array}{ccc|c} \frac{D\varphi}{2W} & 0 & 0 & 0 \\ 0 & -\frac{D\varphi}{2H} & 0 & 0 \\ \hline 0 & 0 & 1 & 0 \end{array}\right]}_{\text{projection II}} \underbrace{\left[\begin{array}{c|c} R & 0 \\ \hline U & 0 \\ \hline N & 0 \\ \hline 0 \; 0 \; 0 & 1 \end{array}\right]}_{\text{rotation I}} \underbrace{\begin{pmatrix} x_0 \\ y_0 \\ z_0 \\ 1 \end{pmatrix}}_{\text{input point}}$$

z ← divisor

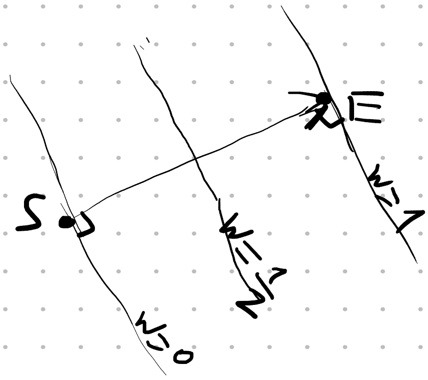
$$w = \frac{(P-S)\cdot(E-S)}{(E-S)\cdot(E-S)} \quad \longleftarrow \text{ not divided by } z!$$

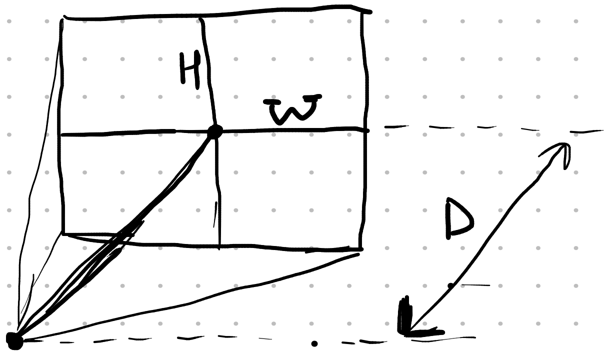
(falloff param)

$w = 0$ at $P = S$

$w = 1$ at $P = E$

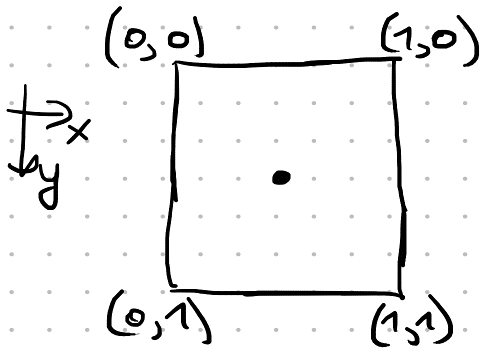
linear!





(after I)

$z \otimes$



(after I, II, III)

no depth here!

w computation independent