screen coordinates

$$\begin{bmatrix} \frac{2 \cdot x_{vieport}}{viewport\_width} - 1 \\ 1 - \frac{2 \cdot y_{vieport}}{viewport\_height} \\ 1 \end{bmatrix}$$

Normalized device coordinates

$$\begin{bmatrix} x_{normalized} \\ y_{normalized} \\ z_{normalized} \\ 1 \end{bmatrix}$$

CLIP coordinates

$$\begin{bmatrix} x_{camera} \\ y_{camera} \\ z_{camera} \\ w_{camera} \end{bmatrix} = Projection^{-1} \begin{bmatrix} x_{clip} \\ y_{clip} \\ z_{clip} \\ w_{clip} \end{bmatrix}$$

$$\begin{bmatrix} x_{camera} \\ y_{camera} \\ -1 \\ 0 \end{bmatrix}$$

camera space

$$\begin{bmatrix} x_{world} \\ y_{world} \\ z_{world} \end{bmatrix}$$

world coordinates

$$\begin{bmatrix} x_{world} \\ y_{world} \\ z_{world} \\ w_{world} \end{bmatrix} = View^{-1} \begin{bmatrix} x_{camera} \\ y_{camera} \\ z_{camera} \\ w_{camera} \end{bmatrix}$$