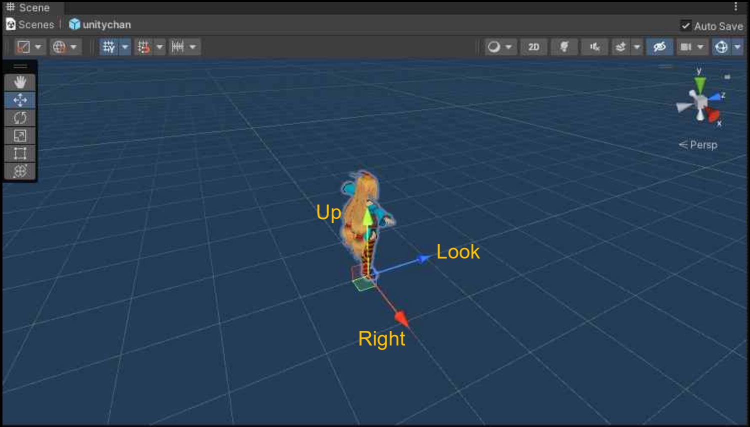
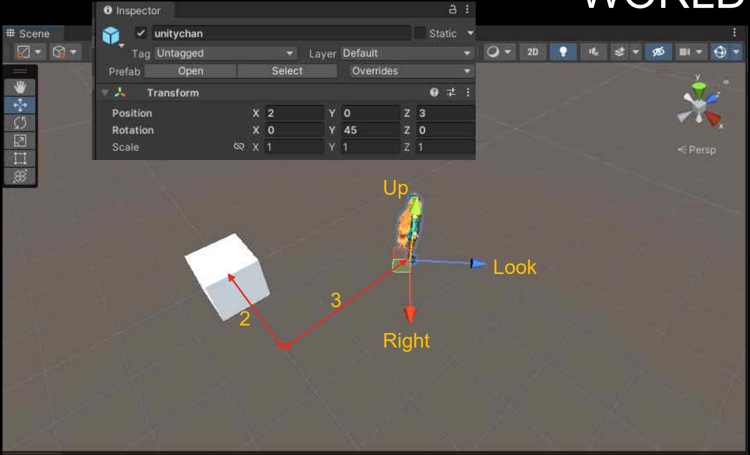
PROJECTION 변환 행렬

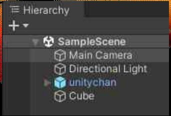
LOCAL SPACE



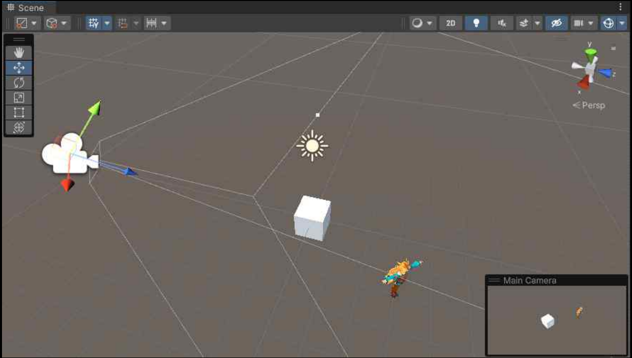
WORLD SPACE



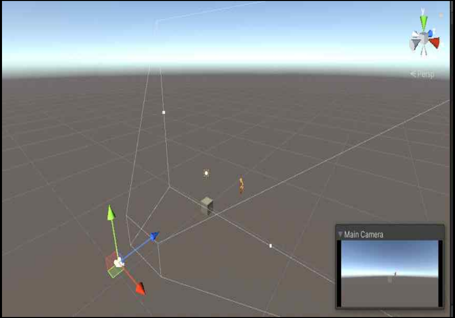
Inspector
Scene
unitychan
Static
Tag Untagged
Layer Default
Prefab Open Select Overrides
Transform
Position X 2 Y 0 Z 3
Rotation X 0 Y 45 Z 0
Scale X 1 Y 1 Z 1
2D
Persp
Up
Look
Right
2
3

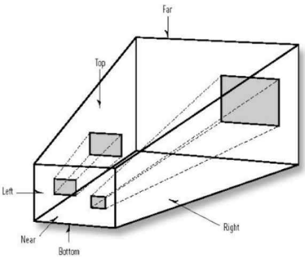


VIEW (CAMERA, EYE) SPACE

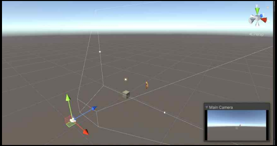


PROJECTION SPACE (HOMOGENOUS CLIP SPACE)



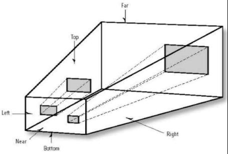


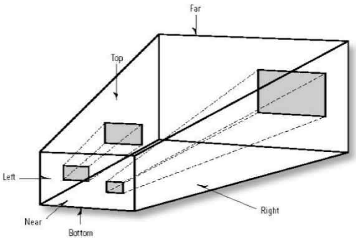
PROJECTION MATRIX

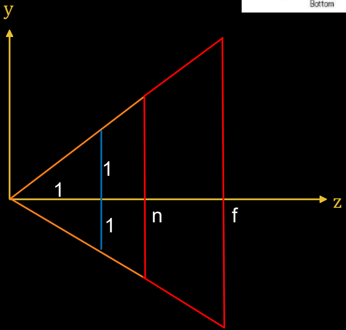


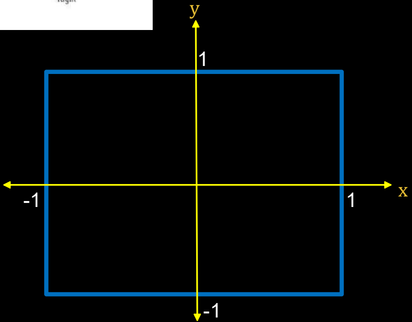
P

P^{-1}




Far
Top
Left
Near
Bottom
Right


y
1
1
1
n
f
z


y
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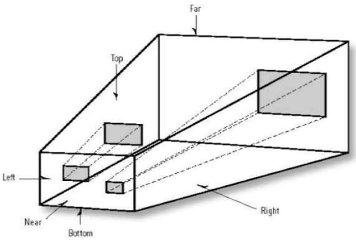
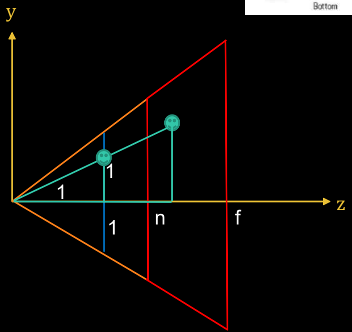
-1
1
x
-1


Far
Top
Left
Near
Bottom
Right


y
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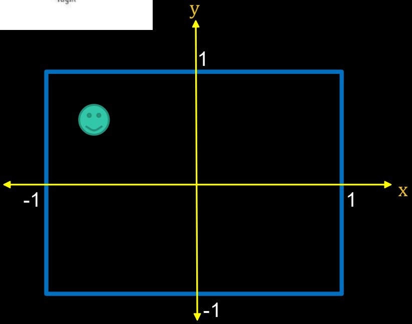
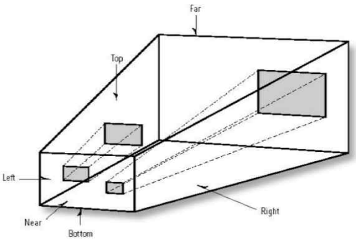
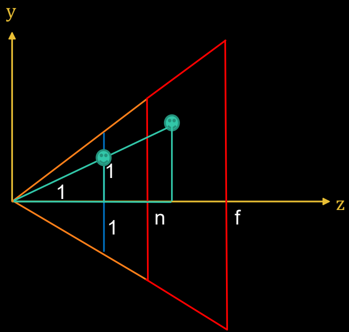
1
1
n
f
z


y
1
-1
1
x
-1

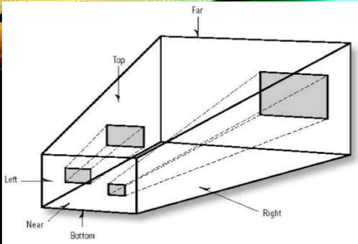


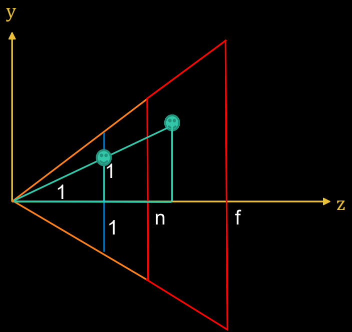


$$\vec{v} = (x, y, z)$$

$$X = \frac{x}{z}$$

$$Y = \frac{y}{z}$$



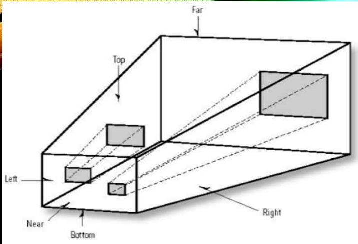


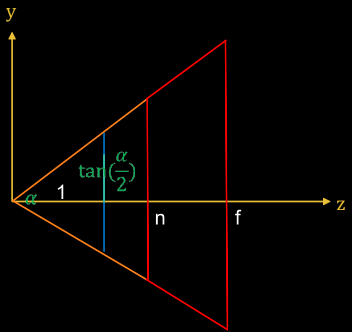
$$\vec{v} = (x, y, z)$$

$$X = \frac{x}{rz}$$

$$Y = \frac{y}{z}$$

$$r = \frac{w}{h} = \frac{800}{600} = 1.3$$





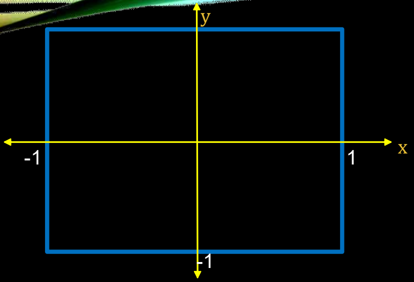
$$\vec{v} = (x, y, z)$$

$$\boxed{X = \frac{x}{rz\tan(\frac{\alpha}{2})} \qquad Y = \frac{y}{z\tan(\frac{\alpha}{2})}}$$

$$r = \frac{w}{h} = \frac{800}{600} = 1.3$$

$$X = \frac{x}{r\,z\tan\left(\frac{\alpha}{2}\right)}$$

$$Y = \frac{y}{z\tan\left(\frac{\alpha}{2}\right)}$$

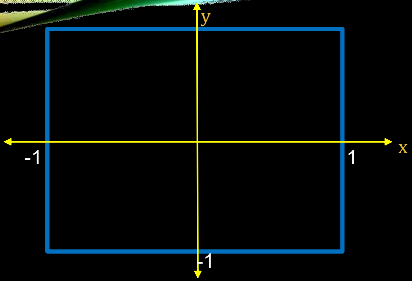


$$M = \begin{bmatrix} m_{11} & m_{12} & m_{13} & m_{14} \\ m_{21} & m_{22} & m_{23} & m_{24} \\ m_{31} & m_{32} & m_{33} & m_{34} \\ m_{41} & m_{42} & m_{43} & m_{44} \end{bmatrix}$$

$$X = xm_{11} + ym_{21} + zm_{31} + m_{41}$$
$$Y = xm_{12} + ym_{22} + zm_{32} + m_{42}$$

$$X = \frac{x}{rz\tan(\frac{\alpha}{2})}$$

$$Y = \frac{y}{z\tan(\frac{\alpha}{2})}$$

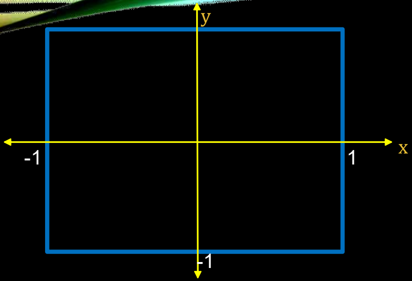


$$M = \begin{bmatrix} \frac{1}{r\tan(\frac{\alpha}{2})} & 0 & 0 & 0 \\ 0 & \frac{1}{\tan(\frac{\alpha}{2})} & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix}$$

$$\vec{V} = \left(\frac{x}{r\tan(\frac{\alpha}{2})}, \frac{y}{\tan(\frac{\alpha}{2})}, z, 1\right)$$

$$X = \frac{x}{r z \tan\left(\frac{\alpha}{2}\right)}$$

$$Y = \frac{y}{z \tan\left(\frac{\alpha}{2}\right)}$$

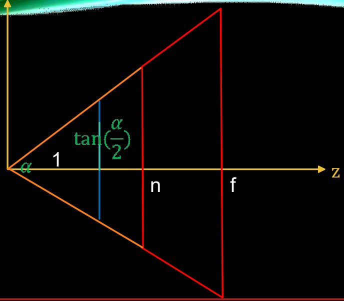


$$M = \begin{bmatrix} \frac{1}{r \tan\left(\frac{\alpha}{2}\right)} & 0 & 0 & 0 \\ 0 & \frac{1}{\tan\left(\frac{\alpha}{2}\right)} & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix}$$

$$\vec{V} = \left(\frac{x}{r \tan\left(\frac{\alpha}{2}\right)}, \frac{y}{\tan\left(\frac{\alpha}{2}\right)}, z, z\right)$$

$$X = \frac{x}{r z \tan(\frac{\alpha}{2})}$$

$$Y = \frac{y}{z\tan(\frac{\alpha}{2})}$$



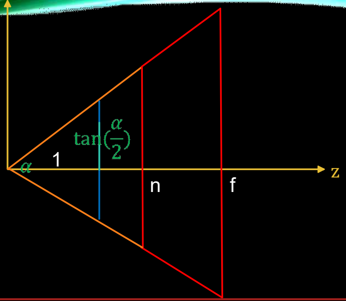
$$M = \begin{bmatrix} \frac{1}{r\tan(\frac{\alpha}{2})} & 0 & 0 & 0 \\ 0 & \frac{1}{\tan(\frac{\alpha}{2})} & 0 & 0 \\ 0 & 0 & A & 1 \\ 0 & 0 & B & 0 \end{bmatrix}$$

$$\vec{V} = \left(\frac{x}{r\tan(\frac{\alpha}{2})}, \frac{y}{\tan(\frac{\alpha}{2})}, Az+B, z\right)$$

$$\vec{V'} = \left(\frac{x}{rz\tan(\frac{\alpha}{2})}, \frac{y}{z\tan(\frac{\alpha}{2})}, A+\frac{B}{z}, 1\right)$$

$$X = \frac{x}{r z \tan(\frac{\alpha}{2})}$$

$$Y = \frac{y}{z \tan(\frac{\alpha}{2})}$$



$$M = \begin{bmatrix} \frac{1}{r\tan(\frac{\alpha}{2})} & 0 & 0 & 0 \\ 0 & \frac{1}{\tan(\frac{\alpha}{2})} & 0 & 0 \\ 0 & 0 & A & 1 \\ 0 & 0 & B & 0 \end{bmatrix}$$

$$\vec{V} = \left(\frac{x}{r\tan(\frac{\alpha}{2})}, \frac{y}{\tan(\frac{\alpha}{2})}, Az+B, z\right)$$

$$\vec{V'} = \left(\frac{x}{rz\tan(\frac{\alpha}{2})}, \frac{y}{z\tan(\frac{\alpha}{2})}, A+\frac{B}{z}, 1\right)$$

$$A+\frac{B}{n} = 0$$

$$A+\frac{B}{f} = 1$$

$$\vec{V} = \left(\frac{x}{r\tan\left(\frac{\alpha}{2}\right)}, \frac{y}{\tan\left(\frac{\alpha}{2}\right)}, Az+B, z\right) \qquad \vec{V'} = \left(\frac{x}{rz\tan\left(\frac{\alpha}{2}\right)}, \frac{y}{z\tan\left(\frac{\alpha}{2}\right)}, A+\frac{B}{z}, 1\right)$$

$$A+\frac{B}{n} = 0$$

$$A+\frac{B}{f} = 1$$

$$\boxed{A = \frac{f}{f-n} \qquad B = \frac{-nf}{f-n}}$$

$$\boxed{\vec{v} = \begin{bmatrix} x & y & z & 1 \end{bmatrix} \qquad M = \begin{bmatrix} \frac{1}{r\tan\left(\frac{\alpha}{2}\right)} & 0 & 0 & 0 \\ 0 & \frac{1}{\tan\left(\frac{\alpha}{2}\right)} & 0 & 0 \\ 0 & 0 & \frac{f}{f-n} & 1 \\ 0 & 0 & \frac{-nf}{f-n} & 0 \end{bmatrix}}$$