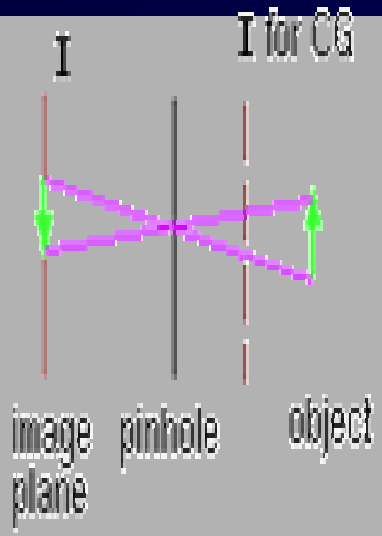
CSC418 Computer Graphics

- Cameras and Projections

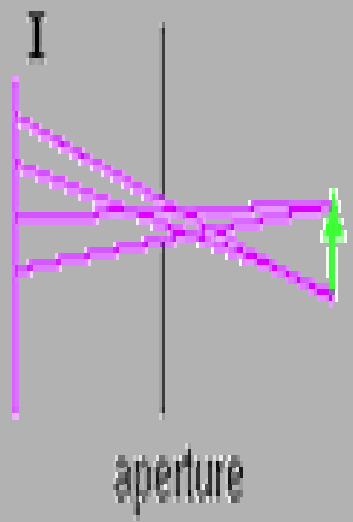
Camera model

Camera model

Ideal pinhole camera

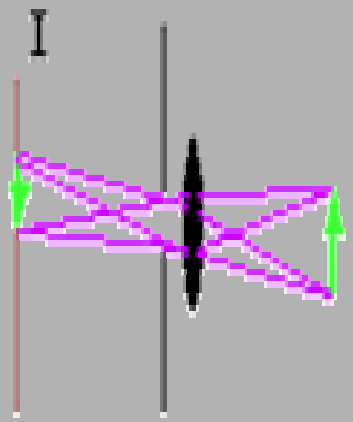


Real pinhole camera

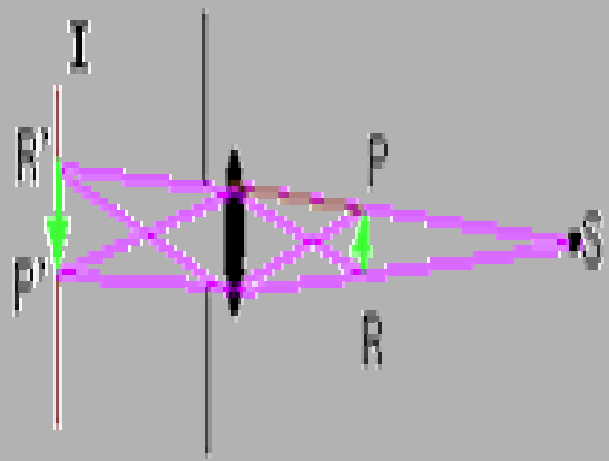


Camera model

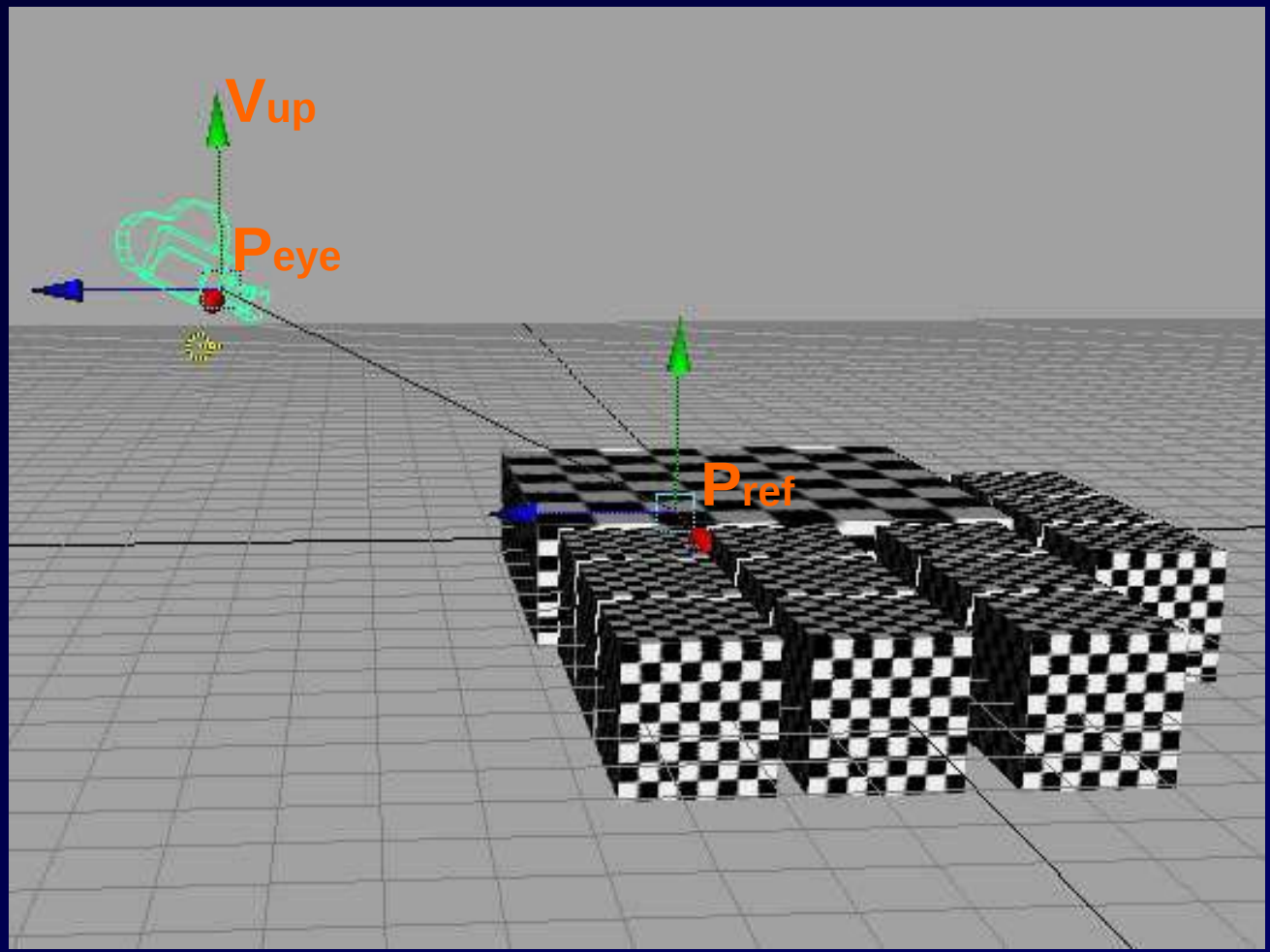
Camera with a lens



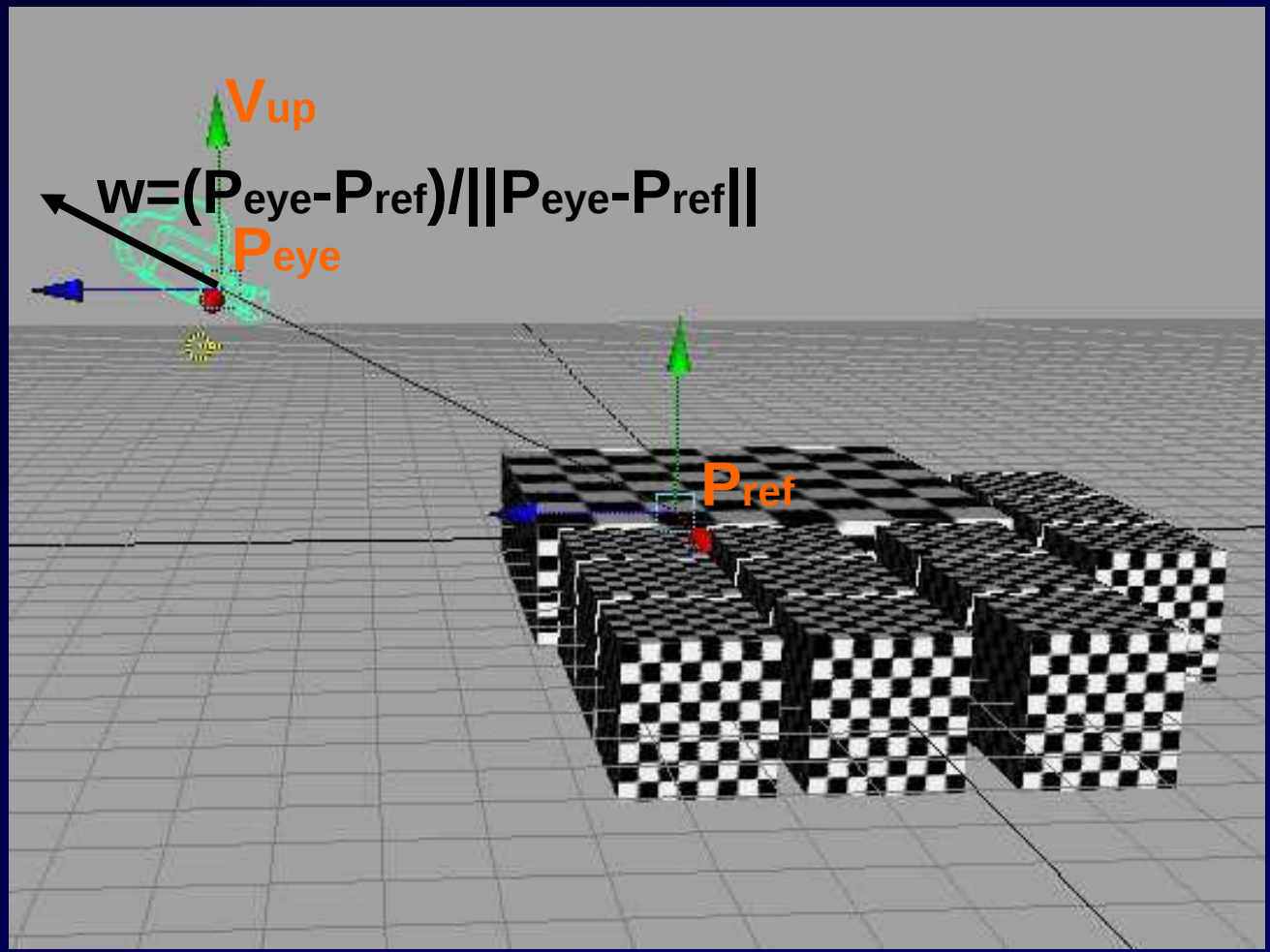
Depth of Field



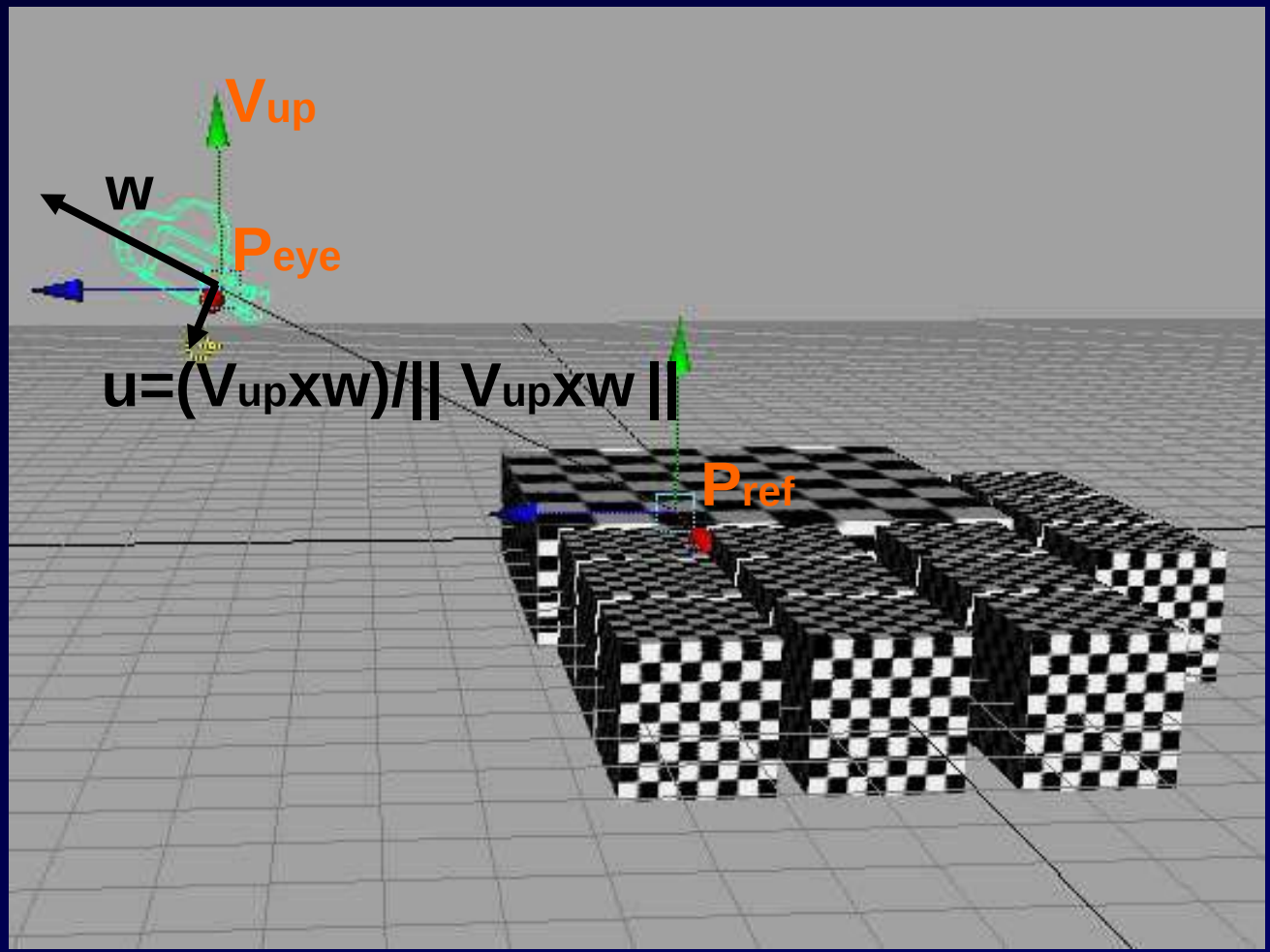
Viewing Transform



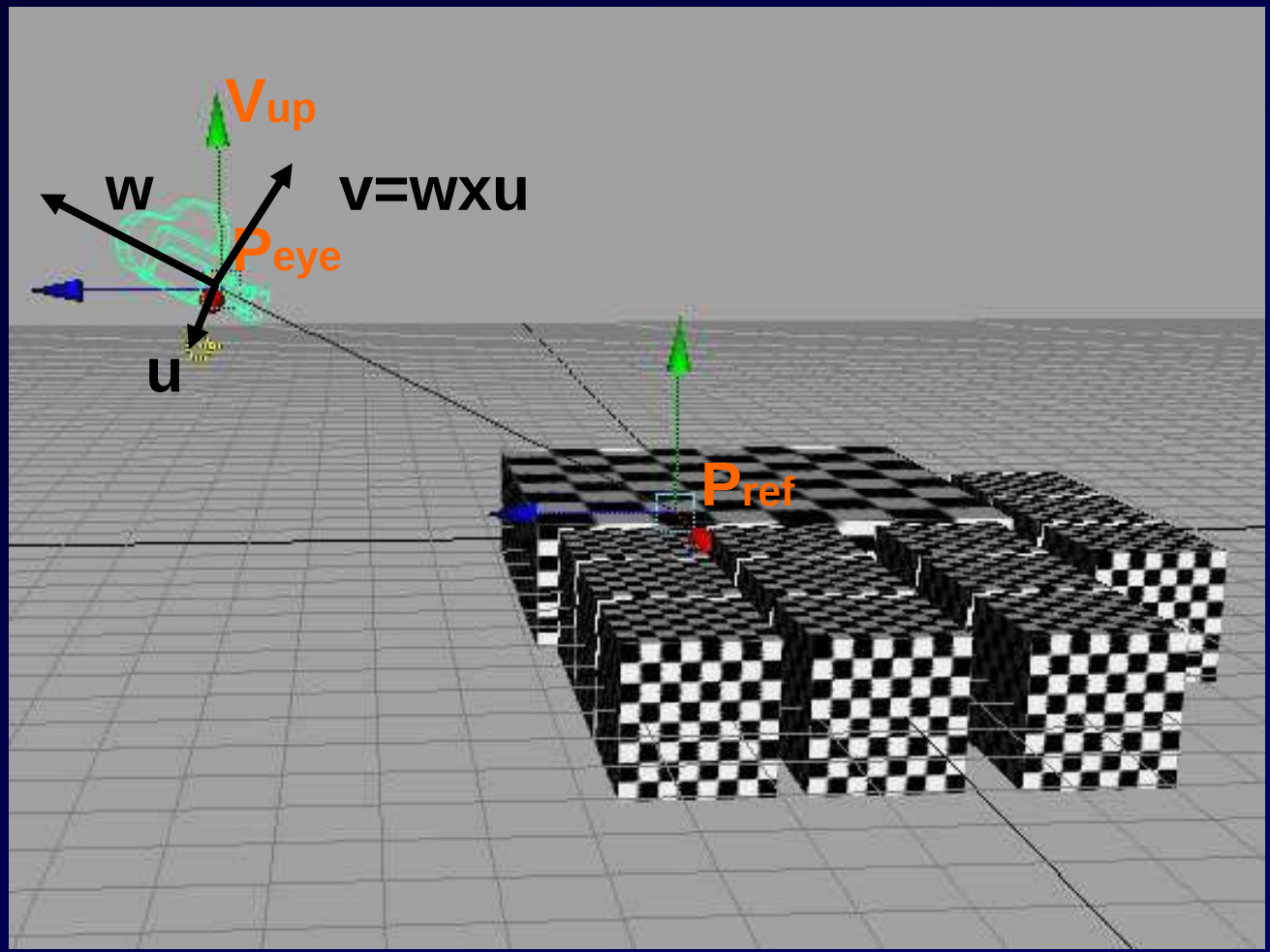
Viewing Transform



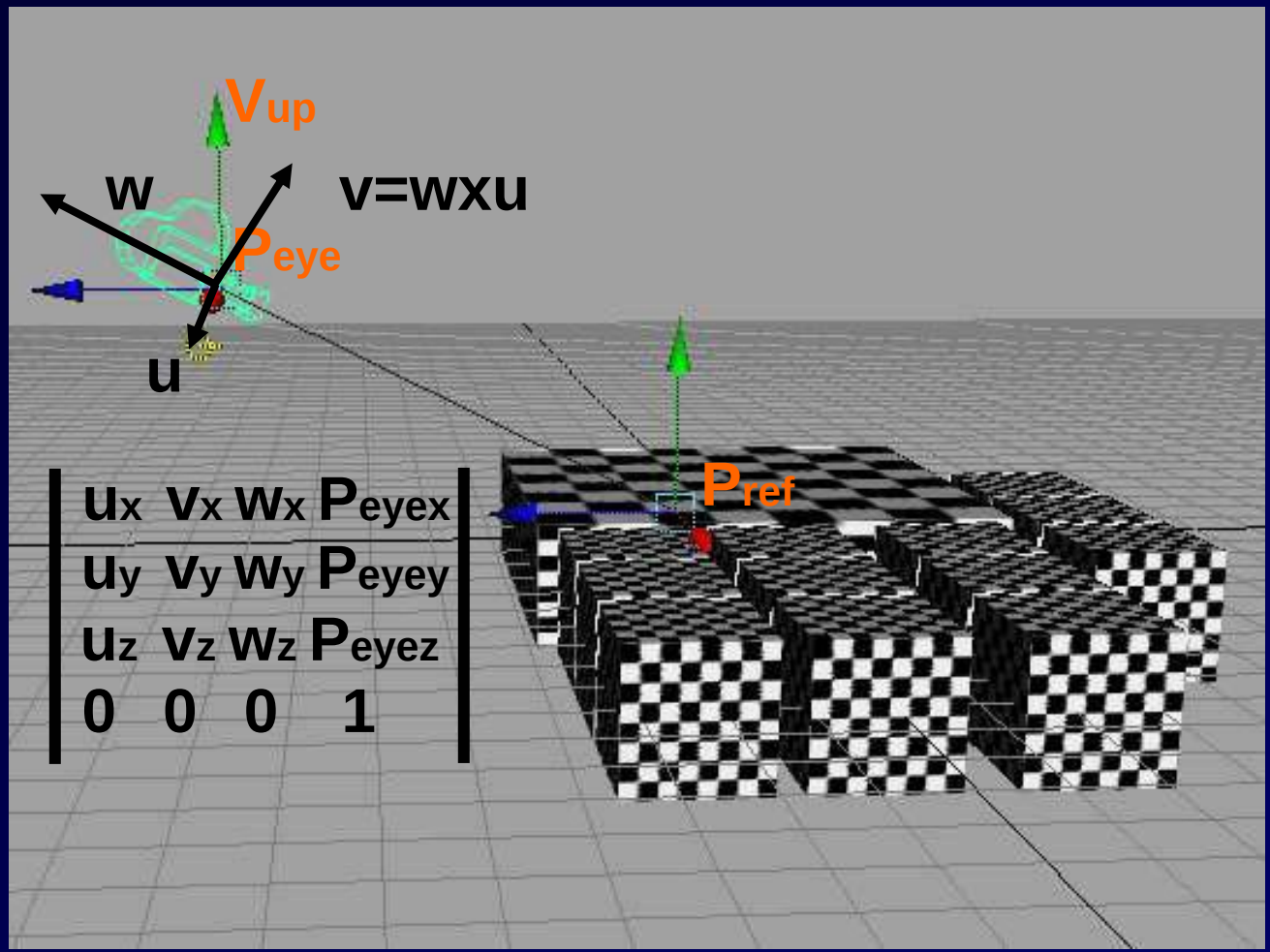
Viewing Transform



Viewing Transform



Change-of-basis Matrix



Camera model

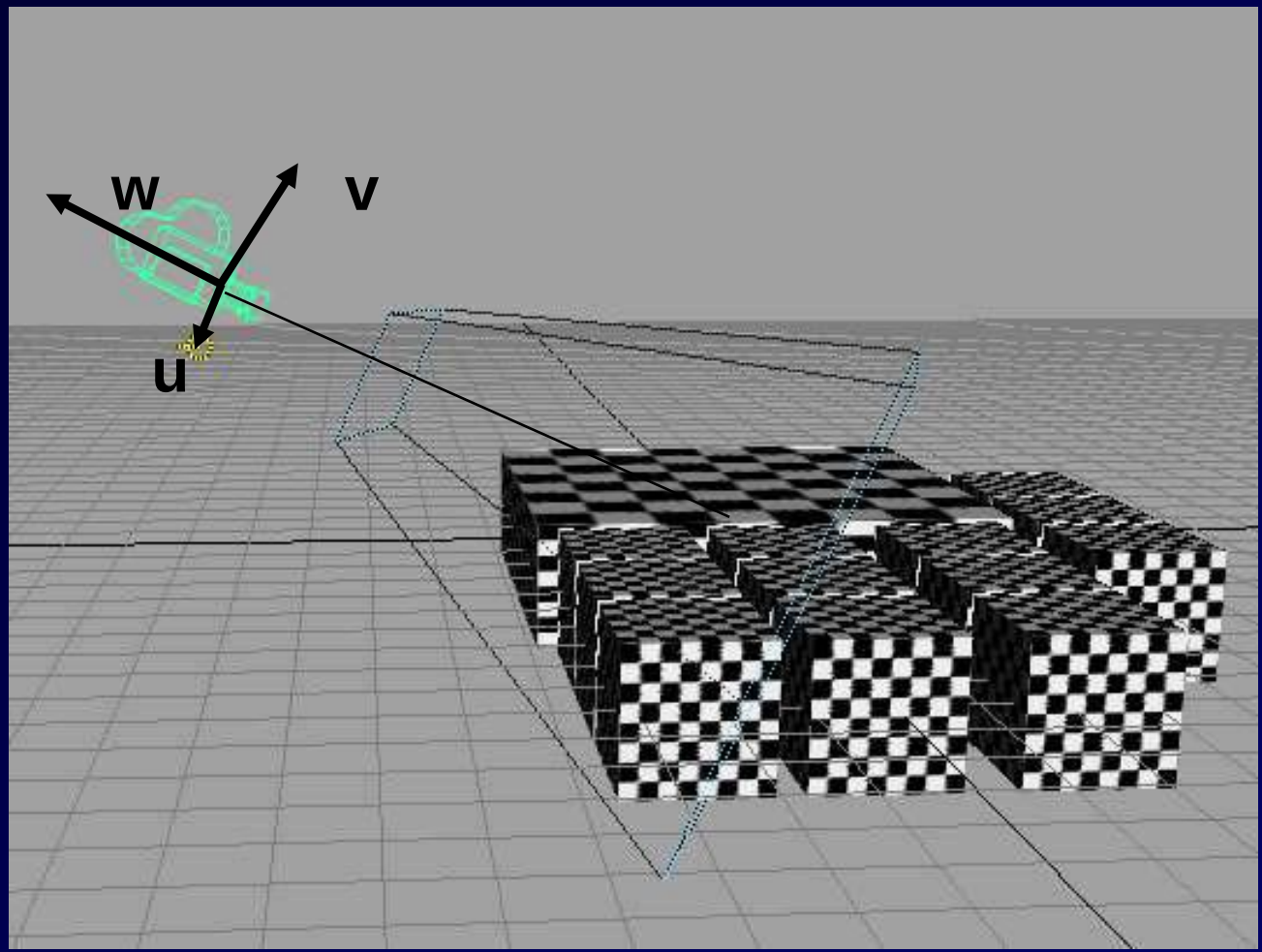
Camera model

What is the difference between these images?

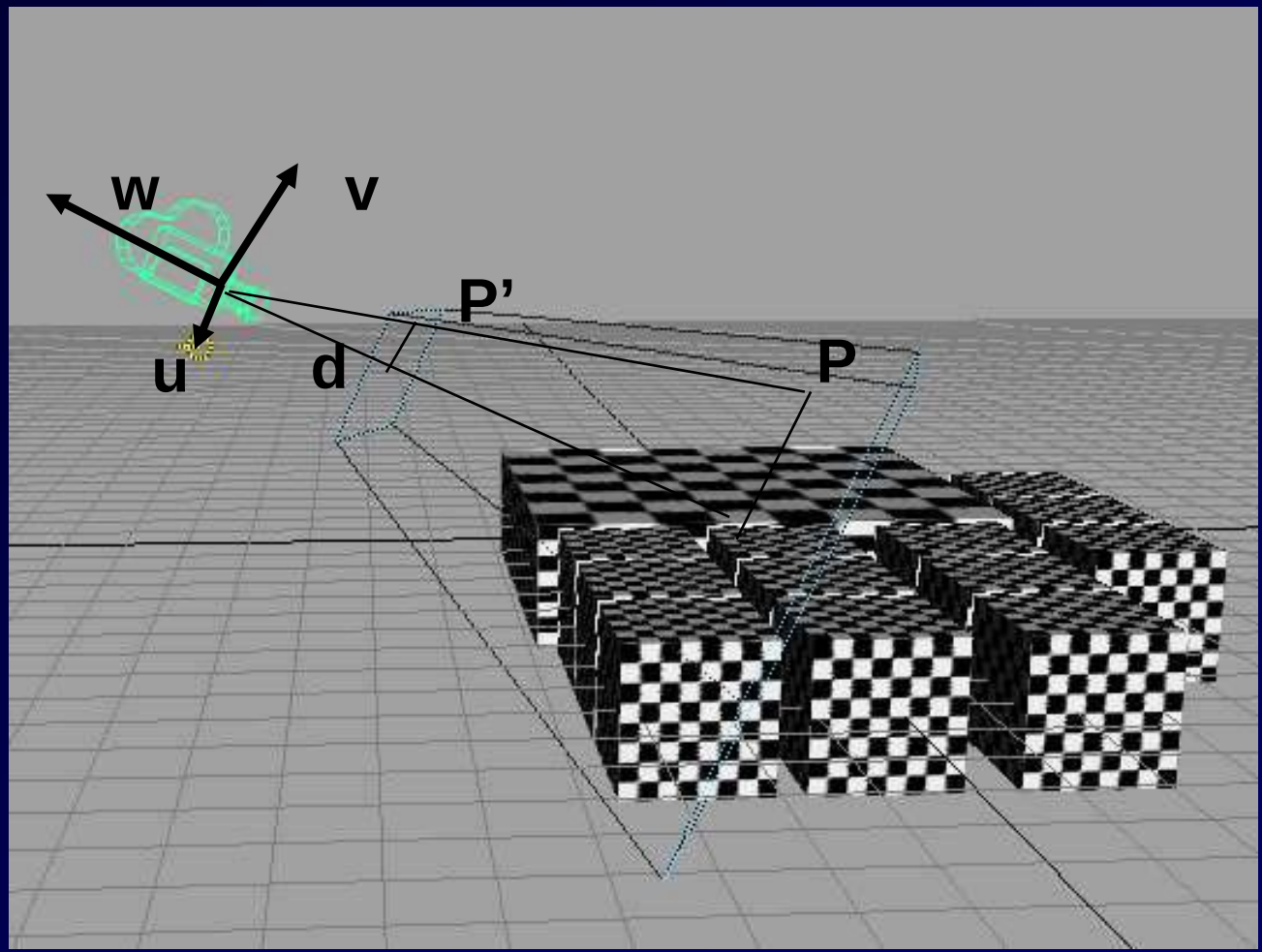
Orthographic

Perspective

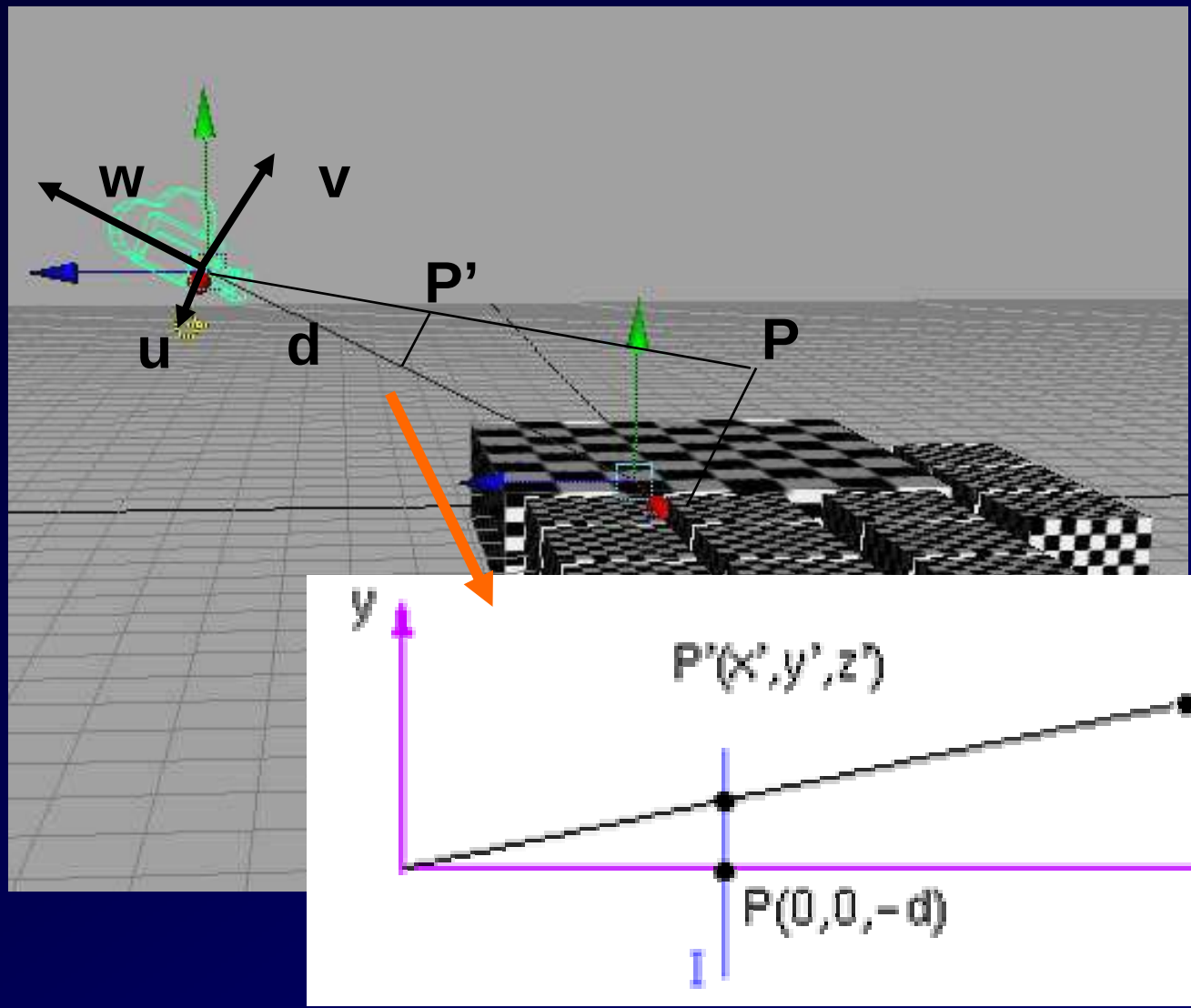
Perspective projection



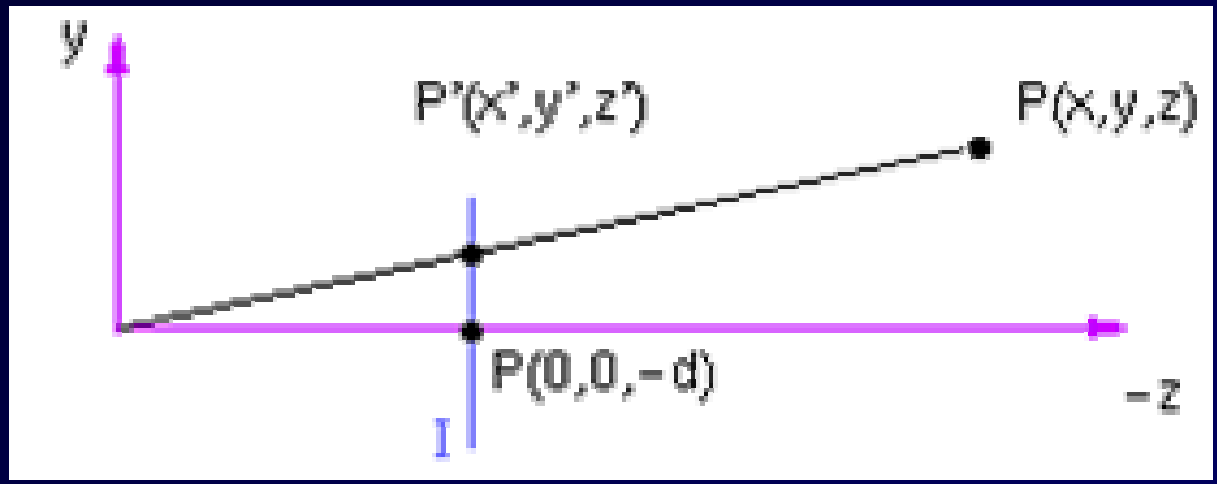
Perspective projection



Simple Perspective

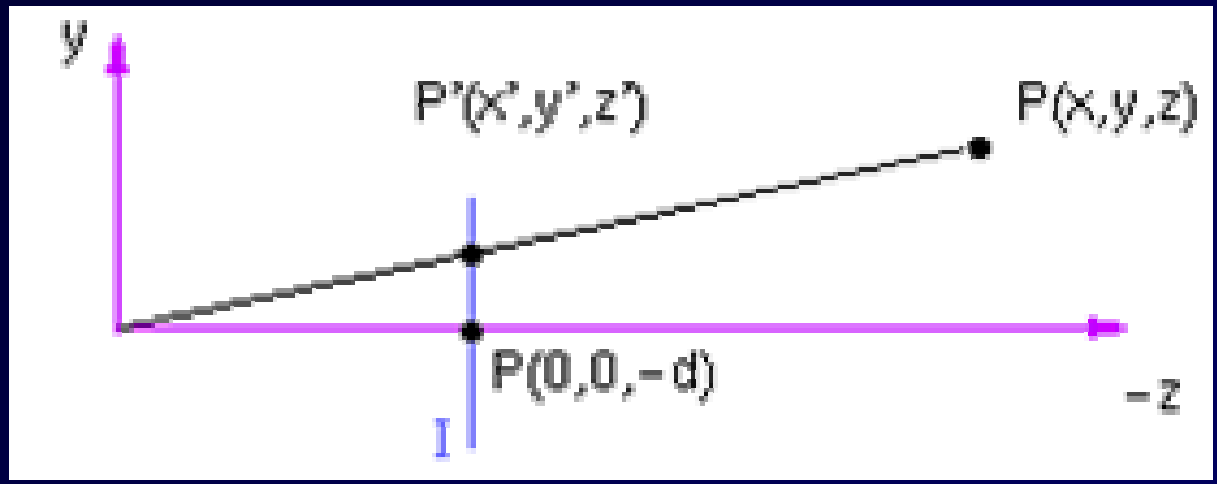


Simple Perspective



- y'= yd/z
- x'= xd/z
- z'=d

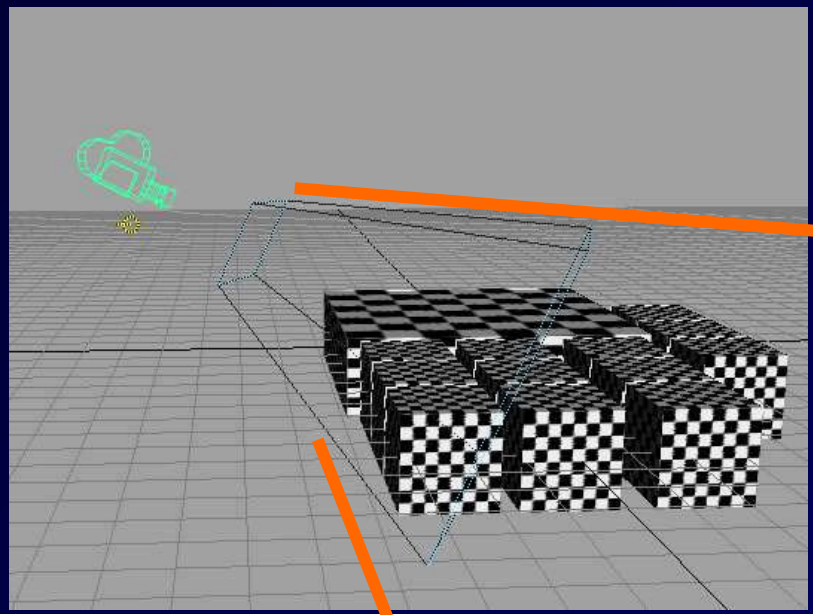
Simple Perspective

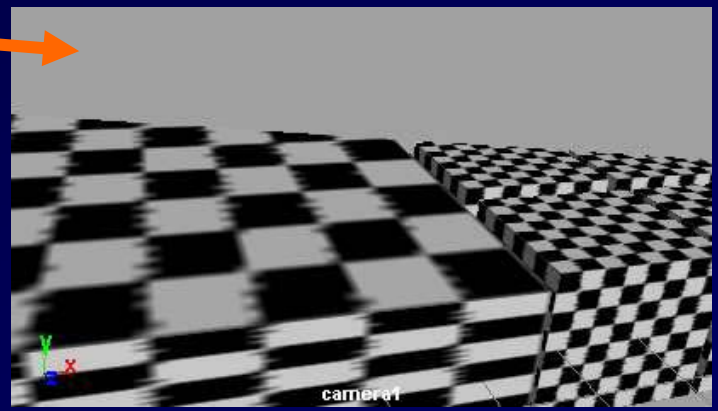


$$\begin{bmatrix} x' \\ y' \\ z' \\ w' \end{bmatrix} = \begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 1/d & 0 \end{bmatrix} \begin{bmatrix} x \\ y \\ z \\ 1 \end{bmatrix}$$

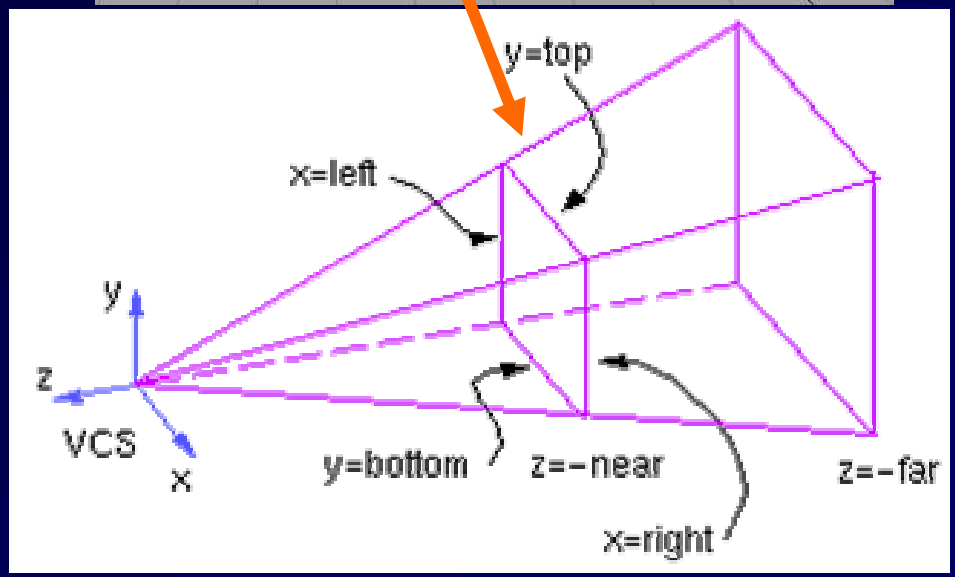
$w' = z/d$

Viewing volumes

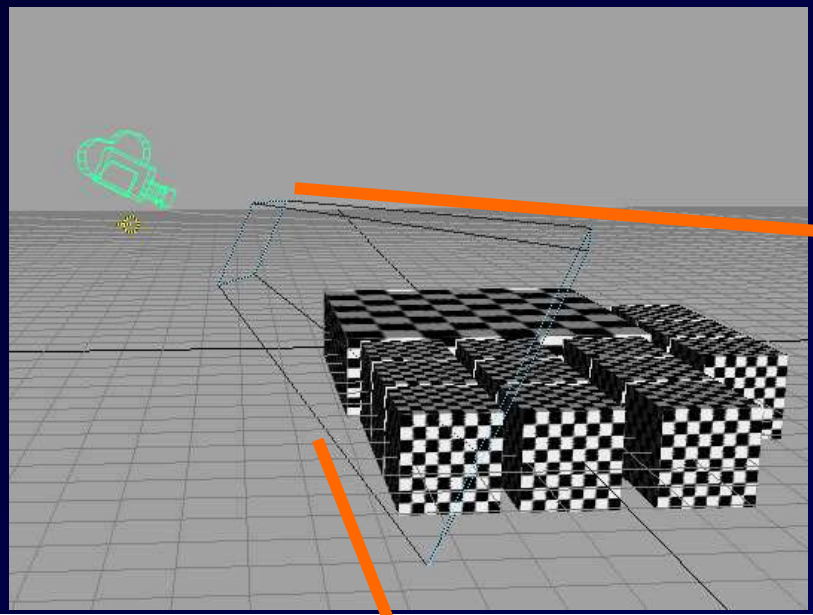


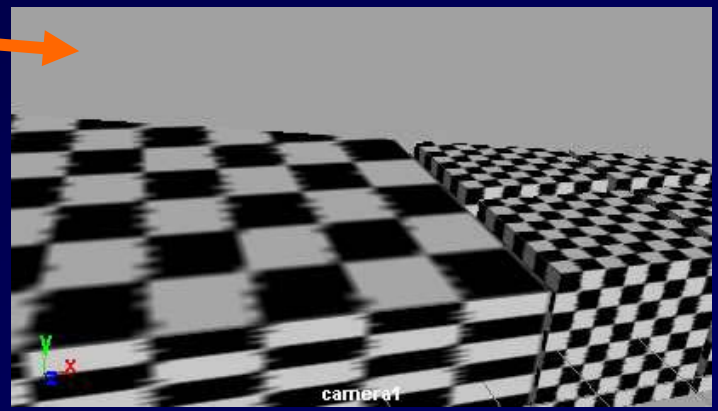


Projected image

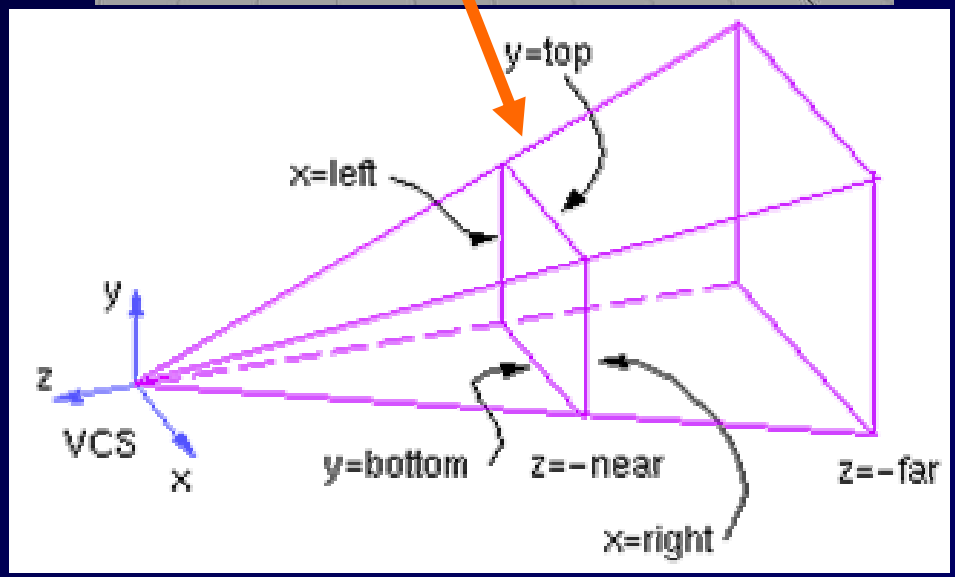


Viewing volumes

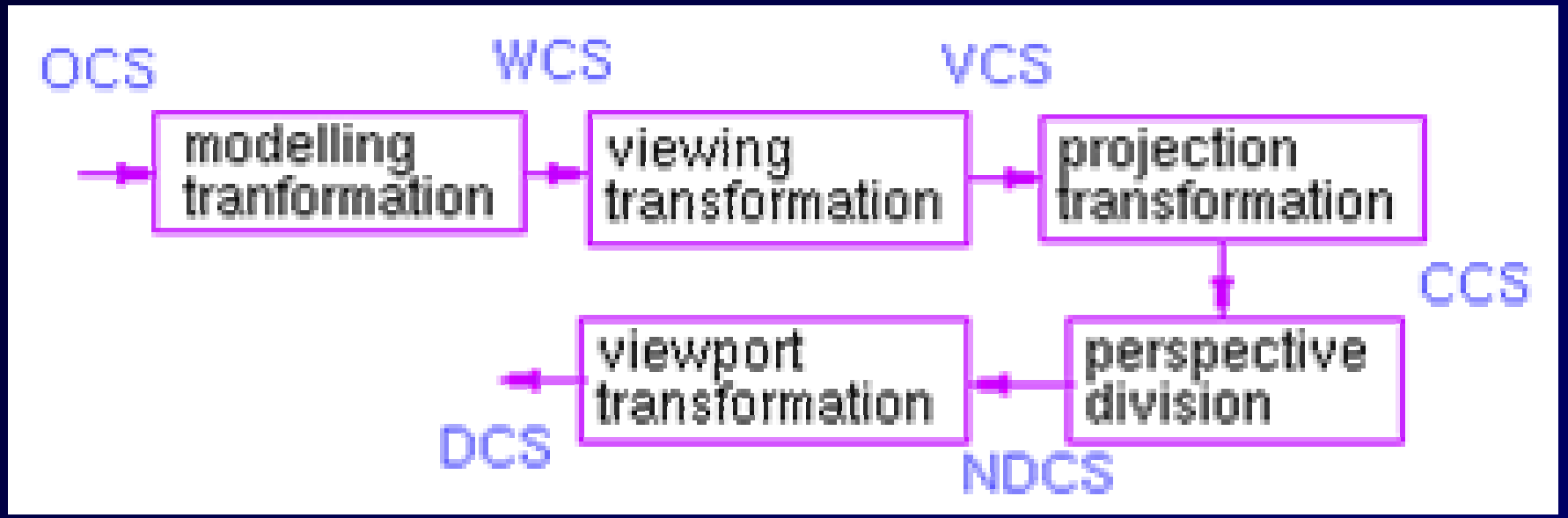




Projected image



Viewing Pipeline



CSC418 Computer Graphics

Next Lecture

- **Cannonical space**
- **3D Clipping**
- **Visibility culling**