

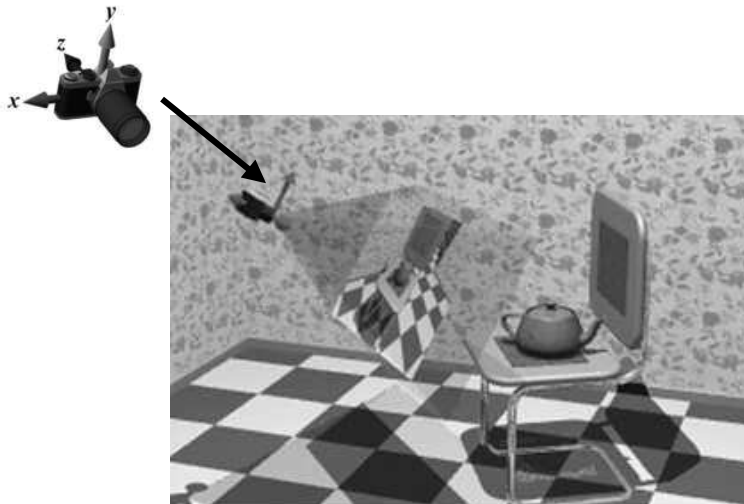
CSC418 Computer Graphics

- Cameras and Projections

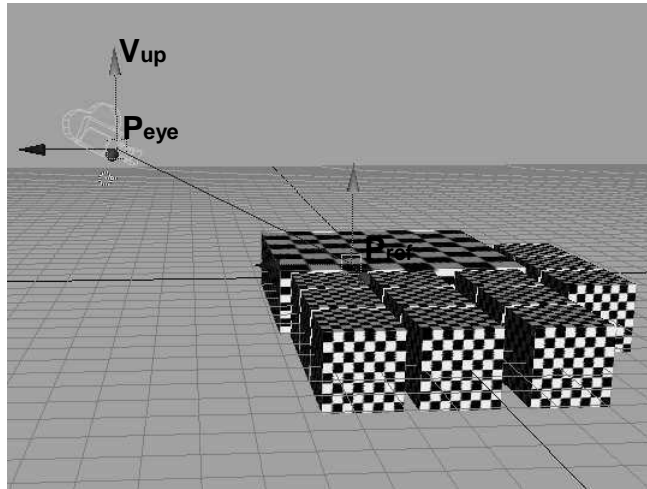


Follow lecture notes on 3D Projection and Clipping :
www.dgp.toronto.edu/~karan/courses/csc418/fall_2002/notes/lectures.html

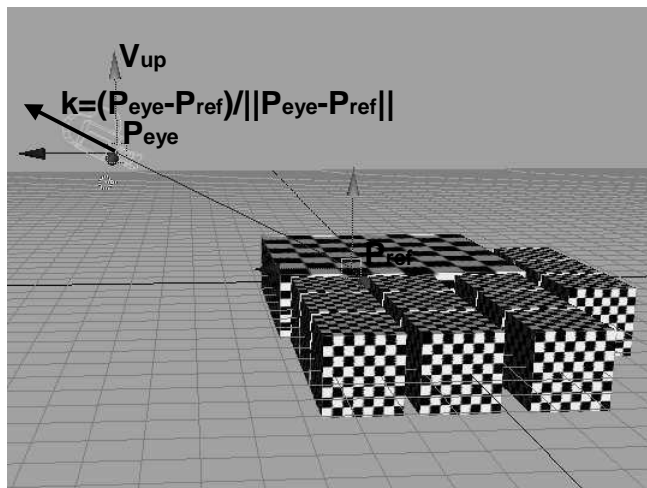
Camera model



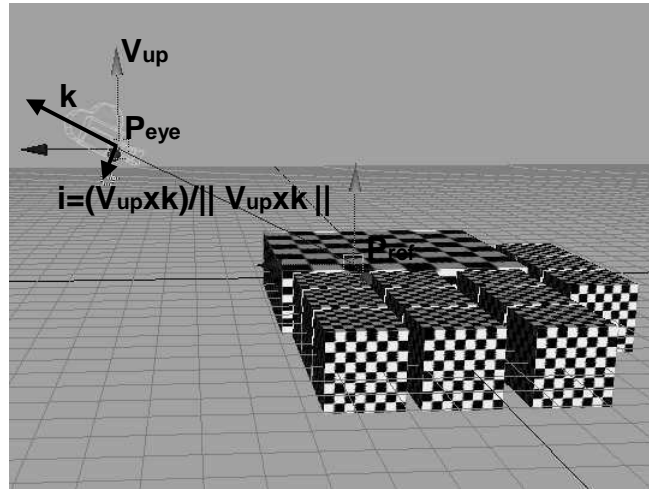
Viewing Transform



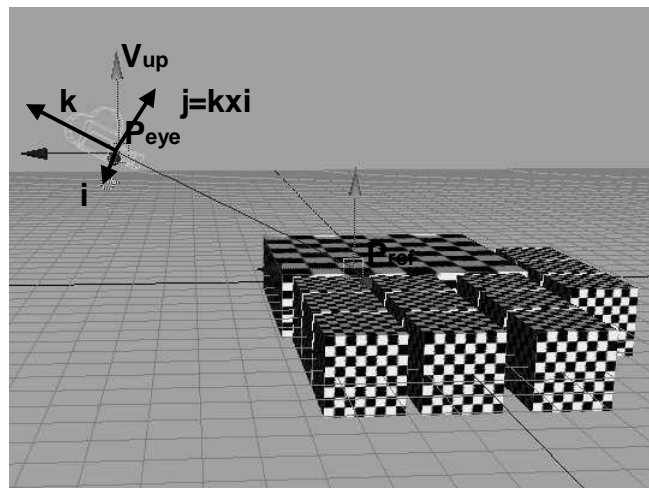
Viewing Transform



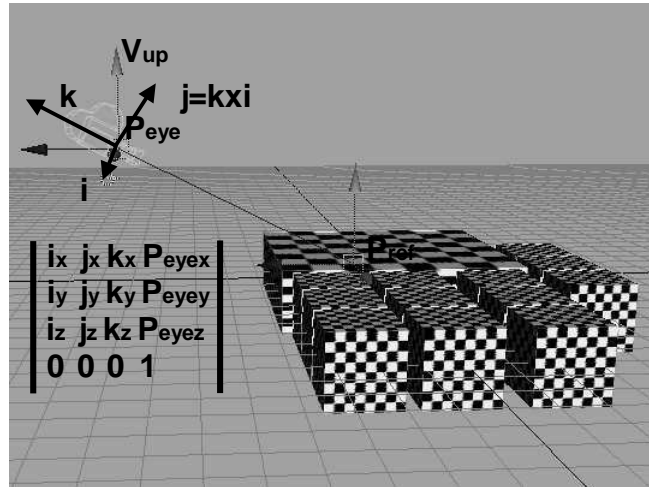
Viewing Transform



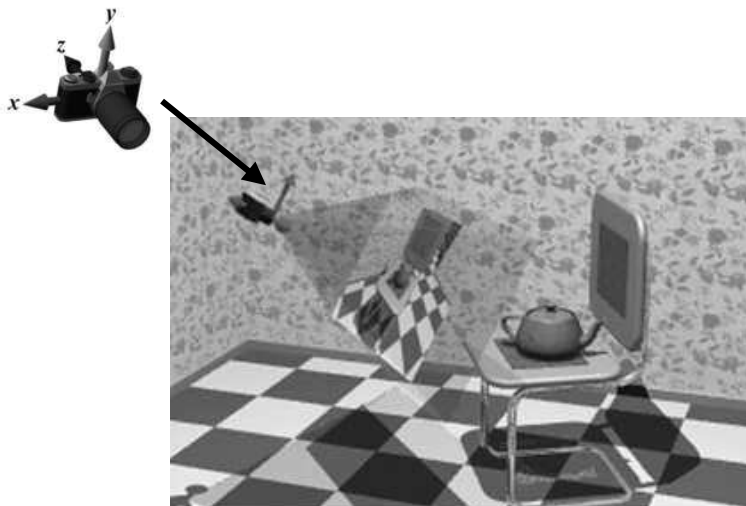
Viewing Transform



Change-of-basis Matrix

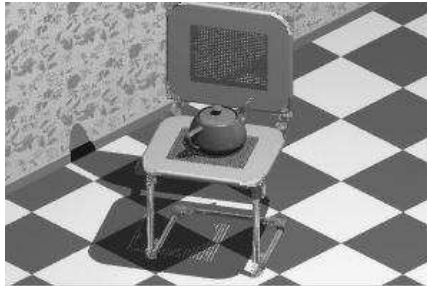


Camera model

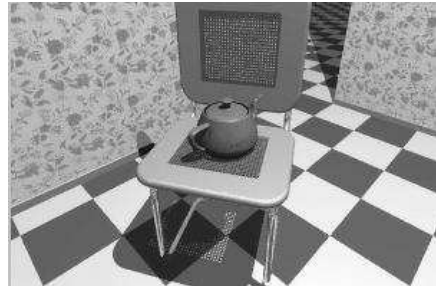


Camera model

What is the difference between these images?

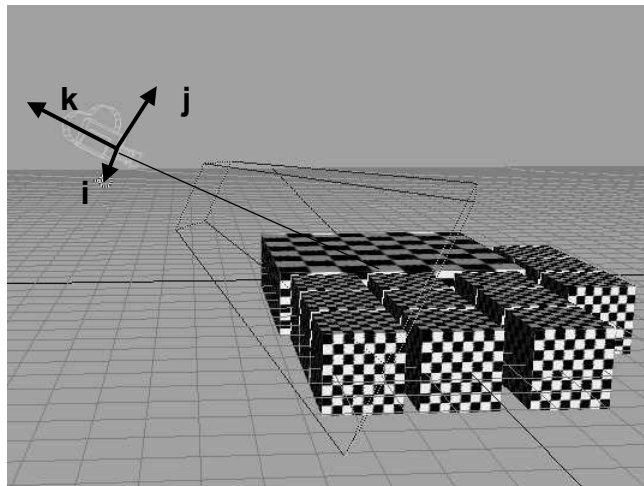


Orthographic

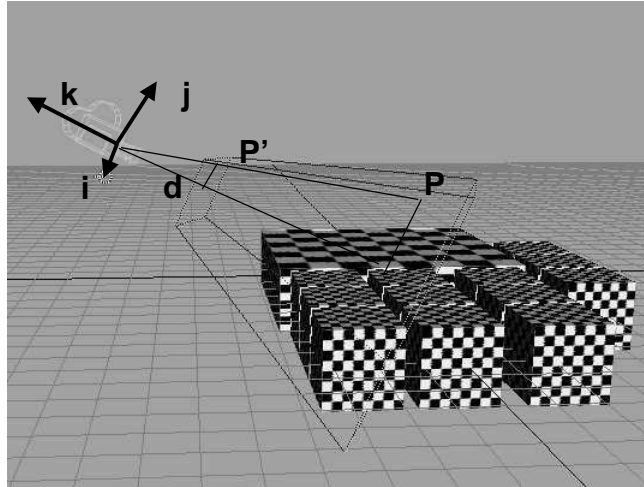


Perspective

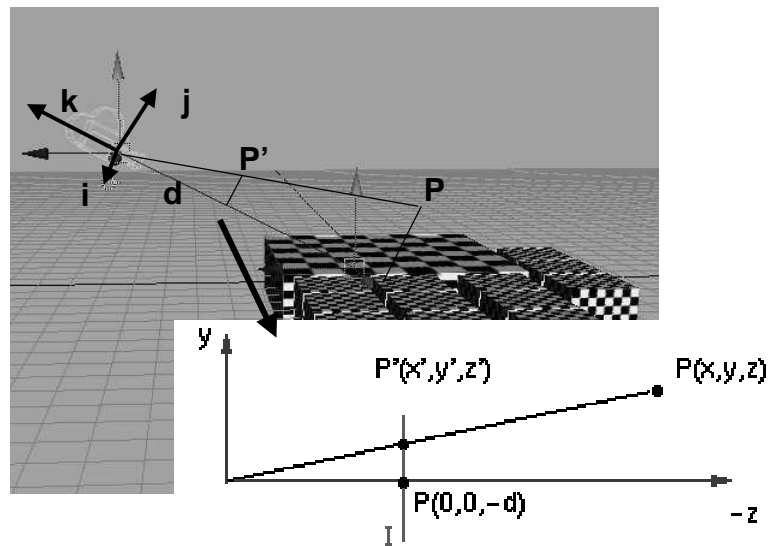
Perspective projection



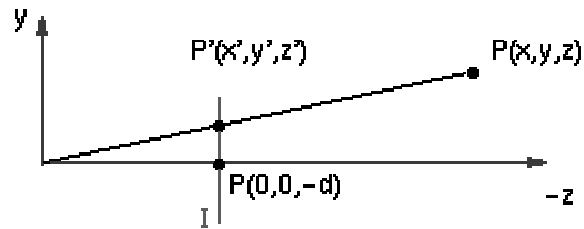
Perspective projection



Simple Perspective

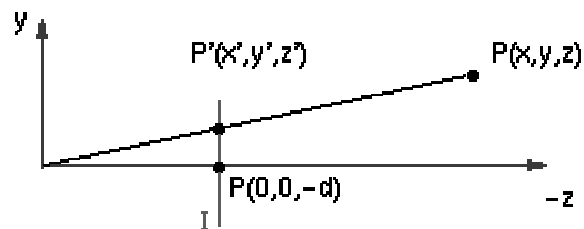


Simple Perspective



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

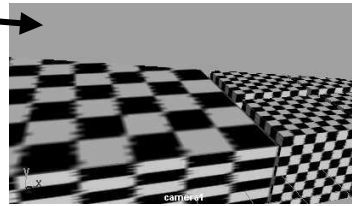
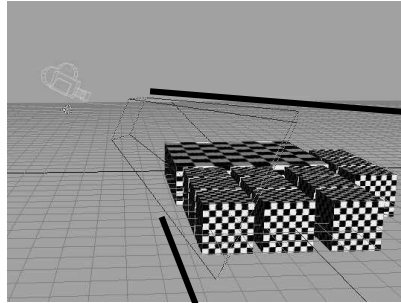
Simple Perspective



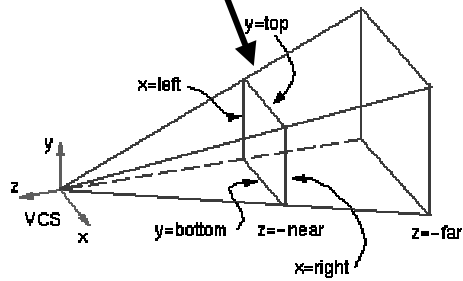
$$\begin{bmatrix} x' \\ y' \\ z' \\ w' \end{bmatrix} = \begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 1/d & 0 \end{bmatrix} \begin{bmatrix} x \\ y \\ z \\ 1 \end{bmatrix}$$

$$w' = z/d$$

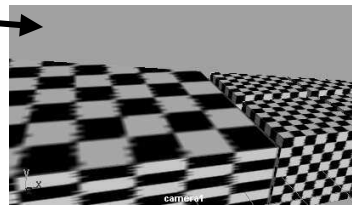
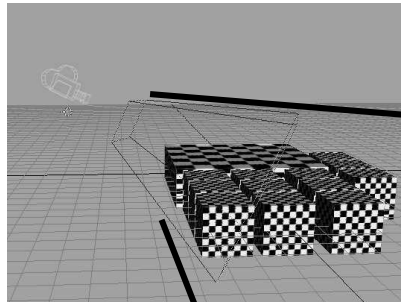
Viewing volumes



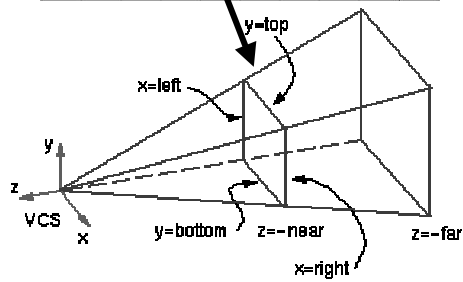
Projected image



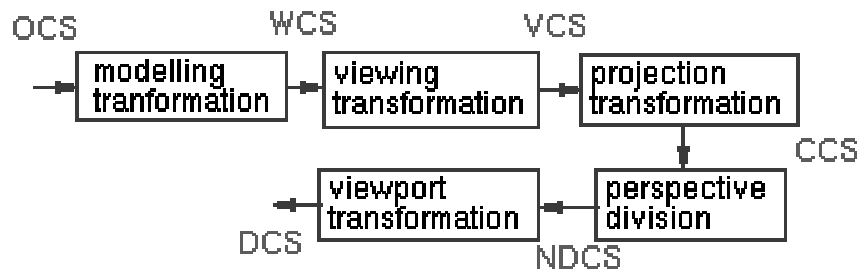
Viewing volumes



Projected image



Viewing Pipeline



CSC418 Computer Graphics

Next Lecture

- Canonical space
- 3D Clipping
- Visibility culling

