

Lighting

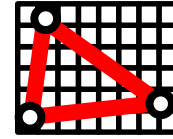
CS418 Computer Graphics

John C. Hart

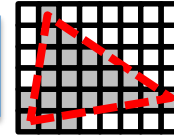
Vertex Pipeline



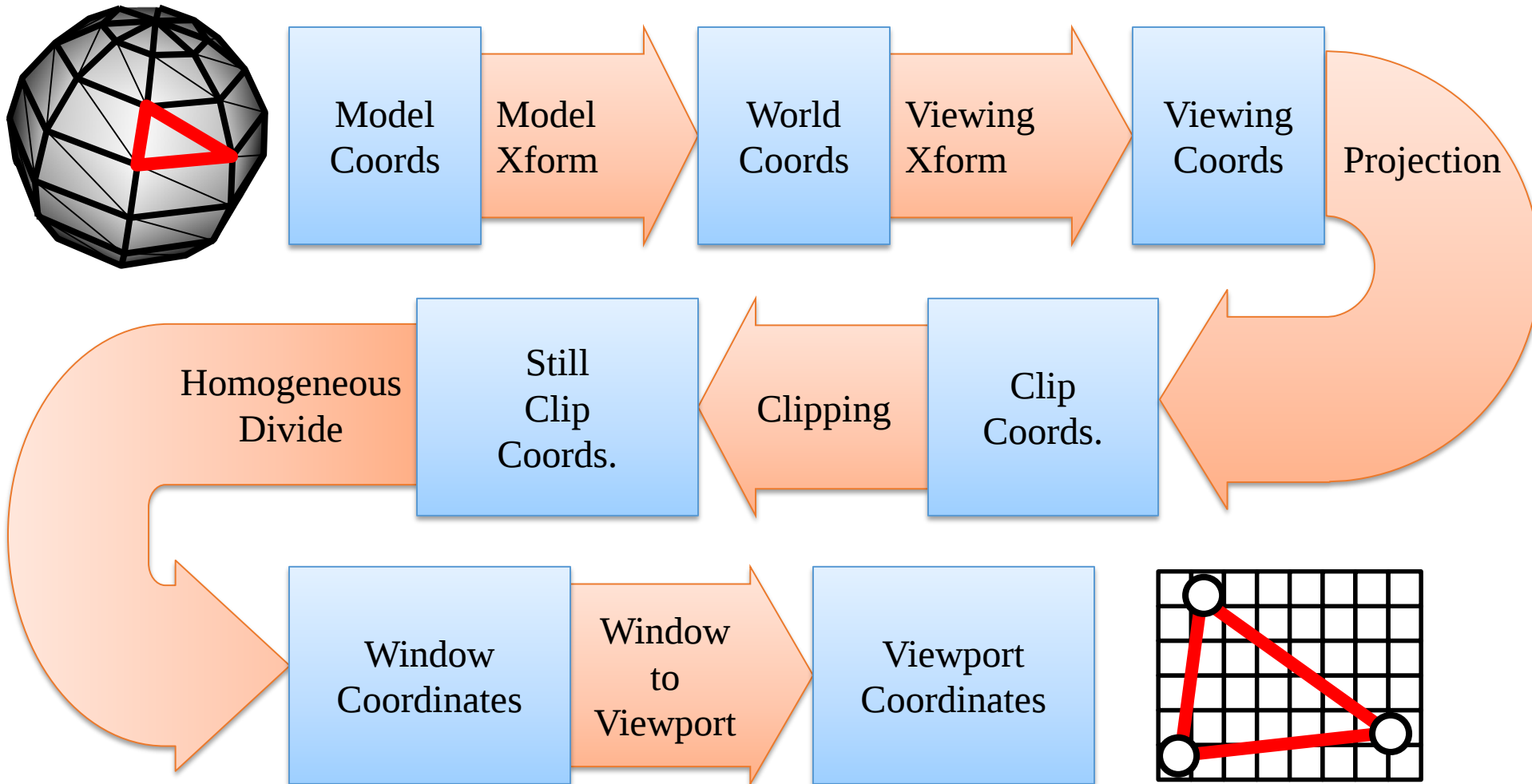
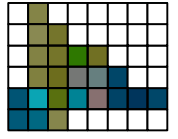
Vertex
Shader



Scan
Converter

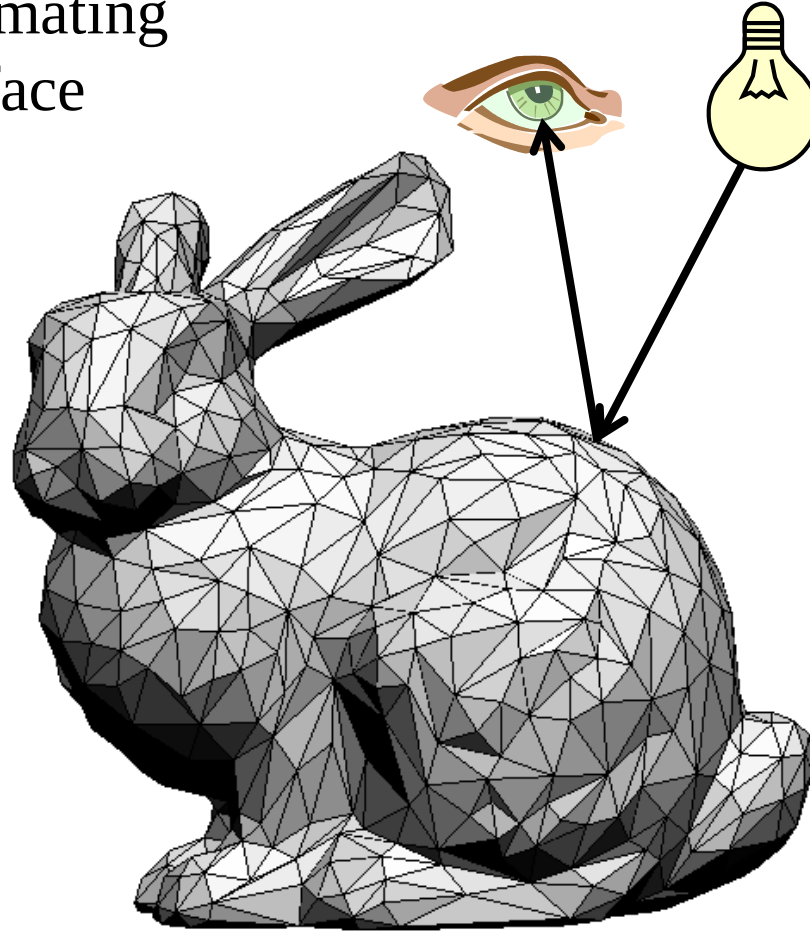
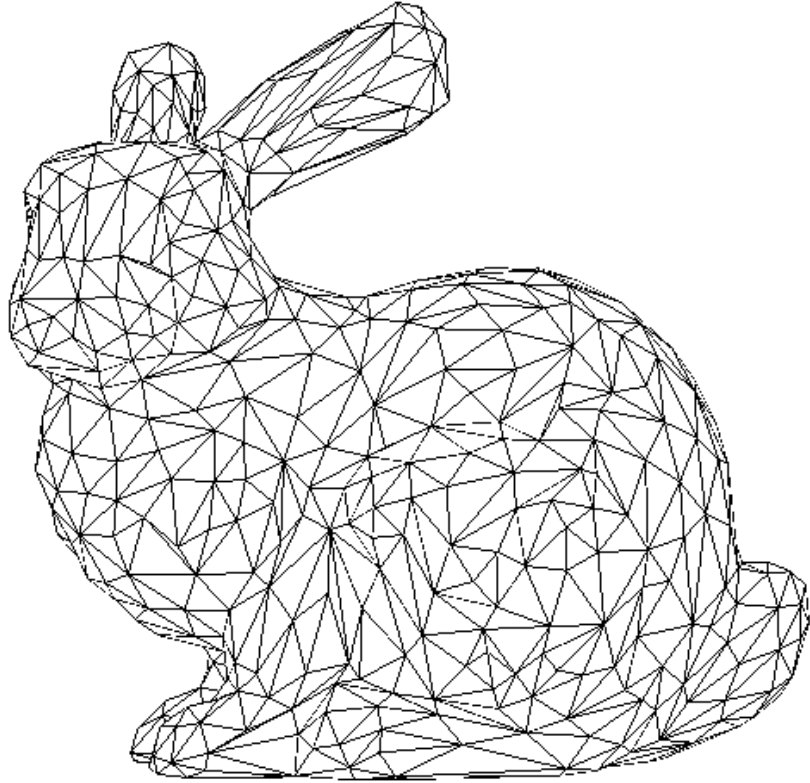


Fragment
Shader



Lighting

Makes viewed, projected, filled polygon meshes look more realistic by approximating how light would bounce off their surface

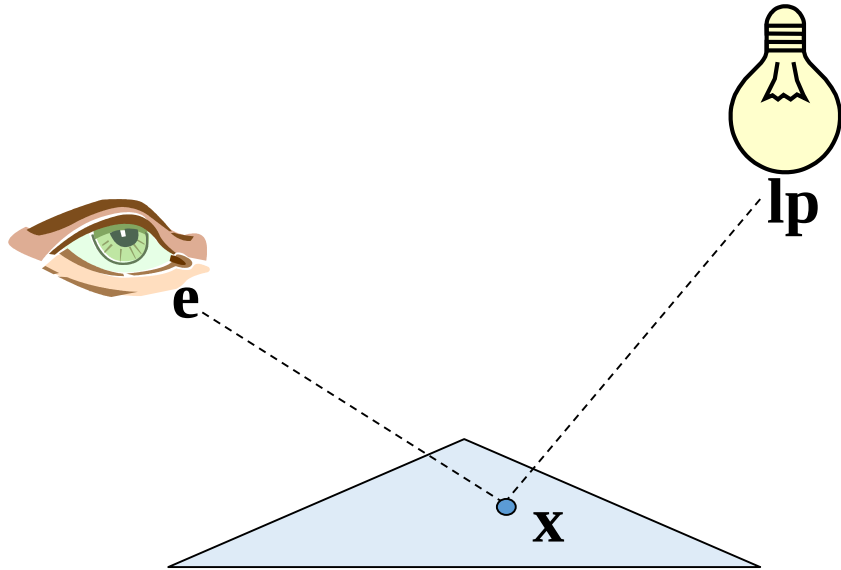


Local Coordinates

x – point on surface

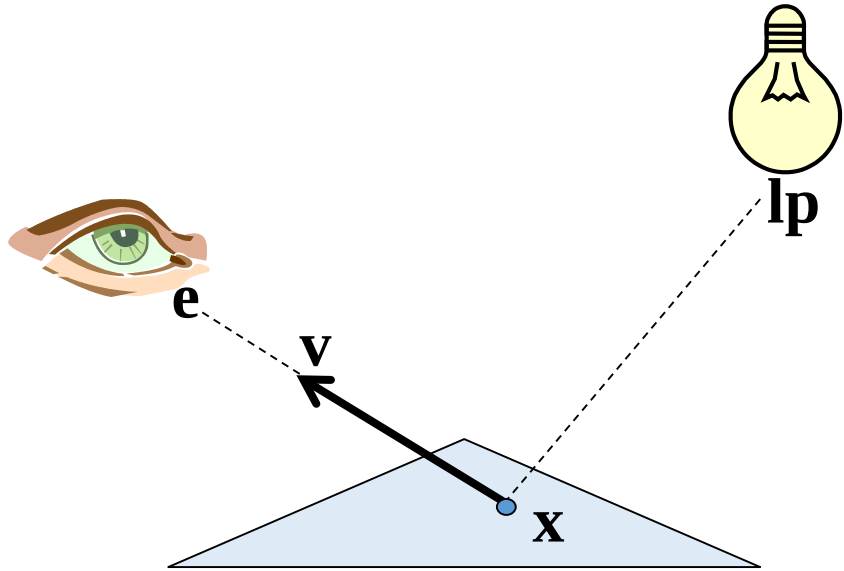
e – eye position

lp – light position



Local Coordinates

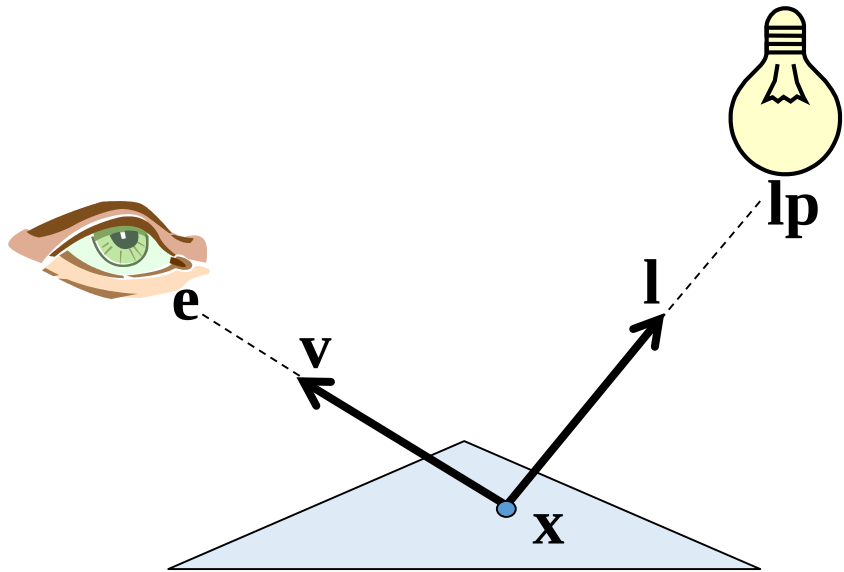
$\mathbf{v}$ – view vector: $\mathbf{v} = (\mathbf{e} - \mathbf{x}) / \|\mathbf{e} - \mathbf{x}\|$



Local Coordinates

v – view vector: $\mathbf{v} = (\mathbf{e} - \mathbf{x}) / \|\mathbf{e} - \mathbf{x}\|$

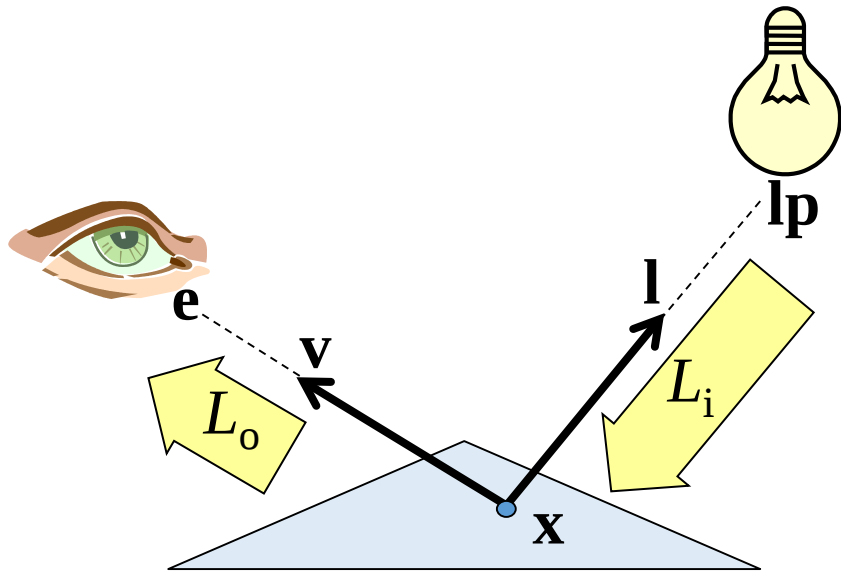
l – light vector: $\mathbf{l} = (\mathbf{lp} - \mathbf{x}) / \|\mathbf{lp} - \mathbf{x}\|$



Local Coordinates

$\mathbf{v}$ – view vector: $\mathbf{v} = (\mathbf{e} - \mathbf{x}) / \|\mathbf{e} - \mathbf{x}\|$

$\mathbf{l}$ – light vector: $\mathbf{l} = (\mathbf{lp} - \mathbf{x}) / \|\mathbf{lp} - \mathbf{x}\|$

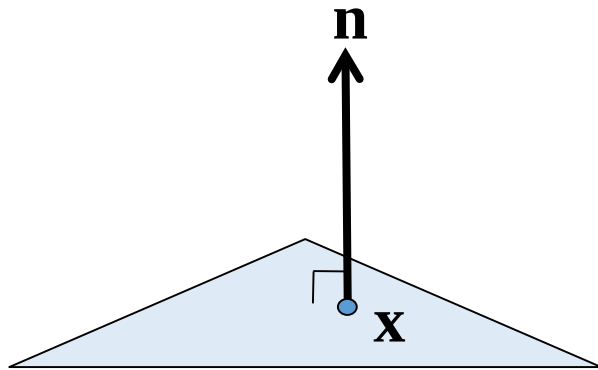


Local Coordinates

v – view vector: $\mathbf{v} = (\mathbf{e} - \mathbf{x}) / \|\mathbf{e} - \mathbf{x}\|$

l – light vector: $\mathbf{l} = (\mathbf{lp} - \mathbf{x}) / \|\mathbf{lp} - \mathbf{x}\|$

n – normal vector

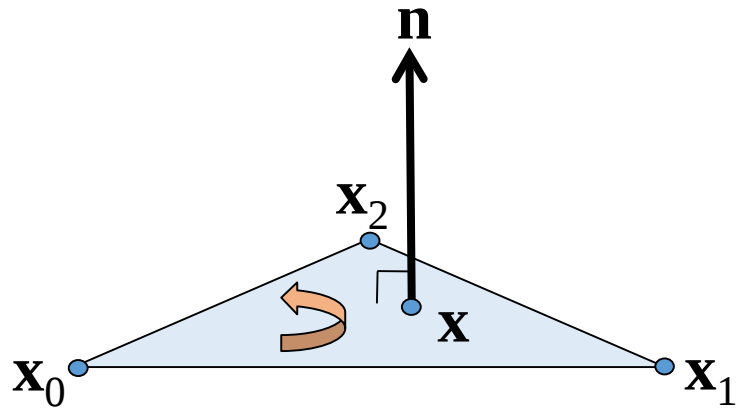


Local Coordinates

v – view vector: $\mathbf{v} = (\mathbf{e} - \mathbf{x}) / \|\mathbf{e} - \mathbf{x}\|$

l – light vector: $\mathbf{l} = (\mathbf{lp} - \mathbf{x}) / \|\mathbf{lp} - \mathbf{x}\|$

n – normal vector: $\mathbf{n} = (\mathbf{x}_1 - \mathbf{x}_0) \times (\mathbf{x}_2 - \mathbf{x}_0) / \|(\mathbf{x}_1 - \mathbf{x}_0) \times (\mathbf{x}_2 - \mathbf{x}_0)\|$



Local Coordinates

v – view vector: $\mathbf{v} = (\mathbf{e} - \mathbf{x}) / \|\mathbf{e} - \mathbf{x}\|$

l – light vector: $\mathbf{l} = (\mathbf{lp} - \mathbf{x}) / \|\mathbf{lp} - \mathbf{x}\|$

n – normal vector: $\mathbf{n} = (\mathbf{x}_1 - \mathbf{x}_0) \times (\mathbf{x}_2 - \mathbf{x}_0) / \|(\mathbf{x}_1 - \mathbf{x}_0) \times (\mathbf{x}_2 - \mathbf{x}_0)\|$

