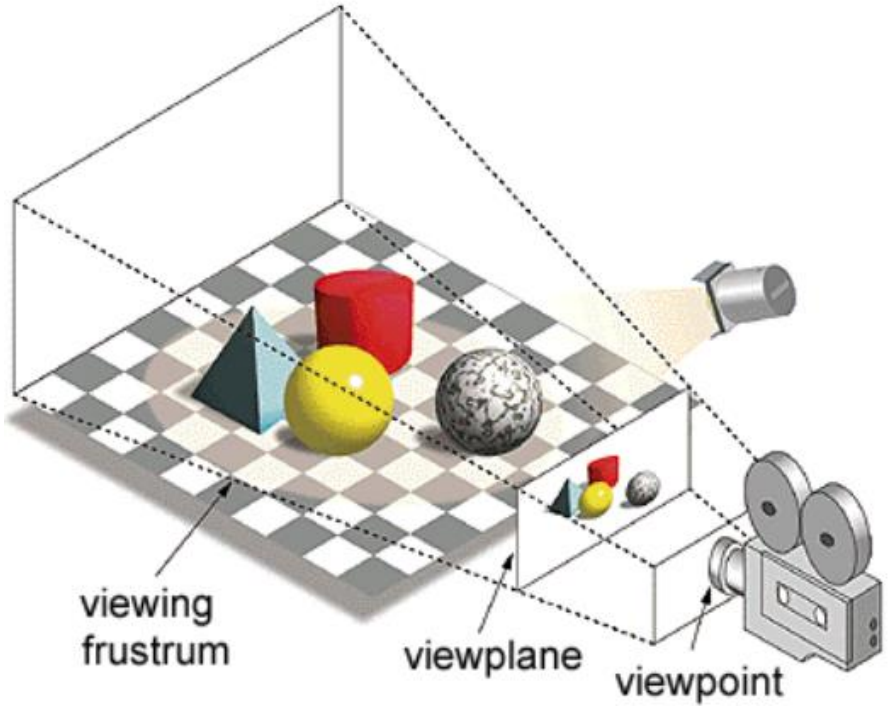
Introduction to Computer Graphics

Computer Graphics

- Generate high quality 2d images efficiently, given the 3d model and camera parameters
- Simulate, animate, model, and light real world



Two Approaches

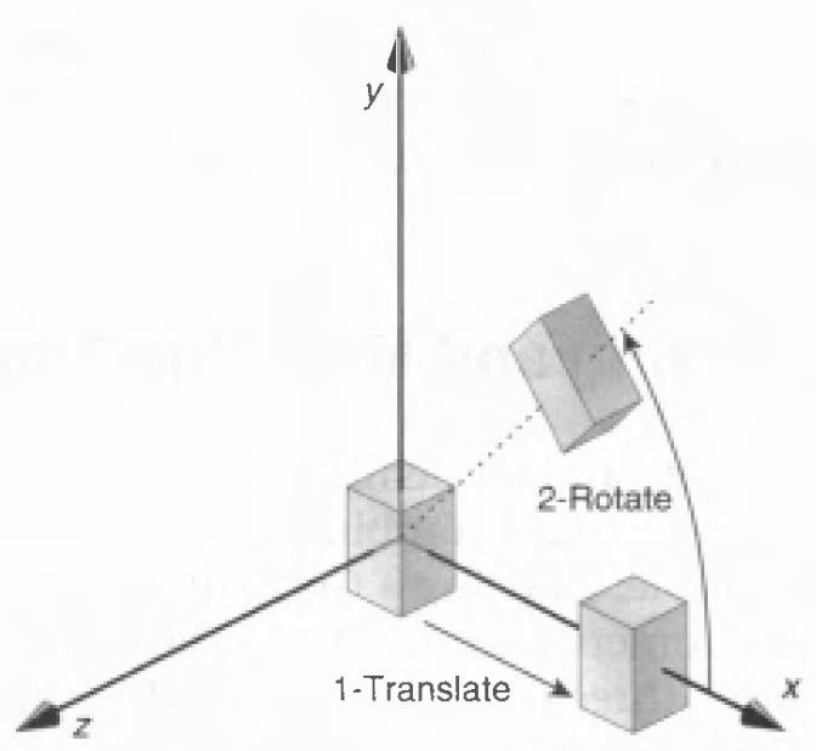
- Rasterization
  - Faster
  - Pipelined
  - Ex. Real-time applications
- Light Transport/Ray Tracing
  - High quality and More realistic
  - Ex. Animation movies

Rasterization Pipeline

- Modeling Transformation
- View Transformation
- Illumination
- Projection Transformation
- Clipping
- Rasterization or Scan conversion
- Texturing

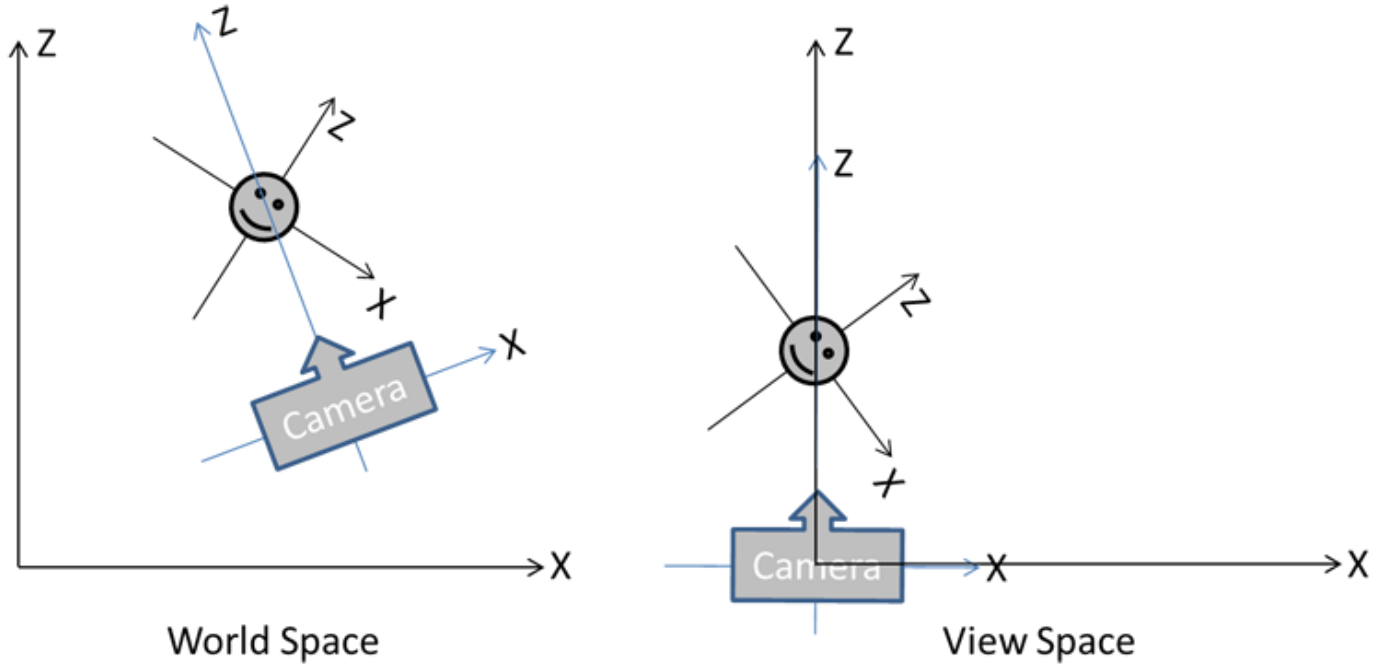
Modeling Transformation

- Use transformation to position objects
- Reuse objects



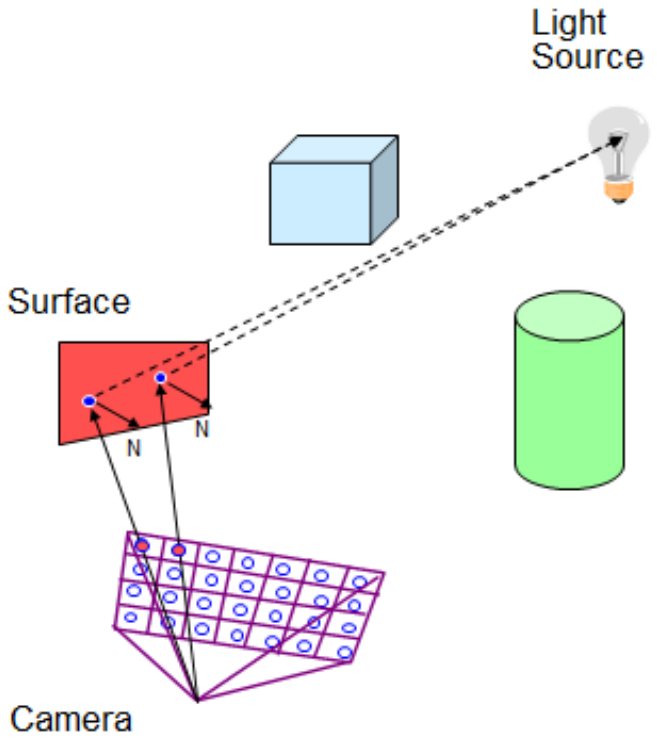
View Transformation

- Translate camera to origin
- Set view direction along a principal axis



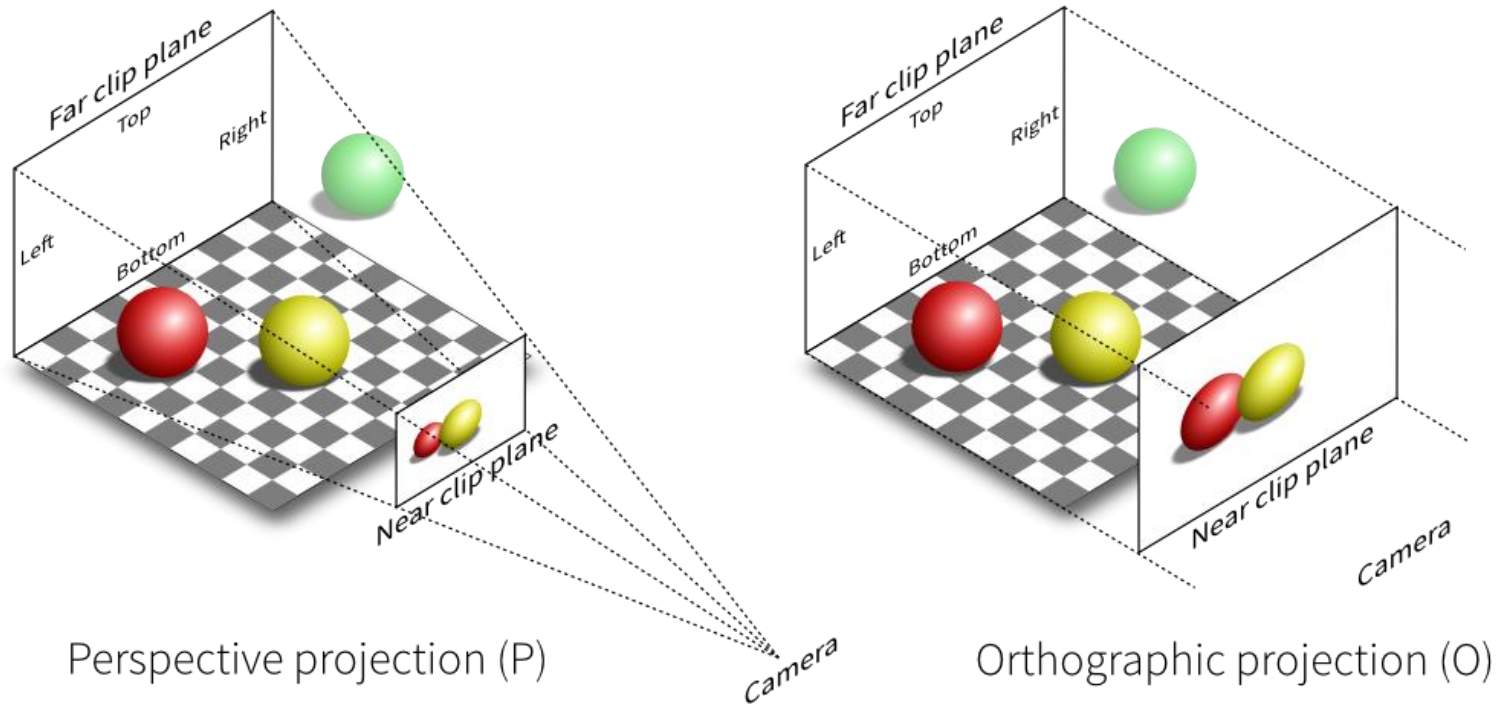
Illumination

- Light the scene according to material properties of objects and light sources
- Highly important to generate realistic image



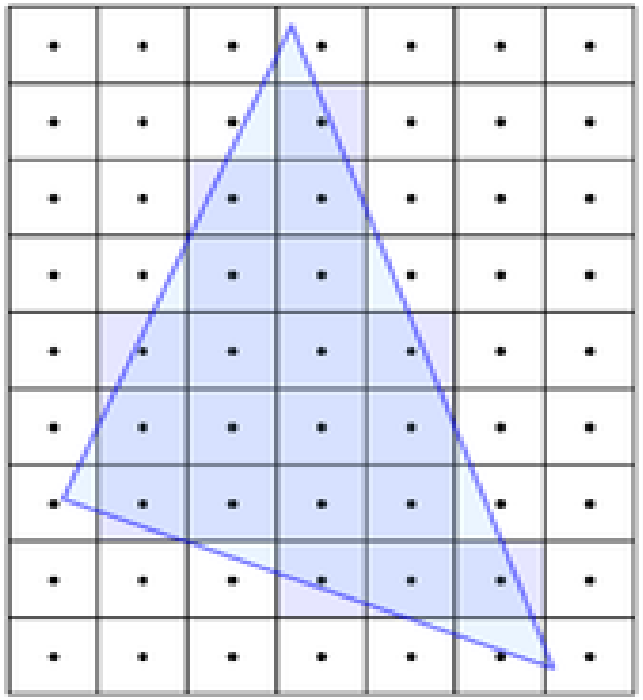
Projection and Clipping

- Project the 3d model on a 2d screen
- Clip objects outside viewing frustum



Rasterization

- Determine which pixels to light on the screen

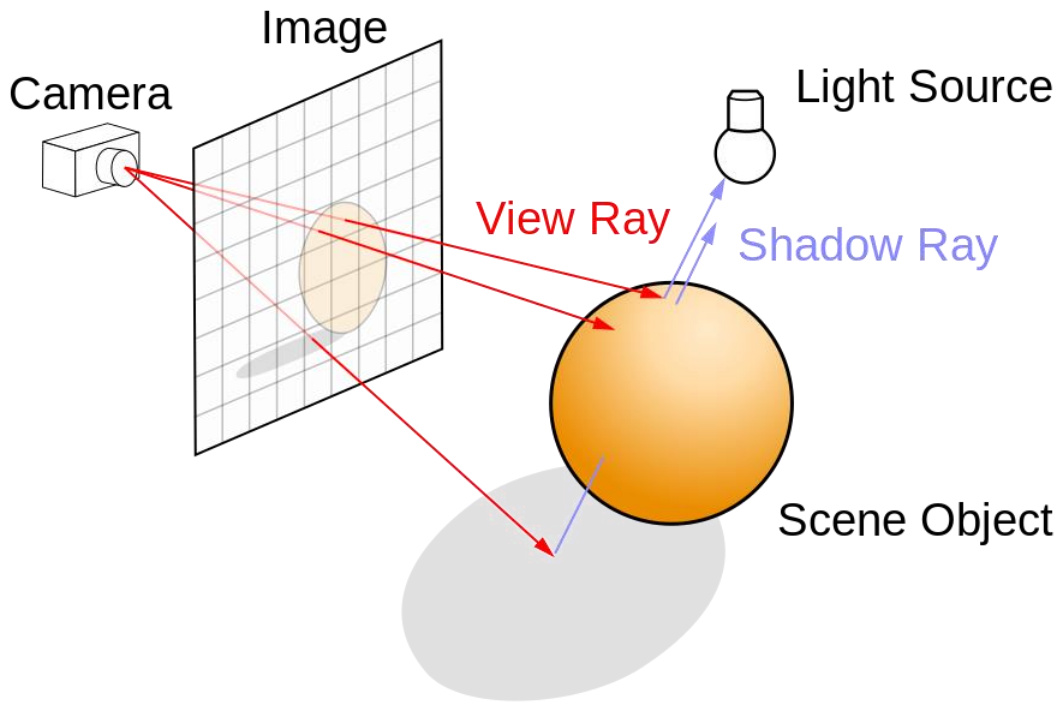


Texturing

- Paste images on object surfaces

Ray Tracing

- Cast rays from eye to each pixel to determine the color of pixel



Ray Tracing

- Produces highly realistic image