



Global Illumination

CSE167: Computer Graphics
Instructor: Steve Rotenberg
UCSD, Fall 2006

Classic Ray Tracing

- The 'classic' ray tracing algorithm shoots one *primary ray* per pixel
- If the ray hits a colored surface, then a *shadow ray* is shot towards each light source to test for shadows, and determine if the light can contribute to the illumination of the surface
- If the ray hits a shiny reflective surface, a *secondary ray* is spawned in the reflection direction and recursively traced through the scene
- If a ray hits a transparent surface, then a reflection and a transmission (refraction) ray are spawned and recursively traced through the scene
- To prevent infinite loops, the recursion depth is usually capped to some reasonable number of bounces (less than 10 usually works)
- In this way, we may end up with an *average* of fewer than 20 or so rays per pixel in scenes with only a few lights and a few reflective or refractive surfaces
- Scenes with many lights and many inter-reflecting surfaces will require more rays
- Images rendered with the classic ray tracing algorithm can contain shadows, exact inter-reflections and refractions, and multiple lights, but may tend to have a rather 'sharp' appearance, due to the limitation to perfectly polished surfaces and point light sources

