



Ray Tracing

CSE167: Computer Graphics
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Ray Tracing

- Ray tracing is a powerful rendering technique that is the foundation of many modern photoreal rendering algorithms
 - The original ray tracing technique was proposed in 1980 by Turner Whitted, although there were suggestions about the possibility in scientific papers dating back to 1968
 - Classic ray tracing shoots virtual view rays into the scene from the camera and traces their paths as they bounce around
 - With ray tracing, one can achieve a wide variety of complex lighting effects, such as accurate shadows and reflections/refractions from curved surfaces
 - Achieving these effects with the same precision is difficult if not impossible with a more traditional rendering pipeline
 - Ray tracing offers a big advance in visual quality, but comes with an expensive price of notoriously slow rendering times
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Ray Intersections

- Tracing a single ray requires determining if that ray intersects any one of potentially millions of primitives
 - This is the basic problem of *ray intersection*
 - Many algorithms exist to make this not only feasible, but remarkably efficient
 - Tracing one ray is a complex problem and requires serious work to make it run at an acceptable speed
 - Of course, the big problem is the fact that one needs to trace lots of rays to generate a high quality image
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