61A Extra Lecture 9

Announcements

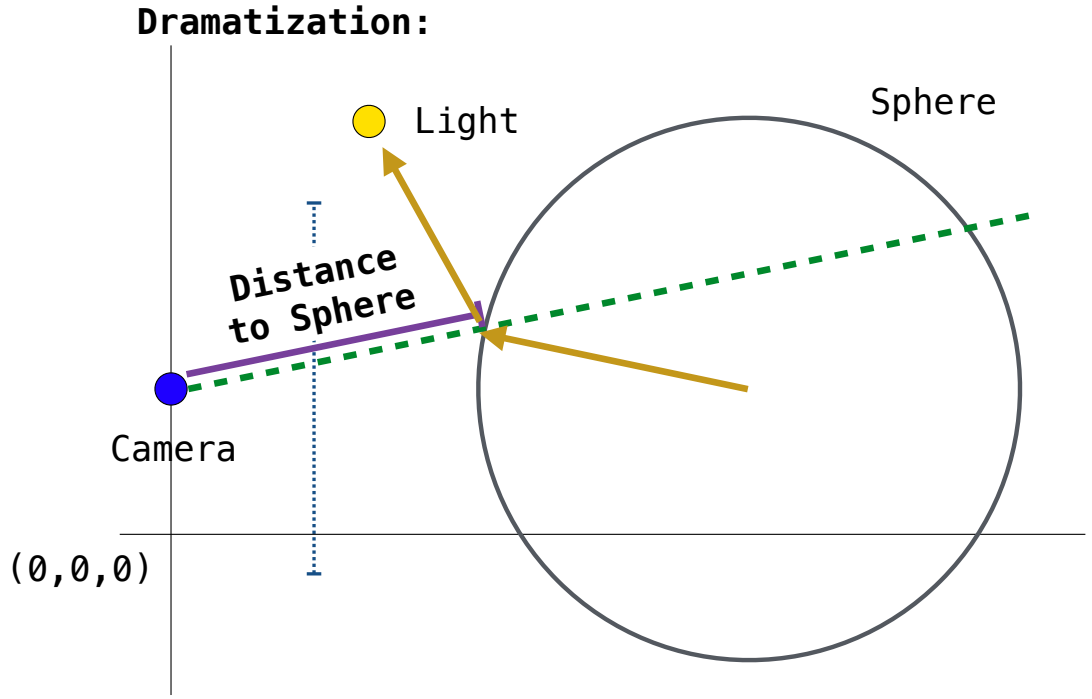
Pixels

(Demo)

Ray Tracing

Ray Tracing

A technique for displaying a 3D scene on a 2D screen by tracing a path through every pixel



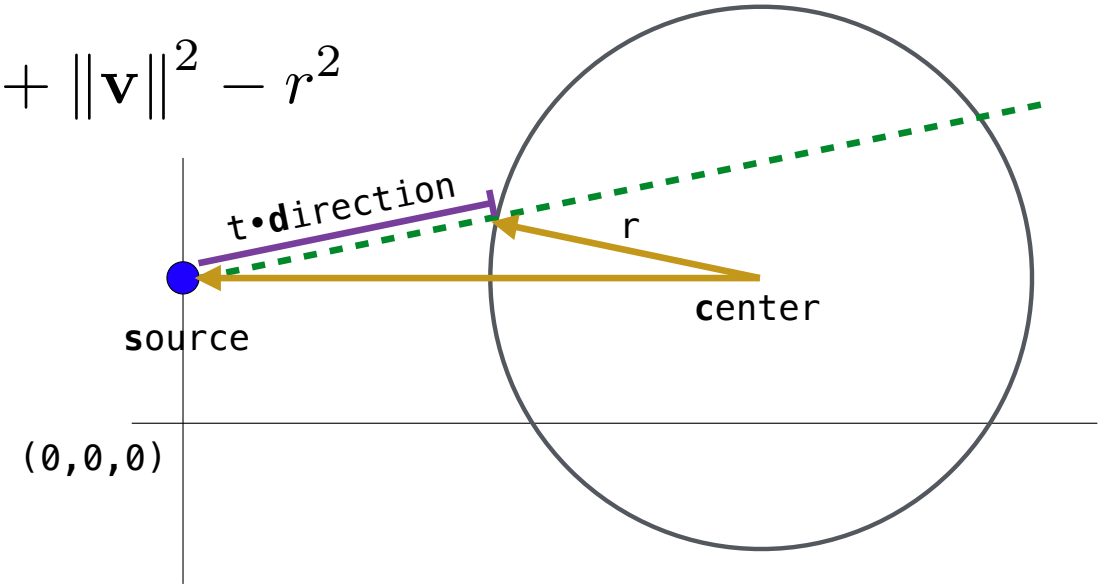
Distance from a Source to a Sphere

$$r^2 = \|\mathbf{s} - \mathbf{c} + t\mathbf{d}\|^2$$

$$0 = \|t\mathbf{d} + \mathbf{v}\|^2 - r^2$$

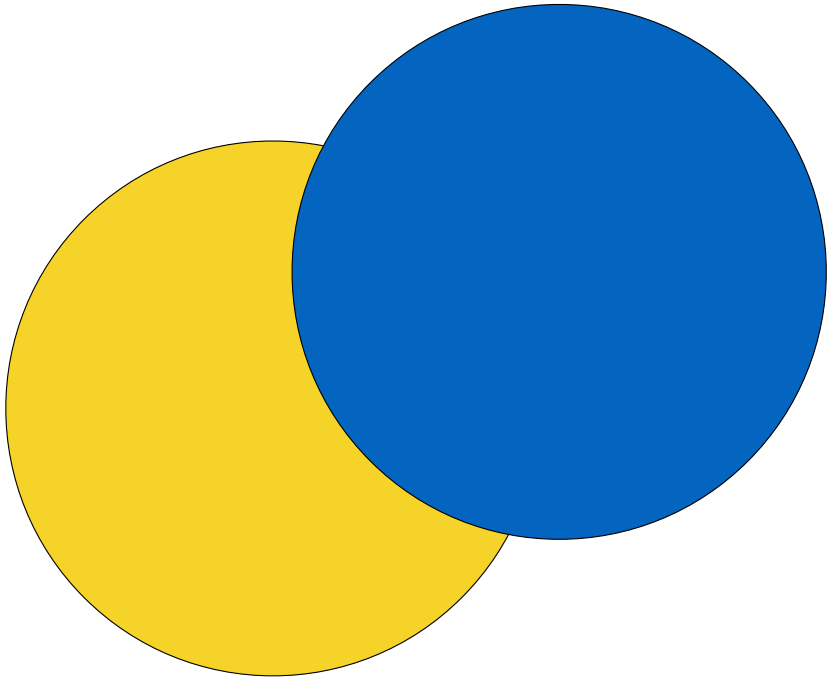
$$0 = t^2 \|\mathbf{d}\|^2 + 2t(\mathbf{v} \cdot \mathbf{d}) + \|\mathbf{v}\|^2 - r^2$$

$$\mathbf{b}$$



(Demo)

Multiple Spheres

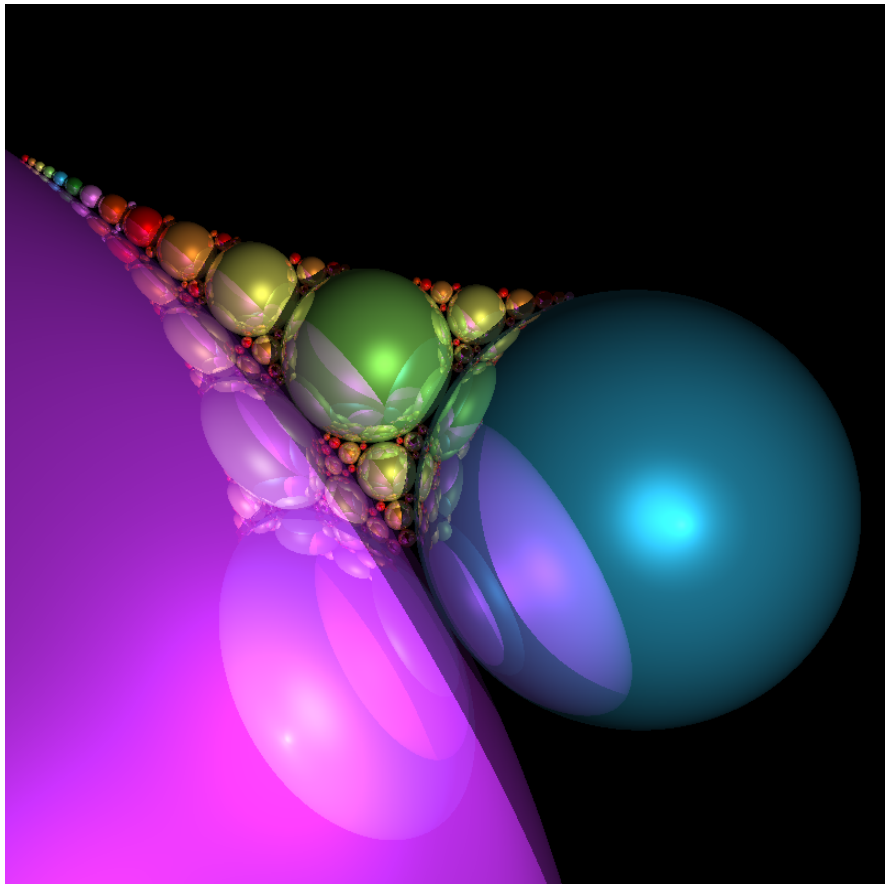


Compute distance to each sphere

Pixel color from the closest sphere

(Demo)

Reflections



Color is a mixture of the sphere & reflection

The **source** of a reflection is the surface of the sphere, instead of the original camera

(Demo)