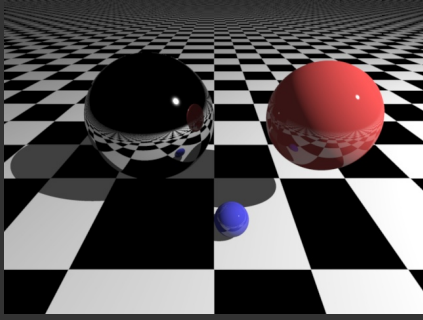


CSE168: Rendering Algorithms Ray Tracing



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Practical details

- Assignment 0 due tonight
- Results to cse168-turnin@graphics.ucsd.edu
- New TA next two weeks (Toshiya Hachisuka)
- See webpage for any changes
- http://graphics.ucsd.edu/courses/cse168_s08/

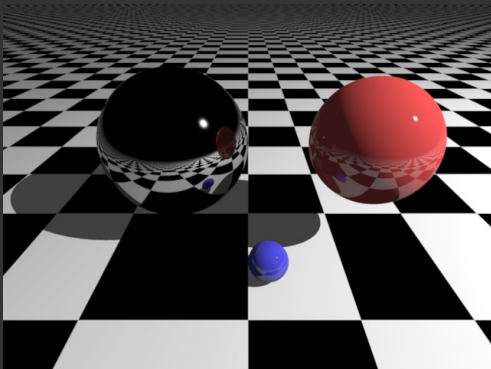
Last time

- Line drawing
- Triangle rasterization
- Z-buffering

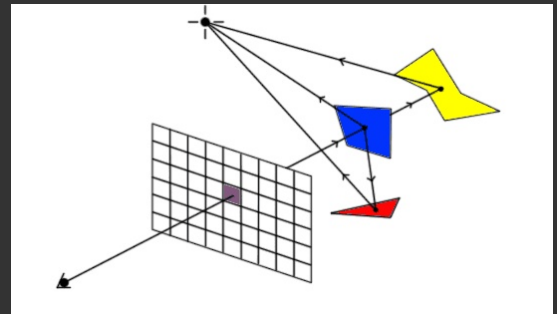
Today

- Ray tracing algorithm
 - ★ Generating primary rays
 - ★ Intersecting a sphere
- Assignment 1

A Ray Traced Image

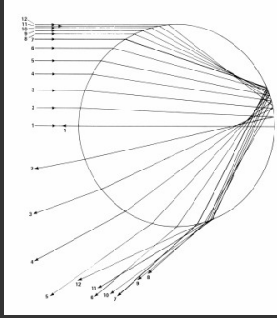


The Ray Tracing Algorithm



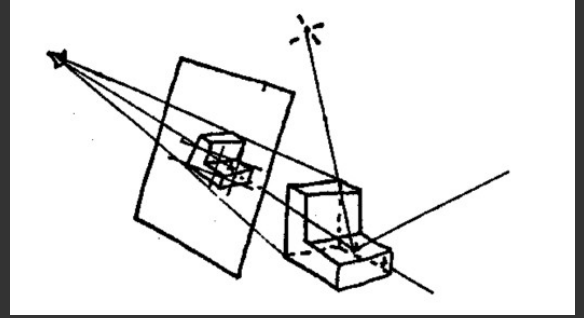
Source Wikipedia

The Origins of Ray Tracing



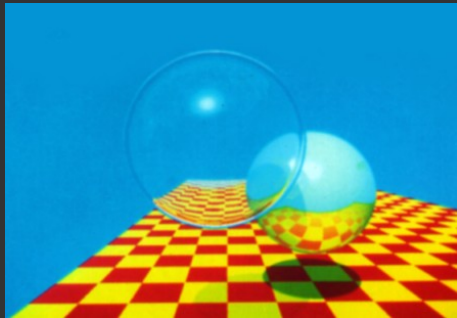
(Descartes 1650)

The Origins of Ray Tracing



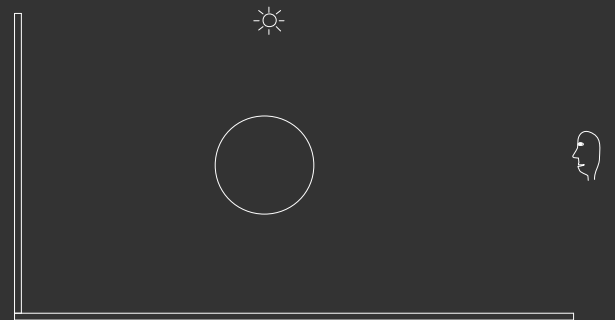
(Appel 1968)

The Origins of Ray Tracing

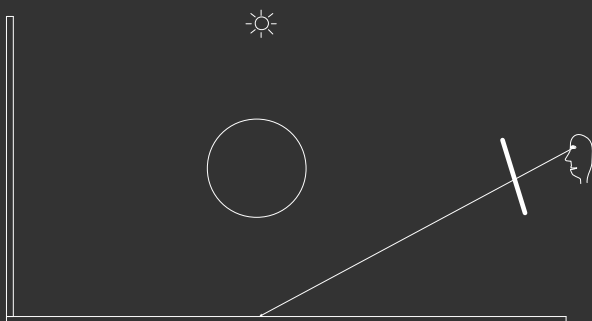


(Whitted 1980)

A Simple Test Scene



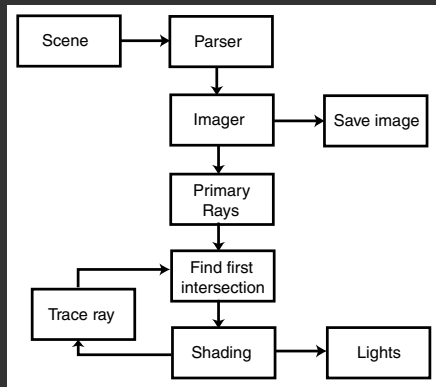
The Primary Ray



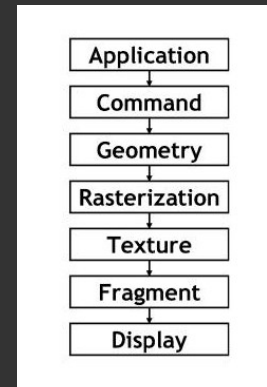
Ray Intersections

Find the intersection between all objects in the scene and a given ray.

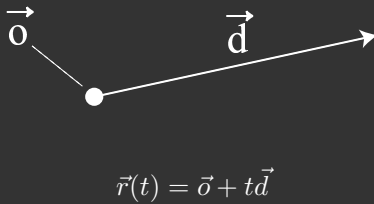
Ray tracing pipeline



OpenGL pipeline



A Ray



Ray tracing pseudocode

```
ray_trace() {  
    parse scene description  
  
    for each pixel  
        make primary ray  
        trace( primary ray )  
}
```

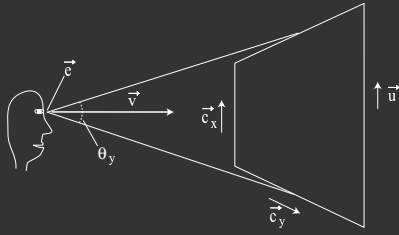
Ray tracing pseudocode

```
trace( ray ) {  
    find first intersection with scene objects  
  
    shade( hit )  
}
```

Data structures

```
class object {  
    bool intersect( ray );  
}  
  
class light {  
    void illuminate(...);  
}  
  
class ray {  
    vector origin  
    vector direction  
}
```

Imaging



- Specifying the view
- Generating primary rays

Ray Tracing Spheres

Next time

- Ray-object intersections