



Lecture 'Computer Graphics'

RAY TRACING

An Introduction

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How Does One See?

Let's start at the very beginning.

Ask your 5-year-old self how vision works.

What is Ray Tracing?

Let's start at the very beginning.

Brainstorm!

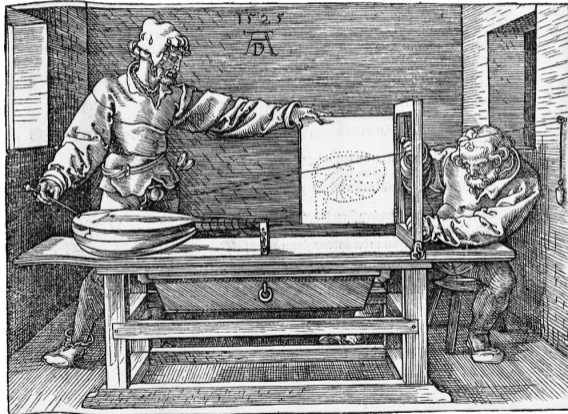


Albrecht Dürer: Unterweysung der Messung mit dem Zirckel und Richtscheyt in Linien Ebenen unnd gantzen corporen. 1525.

What is Ray Tracing?

Let's start at the very beginning.

Brainstorm!



Albrecht Dürer: Unterweysung der Messung mit dem Zirckel und Richtscheyt in Linien Ebenen unnd gantzen corporen. 1525.

What is Ray Tracing?

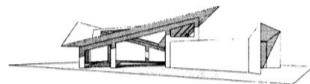
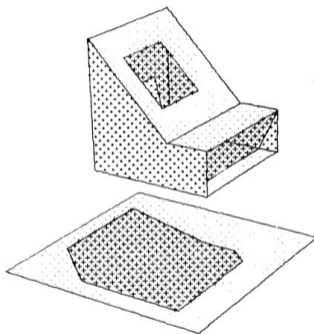
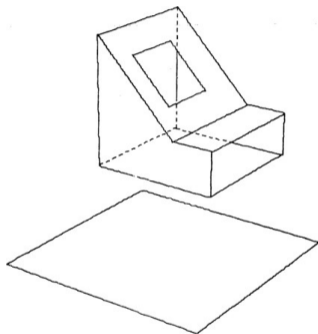
Let's start at the very beginning.

Definition-y:



First Ray Casting¹

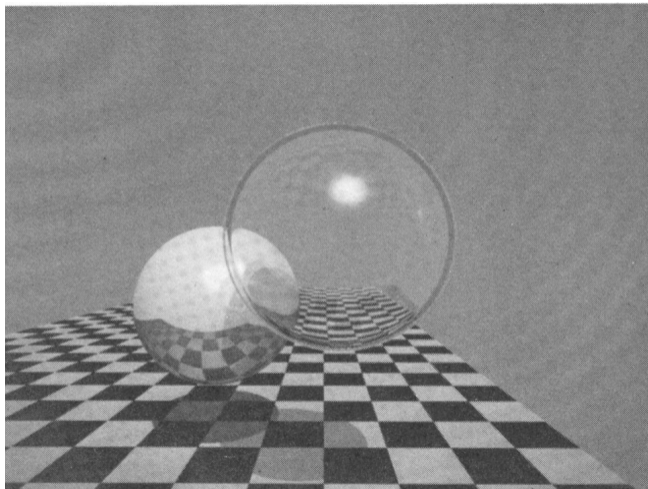
Arthur Appel, 1968



¹Arthur Appel: *Some techniques for shading machine renderings of solids*. In Proc. Spring Joint Computer Conf., 1968.
DOI: 10.1145/1468075.1468082

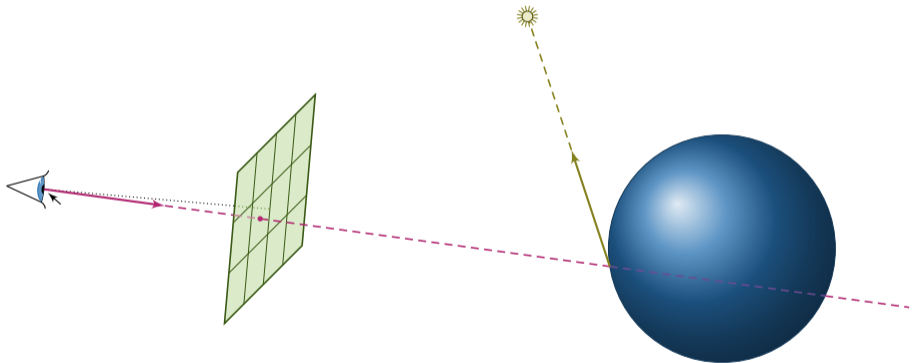
First Recursive Ray Tracing¹

J. Turner Whitted, Bell Labs, 1980.



¹Turner Whitted: *An improved illumination model for shaded display*. In Commun. ACM, 23(6), 1980.
DOI: 10.1145/358876.358882

How Does Ray Tracing Work?

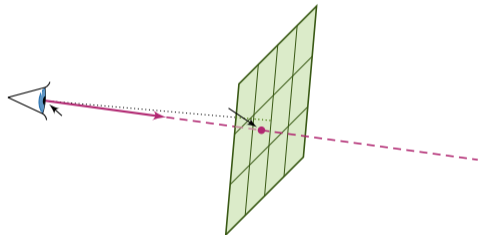


What Data Types Do We Need?



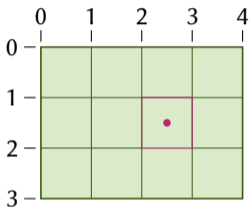
How to Generate Rays?

- ▶
- ▶
- ▶
- ▶
- ▶
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- ▶
- ▶
- ▶



How to Generate Rays?

Image:

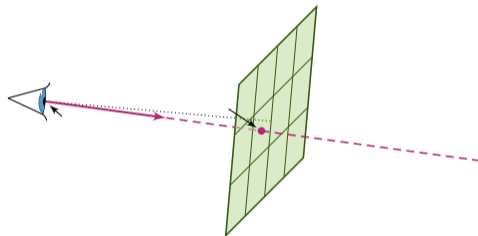


Pixel:
Sample:

Further Data Type:

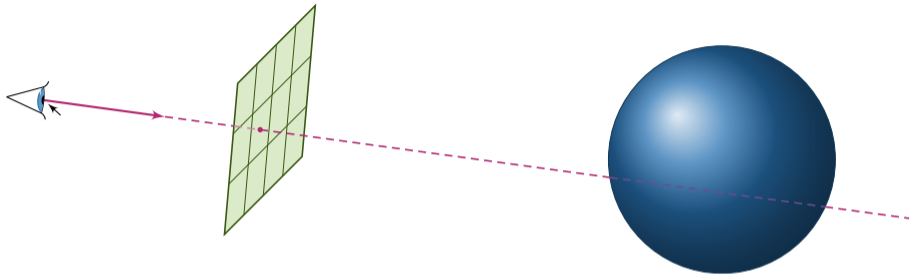


Camera:



Canonical
Screen Coordinate System:

Find Intersections



- ▶
- ▶
- ▶

Determine Pixel Color


If intersection:

If no intersection:

Summary



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