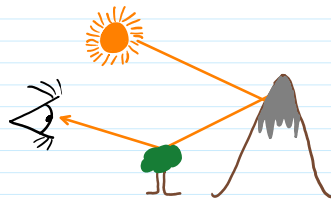


How is an image formed in general?



In computer graphics,

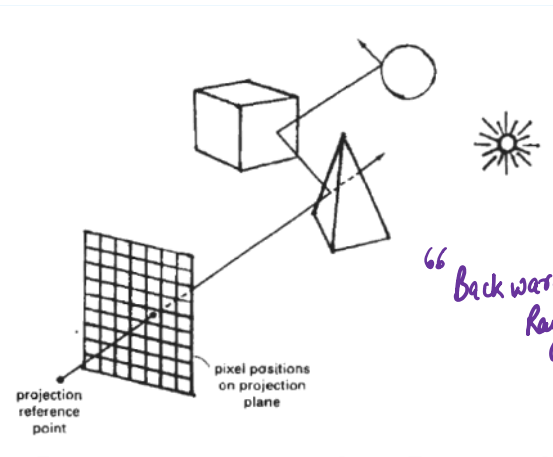
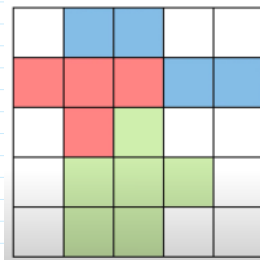
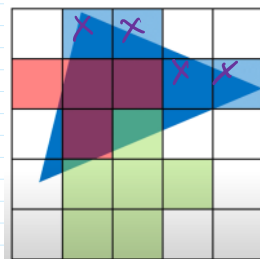
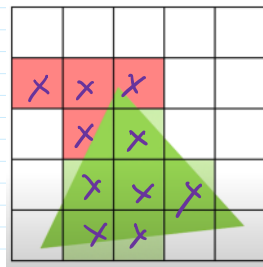
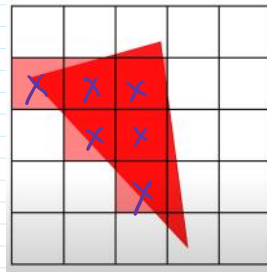


Figure 14-49
Tracing a ray from the projection reference point through a pixel position with multiple reflections and transmissions.

Rasterization v/s Ray Tracing :-

Rasterization

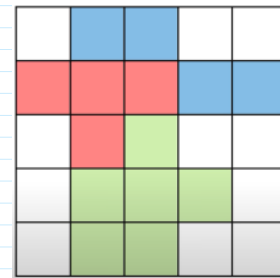
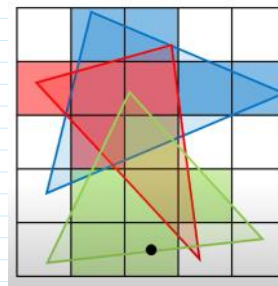
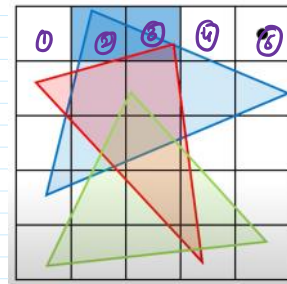
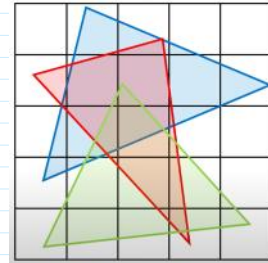
for each object $\{$
 for each pixel
 $\{$
 $\}$
 $\}$



What pixels does geometry cover?
 Test if pixel is inside triangle.

Ray Tracing

for each pixel $\{$
 for each object
 $\{$
 $\}$
 $\}$



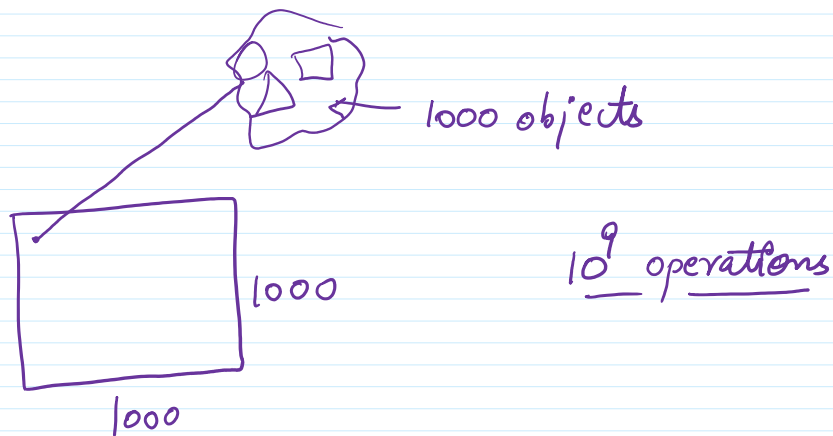
What is visible along this ray?
 Ray-triangle intersection

Test if pixel is inside triangle.

Stream triangles
(each stream test pixels)

Ray-triangle intersection

Stream rays
(each stream test intersections)



Three fundamental questions related to ray tracing

- ① Draw shadows?
- ② Mirror reflections?
- ③ Refraction?

"Ray tracing is the technology of the future
and always will be!"

— David Kirk, NVIDIA.

A Single NVIDIA RTX™ (a.k.a. NVIDIA Turing™) Card

From the 2018 Star Wars short *Reflections*, produced by Epic Games and built in Unreal Engine in collaboration with IMAX and NVIDIA



In 1980,

Graphics and
Image Processing

J.D. Foley
Editor

An Improved Illumination Model for Shaded Display

Turner Whitted
Bell Laboratories
Holmdel, New Jersey

To accurately render a two-dimensional image of a three-dimensional scene, global illumination information that affects the intensity of each pixel of the image must be known at the time the intensity is calculated. In a simplified form, this information is stored in a tree of "rays" extending from the viewer to the first surface encountered and from there to other surfaces and to the light sources. A visible surface algorithm creates