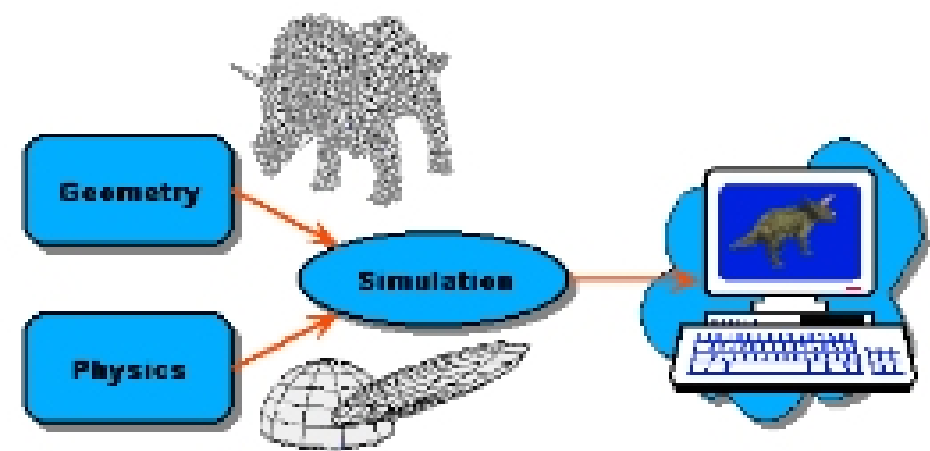


Image-Based Modeling and Rendering

Thomas Funkhouser
Princeton University
COS 426 Guest Lecture
Spring 2003

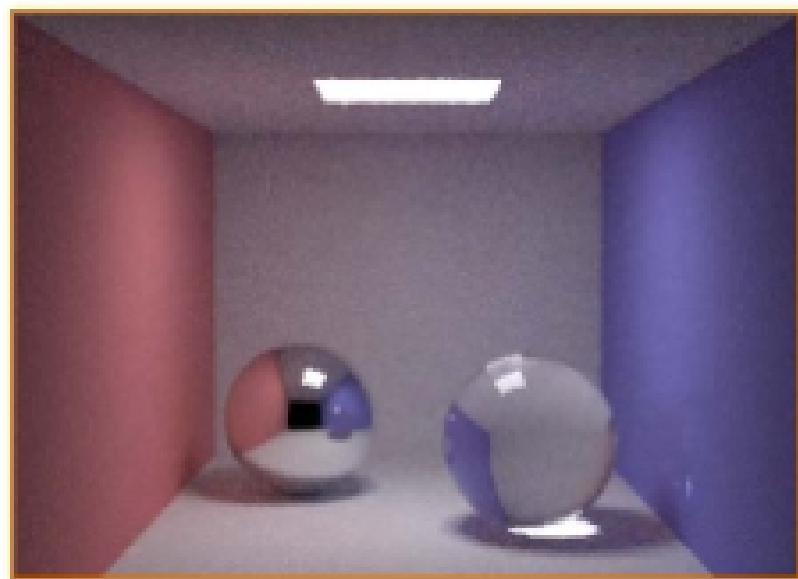


Traditional Computer Graphics



#tqvbtq

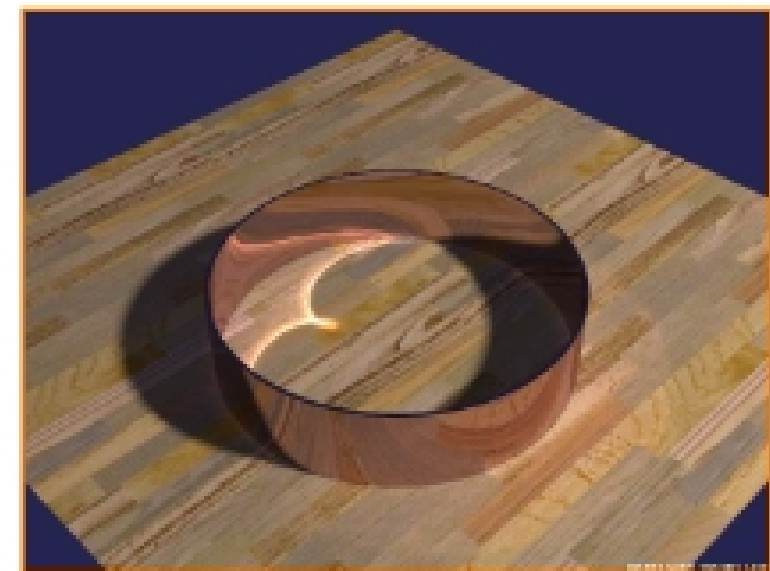
When Does This Pipeline Work?



How would you model and render this scene?

#tqvbtq

When Does This Pipeline Work?



How about this one?

#tqvbtq

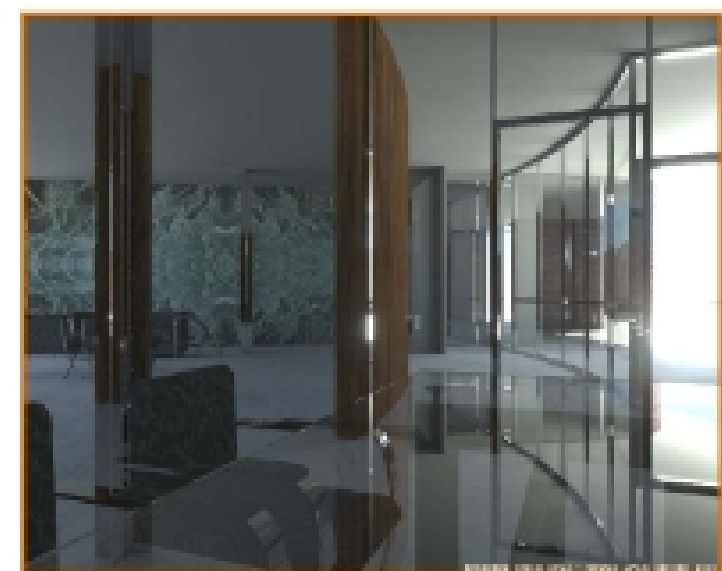
When Does This Pipeline Work?



.. and this one?

#tqvbtq

When Does This Pipeline Work?



What about this one?

#tqvbtq

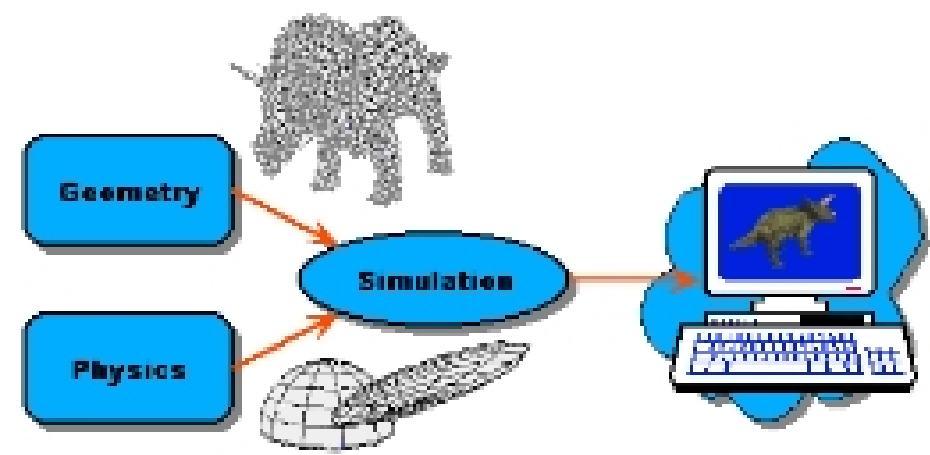
When Does This Pipeline Work?



How about this one?

Crayth,

When Does This Pipeline Work?



When doesn't this pipeline work?

IP Inst,

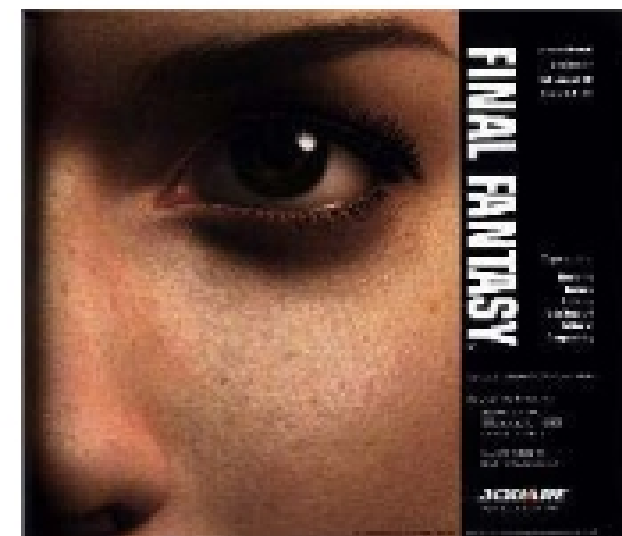
Geometric Modeling



It is hard to create 3D meshes for complex objects ...

Qyr,

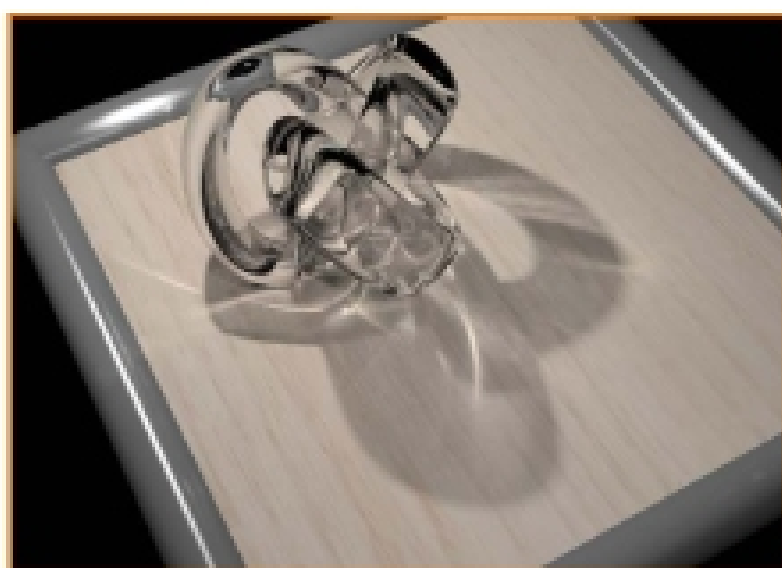
Reflectance Modeling



It is hard to acquire good BRDFs for complex surfaces ...

ALsch,

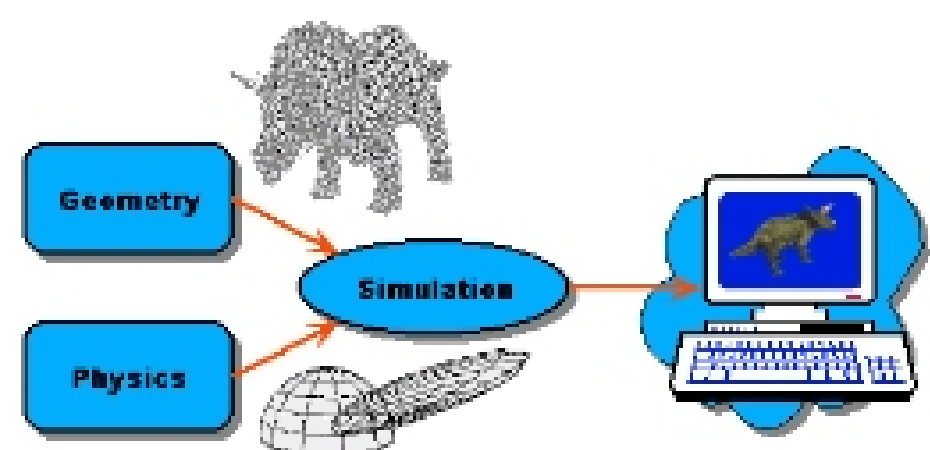
Light Transport Simulation



It is hard to compute all light paths for complex illumination ...

UnghtSch,

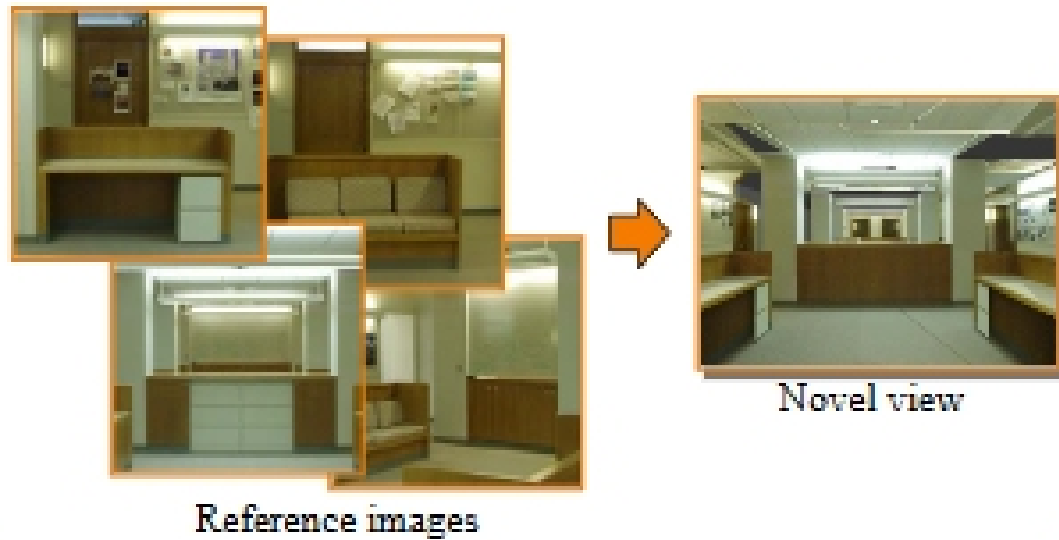
What Else Can We Do?



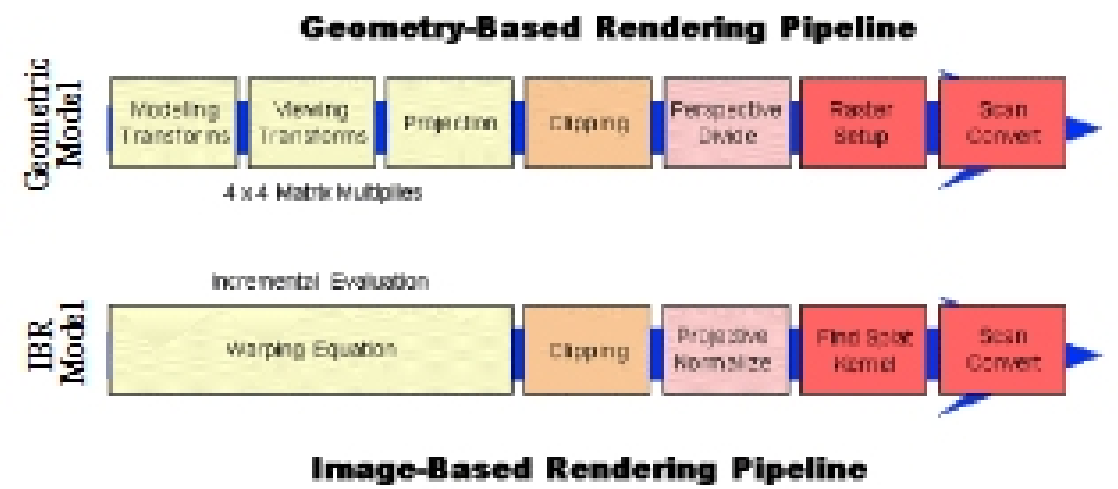
IP Inst,

Image-Based Rendering (IBR)

- Model scene as set of reference images
- Render novel views by resampling pixels



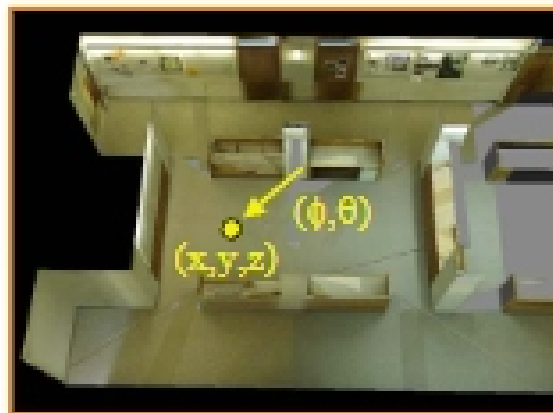
IBR Rendering Pipeline



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Image-Based Representations

- Plenoptic function (7D):
 - Describes the radiance traveling along a ray
 - to/from any point (x, y, z) ,
 - in any direction (ϕ, θ) ,
 - at any frequency (λ) ,
 - at any time (t)



$$F(x, y, z, \phi, \theta, \lambda, t)$$

Image-Based Representations

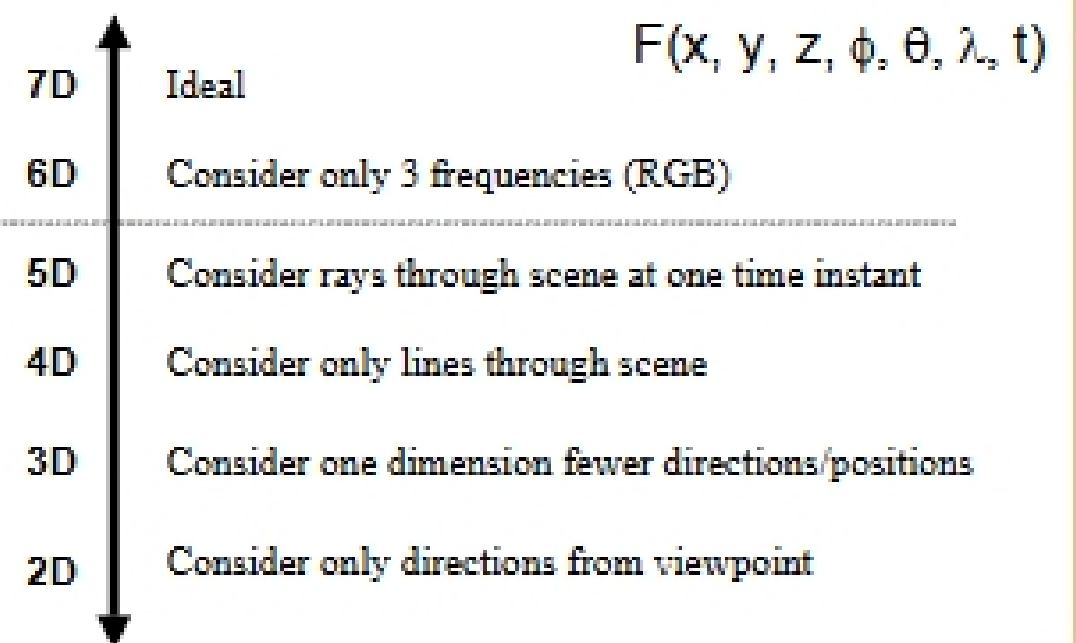


Image-Based Representations

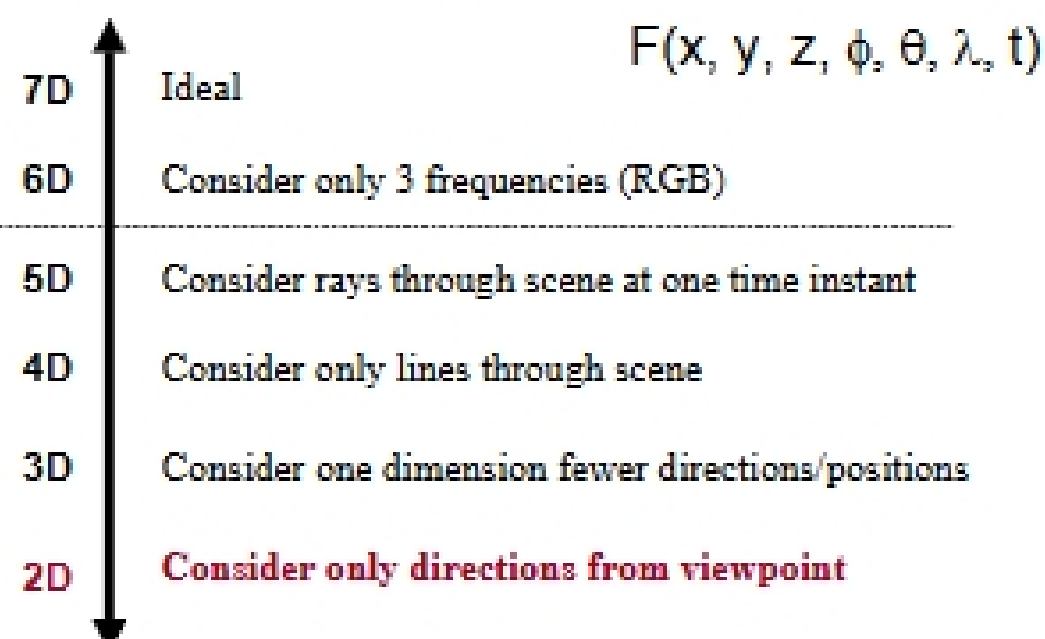


Image Panoramas



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