Comparing Global Illumination Renderers

Jan Walter - The Mill (London)
Books

- Advanced RenderMan
- Production Rendering
- Writing mental ray Shaders
- Physically Based Rendering
- Rendering with Radiance
Phases

- Reyes
  - Shading language (RSL, C/C++, Meta/OSL)
  - SIMD (Single Instruction, Multiple Data)
- Raytracing techniques
  - Reflection / refraction
  - Ambient occlusion
- HDR (High Dynamic Range)
- GI (Global Illumination) algorithms
Reyes

- Renders Everything You Ever Saw
- Smooth, curved surfaces
- Surface texturing
- Motion blur
- Depth of field
Raytracing Techniques

- Reflections vs. environment lookups
- Refractions
  - IOR (index of refraction)
- Acceleration structures
  - Octree
  - BSP (binary space partition)
  - K-d tree (k-dimensional tree)
- Ambient Occlusion
Global Illumination

- Radiosity (LD\*E, purely diffuse surfaces)
- Photon Mapping (biased, caustics)
- Path Tracing (soft shadows, caustics, AO)
- Metropolis Light Transport (MLT) - quicker
- Final Gather (mental ray world)
- Irradiance Maps (V-Ray world)
- Light Caches (V-Ray world)
Radiosity
Path Tracing

- http://madebyevan.com/webgl-path-tracing/
- Made by Evan Wallace in 2010
GI Renderers

- Radiance - http://radsite.lbl.gov/radiance/
- Arnold - http://www.solidangle.com/
- V-Ray - http://www.chaosgroup.com/
- Maxwell - http://maxwellrender.com/
- Indigo - http://www.indigorenderer.com/
- iray / mental ray / neuray - irayrender.com
- Luxrender - http://www.luxrender.net/
- Octane - http://www.refractivesoftware.com/
Radiance
V-Ray

- www.spot3d.com
- www.francescolegrenzi.com
Maxwell

- First tests of the Radiance gallery back in 2005
Indigo

- Without MLT
- With MLT

model courtesy of Anders Lejczak

http://www.indigorenderer.com/features/MLT
iray

Luxrender

- Austrian Emperor Crown by Martin Lubich
  - http://www.loramel.net/blender_minutes/2009/03/austrian-imperial-crown-finished/
Octane Render
Very Short Look at RIB

Rendered with 3Delight ( http://www.3delight.com )

shaderdl -o myImager.sdl myImager.sl
shaderdl -o myLight.sdl myLight.sl
shaderdl -o mySurface.sdl mySurface.sl
shaderdl -o myDisplacement.sdl myDisplacement.sl
renderdl -d shadertest.08.rib
Primitives & CSG

there are 31 lights and 2748 objects:

- 135 polymeshes
- 127 boxes
- 1189 cylinders
- 153 cones
- 1094 spheres
- 50 disks

- using Constructive Solid Geometry
- vs.
- modelling intersections of e.g. spheres or cylinders
Light Emitters

- Light emitting sphere in room
- Sun light shining onto the floor (bright spot)
- Blueish skylight
- Reflection of indoor light bulb in window
- Caustics?
Fake Specular vs. Refl./Refr.

- Phong
- vs.
- Blinn-Phong

Caustics
Simple Scene

- Light emitting geo vs.
- Sun & sky / ground
- Tonemapping vs.
- Physical camera
- One button render vs.
- Faking effects *but*
- Faster render times
Cafe Scene – Change Lights

Point (with radius) and area lights vs. light emitting geometry
Gallery Scene
Web Sites

- http://janwalter.blogspot.co.uk/
- http://www.janwalter.com/...
- ../RadianceVsYouNameIt/radiance_vs_younameit.html
- ../Download/PDF/fmx_2012_slides.pdf
- https://bitbucket.org/wahn/radiance_vs_younameit
- https://bitbucket.org/wahn/blender-add-ons
  - io_scene_rad: Radiance importer (exporter?)
  - io_scene_ass: Arnold exporter
  - io_scene_rib: RenderMan exporter