




# Hydra Renderer

Quick Start  
v1.7c



# Installation

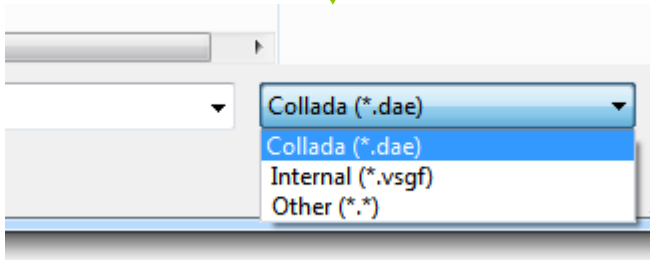
- You will need:
  - CUDA 5.5 or higher
    - Reboot your machine after CUDA installation
    - Otherwise hydra.exe may not find appropriate CUDA DLL
    - But if you run hydra.exe from the command prompt reboot is not needed
  - Any CUDA enabled GPU
    - CUDA Compute Capability 1.1 is recommended
    - Necessary for photon mapping and partially IC
    - ~1Gb video memory is recommended
  - Please visit
  - <https://developer.nvidia.com/cuda-downloads>

# Scene export

- ◉ Autodesk Max 2012/2013
- ◉ Use “HydraPlugin.dlr”, it works!
  - ◉ Please see “plugin\_manual.pdf”
- ◉ You may also try
  - ◉ FBX COLLADA
  - ◉ OpenCollada (usually works better)

# Open scene from file

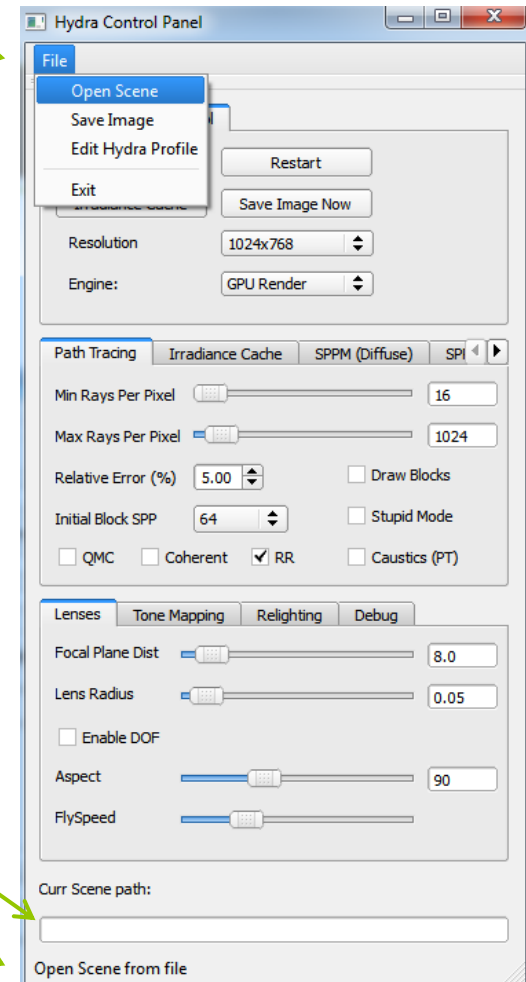
Don't forget to select right file type



Current path displayed here

Prompts displayed here

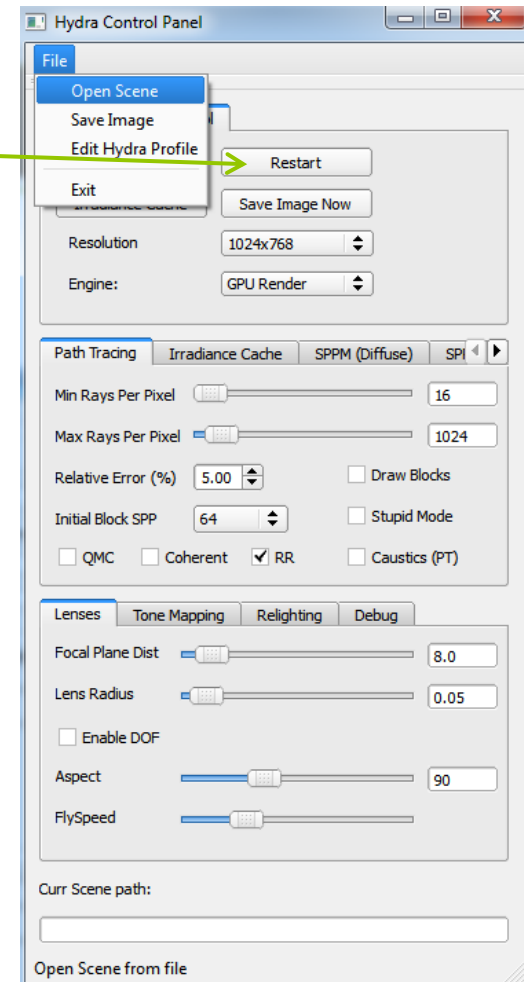
**Don't use unicode path!**



# Starting renderer

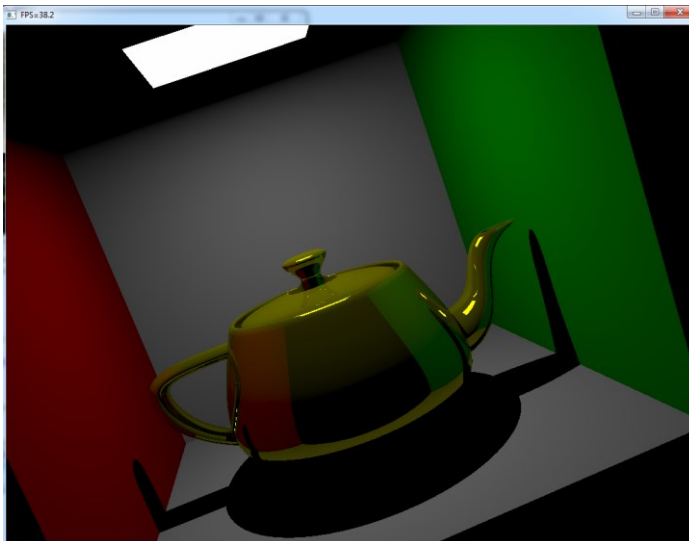
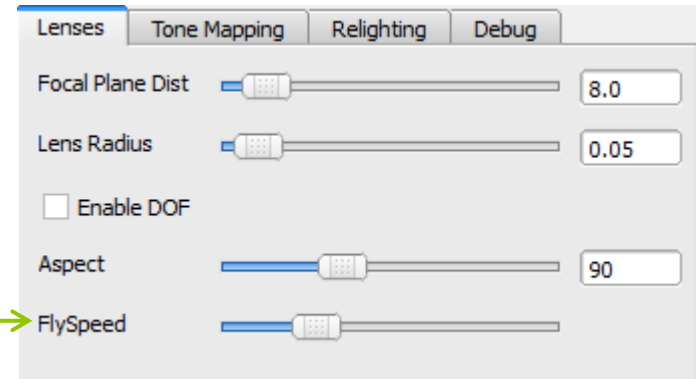
Press “Restart”

If nothing happened run hydra.exe  
from the command prompt  
after “File->Open Scene”



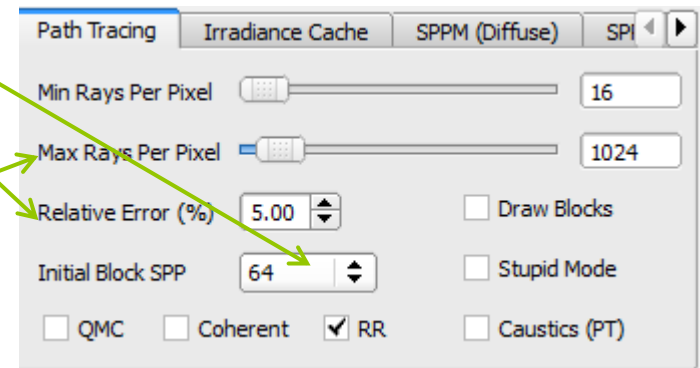
# Move over the scene

- W,A,S,D (like in 3D shooters)
- R,F (up and down)
- Q,E (rotate)
- 'Shift' to fly faster
- You may also change fly speed here →



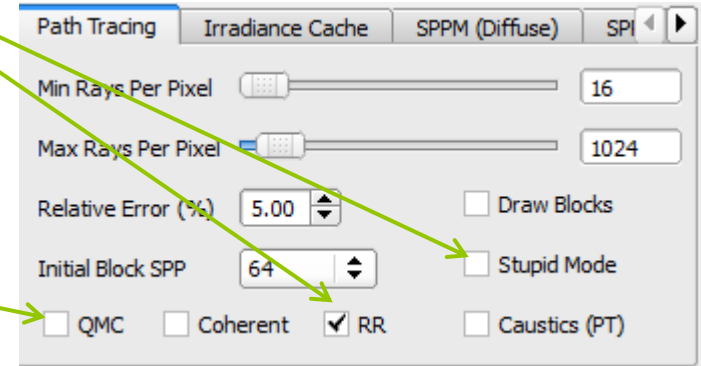
# Path Tracing

- Progressive Mode (default)
- Production Mode
  - Path Tracing -> Set “Initial Block SPP” to 64 or higher
- Quality control
  - Set relative Err for HDR image
  - But not more than max samples
- When change Path Tracing settings
  - You’ll see the effect when run Path Tracing again



# Path Tracing (advanced)

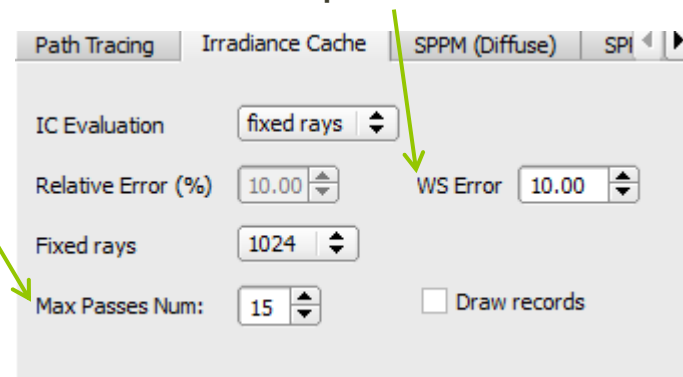
- Stupid Mode
  - Stupid Mode will not use any shadow rays
- Per Warp Russian Roulette (RR)
  - Disable if see small rectangle blocks
  - Good for performance on scenes with strong indirect lighting
- Quasi Monte Carlo (QMC)
  - It is actually “Coherent QMC”
  - Run faster but gives banding
  - Use it if you need extra quality and very high maximum number of samples are selected





# Irradiance Caching

- Use it manually by pressing “Irradiance Cache”
- Then press “Path Tracing” to render final image
- Please reduce manually maximum rays per pixel for Path Tracing if it hangs too long when IC computed
- Reduce passes number or increase World Space Error if there too many records



# SPPM (Caustics)

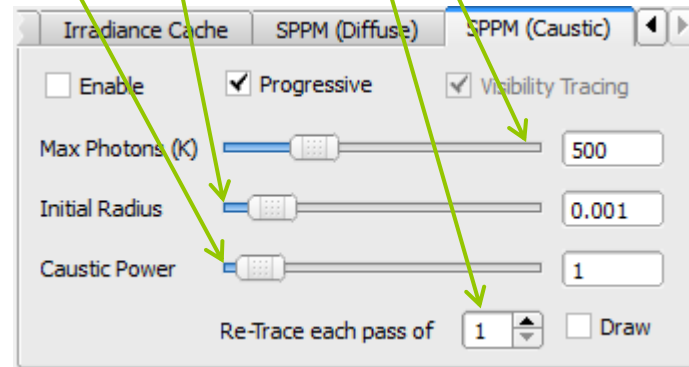
- Stochastic Progressive Photon Maps (SPPM)
  - Should be used with Progressive Path Tracing mode
  - Only single light is supported correctly for now
  - You may disable other lights with like this:

```
<general>  
  <type> spot </type>|  
  <disable_for_photonmap> 1 </disable_for_photonmap>  
</general>
```

- Run SPPM for caustics:
  - SPPM (caustics) -> Check “Enable” checkbox
  - Please increase manually minimum rays per pixel for Path Tracing up to 128 – 256
  - Press “Path Tracing”

# SPPM (Caustics)

- Balance between amount of photons and gather rays
- Balance between noise and bias
- Controls caustic brightness



# SPPM (Diffuse)

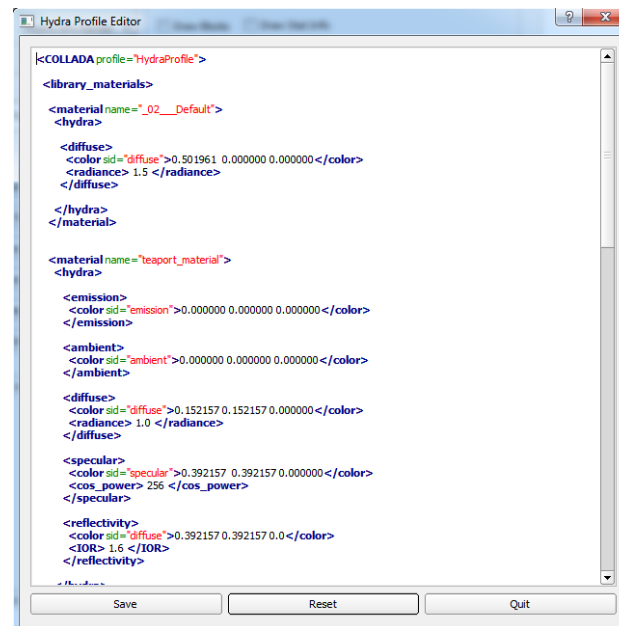
- Don't use it
  - It is made for testing photon maps in general
  - But of course you can try it
- Run SPPM for the whole lighting:
  - SPPM (diffuse) -> Check "Enable" checkbox
  - SPPM (diffuse) -> Check "Progressive" checkbox
  - Please increase manually minimum rays per pixel for Path Tracing up to 256-512
  - Set both store and gather bounces to 0
  - Press "Path Tracing"

# Final Gathering

- To Enable Final Gathering:
  - Check SPPM(Diffuse) -> Enable
  - Don't check SPPM(Diffuse) -> Progressive
- Press SPPM(Diffuse) -> Single Pass
  - After that you may change "Gather Bounce" to 0 to see what happened
  - It is recommended to manually tweak gather radius to balance between coverage and performance
  - Change "Gather Bounce" back to 1
- Run Path Tracing or Irradiance Cache
  - Final Gathering enabled when "Gather Bounce" equal to 1

# Hydra materials and lights

- File->Edit Hydra Profile
- Documentation located here
  - <http://ray-tracing.ru/articles235.html> (rus)
  - Samples can be found in 'lessons' folder





# Hydra materials and lights

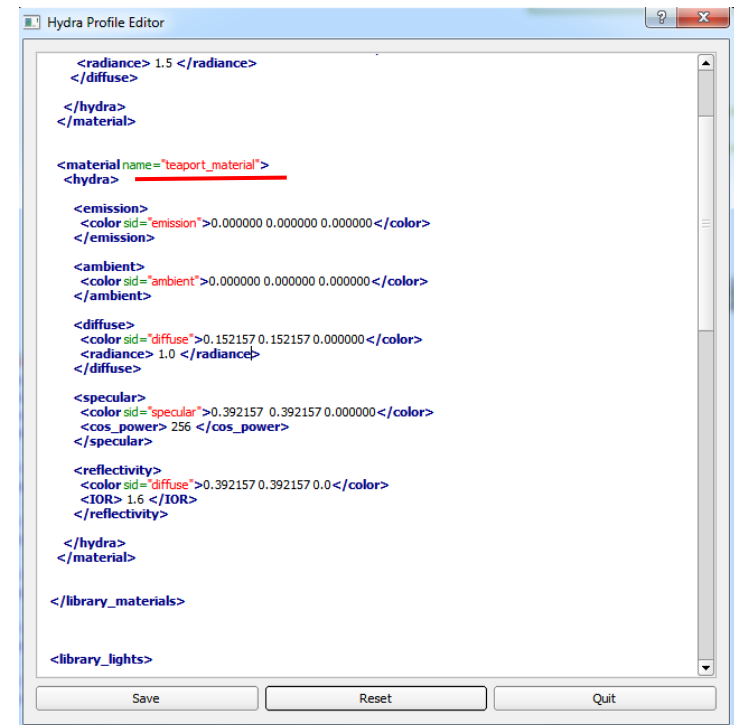
- The 'Hydra profile' mechanism was created to replace any 'standard' materials and lights with the internal Hydra materials and lights
- But you also can add new lights to the scene in the same way
- To replace material or light you need to specify appropriate **same** material/light name
- When adding light you may specify any light name

# Hydra materials and lights

- Example of replacing:  
Collada file:

```
<effect id="teaport_material-fx" name="teaport_material">
  <profile_COMMON>
    <technique sid="standard">
      <phong>
        <emission>
          <color sid="emission">0.000000 0.000000 0.000000 1.000000</color>
        </emission>
        <ambient>
          <color sid="ambient">0.000000 0.000000 0.000000 1.000000</color>
        </ambient>
        <diffuse>
          <color sid="diffuse">0.392157 0.392157 0.000000 1.000000</color>
        </diffuse>
        <specular>
          <color sid="specular">0.392157 0.392157 0.000000 1.000000</color>
        </specular>
        <shininess>
          <float sid="shininess">256.000338</float>
        </shininess>
        <transparency>
          <float sid="transparency">0.000000</float>
        </transparency>
      </phong>
    </technique>
  </profile_COMMON>
</effect>
```

hydra profile:



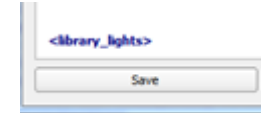


# Hydra materials and lights

- You don't have to seek for material names in Collada files or 3ds max;
- After first load:
  - **hydra\_profile\_generated.xml** have all names and current parameters
    - You may use this file as initial template
    - it located in the scene folder
  - 3ds max plugin also generates **hydra\_profile.xml**
    - This file can be uses as source or starting point for editing materials and lights
    - Located in "C:/[Hydra]/pluginFiles/"

# Hydra materials and lights

- When you press “Save button”



- All material and lights parameters will be reloaded immediately!
- You don't have to press “restart” unless you changed textures, or add new lights.
- Also you have to press “restart” if you changed position of spherical, area or mesh light (because BVH have to be reconstructed)
- **hydra\_profile\_generated.xml** have all names and current parameters

# Run Hydra without GUI

- Run cmd line:
  - test\_app.exe “path\_to\_my\_scene.dae” “path\_to\_hydra\_profile.xml”
- Move: **W,A,S,D**, **R,F**, (up & down) **Q,E** (“Roll”)
- Path tracing : **P**
  - Enable/Disable diffuse bounces: **C**
  - Draw stat and blocks: **N,M**
- Irradiance Cache : **I**
- Trace depth: **1,2,3,4,5**
- Shadows : **Z**
- Compute images for relighting: **O**

# “Other” hotkey list

- Shift+B – Draw IC records
- Shift+R – Compute Radiance Cache
- Shift+P – Trace Photons (a portion)
- Shift+O – Trace Caustics Photons (a portion)
- Shift+N – Draw diffuse photons photons
- Shift+M – Draw caustic photons photons
- Shift+(3,4,5) – Save camera
- (F3,F4,F5) – Load camera

Looks like this

