Tutorial for Kray 1.7

> by Jure

- > material: <u>http://www.vizualizacije.com/Kray_tut/tutorial_1.7-1.rar</u>
- > source: http://www.Kraytracing.com/forum/viewtopic.php?t=411

Step 1

First we need to set LightWave ray trace flags to work nicely with Kray's GI. Go to Render Globals panel and check that you have following options right.

Sender Globals	
Range Type	Single 💌
First 1 Last 60	Step 1
🗸 Auto Frame Advance	Frame End Beep
Preview	320 × 240 💌
Render Display	Image Viewer FP 🔹
	Enable VIPER
Resolution	VGA (640 x 480) 🔹 💌
Multiplier	100 %
Field Rendering	Off
Width 640	Aspect 1.0
Height 480	Frame 0.5906"
Limited Region Off 🛛 🔻	Segment Memory Limit
Frame Aspect Ratio: 1.333	Segments: 1
Overlay Off	
Render Filtering Global	Illum Output Mask
Render Mode	Realistic 💌
✓ Ray Trace Shadows	✓ Ray Trace Reflection
✓ Ray Trace Transparency	✓ Ray Trace Refraction
	Depth Buffer AA
Ray Recursion Limit	24
Light Intensity	100.0 % 🔸 E
Flare Intensity	100.0 % 🕶 E
✓ Lens Flares	✓ Shadow Maps
Noise Reduction	Volumetric Lights
Multithreading	4 Threads 💌

This will ensure that GI bounces correctly through transparent surface, casts proper shadows and calculates reflections right.

🐕 Sun Spot		<u> </u>
Distance	1 km	
Second	0	•
Minute	22	•
Hour	15	•
Day	2	•
Month	June	•
Year	2008	•
Time Lapse	0.0	
Preset	San Francisco	-
Longitude (E)	-122.42 °	
Latitude	37.78 °	↔ E
Time Zone	-8	•

The next thing I usually do is add motion modifier SunSpot to my main Sun light so that I get correct position of the sun. This also places sun 1km away which we'll use later for Inverse Distance ^ 2 falloff distance in light panel.

Now open your lights properties and set your sunlight to Spot light with Inverse Distance ^ 2 fallof distance of 1km (the distance from Sunspot modifier). Also increase Light Intensity to 150% or 200% or more depending on your taste.

Kight Properties	
Clear All Lights	Lights in Scene: 1
Ambient Color	255 255 255 E
Ambient Intensity	0.0 % E
Current Light	Light
Light Type	Spotlight 💌
Light Color	255 246 223 E
Light Intensity	150.0 % 🕈 E
Intensity Falloff	Inverse Distance ^ 2 🛛 🔻
Range/Nominal Distance	1 km 🔸 E
Basic Shadows Object Affect Diffuse Affect OpenGL	s Affect Specular Affect Caustics
Lens Flare	Lens Flare Options
Volumetric Lighting	Volumetric Light Options
Linear/Area Light Quality	4 🗘 E
Spotlight Cone Angle	2.0° 🕶 E
Spotlight Soft Edge Angle	0.55° 🔶 E
Projection Image	(none)

Now our scene is still lacking some global illumination from sky so we'll add sky light. Hopefully you have <code>SkyLight</code> plugin installed which is a wonderful plugin from Denis Pontonnier (http://perso.orange.fr/dpont/plugins/Textures.htm). I usually set my sky to values as you see in screenshot below.

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When you open up Kray you'll be presented with general setup screen.

First we'll do quick preview of the scene. Select Low preset from dropdown list which will set all presets on the other tabs to low. This should give us quick preview of light and mood. Also make sure you selected Photon mapping and Cache irradiance is checked. Photon mapping with cache irradiance is the fasted method to render your GI scenes and you're not likely to ever use any other mode except for testing or preview.

I've also turned Gamma parameter to 1.6 to make room a bit brighter since 1.0 makes it very contrasty.

Tutorial for Kray	1.7	TUTORIAL
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Kray rendering General Photo	g options
Render preset	Set
Diffuse model	Photon mapping Caustics Cache irradiance
GI mode	Independent 💌
Camera mode	Perspective
Pixel order	Progressive 💌
	Override surfaces
DOF target	(none) Color 200 200 200
Output file(s)	krav render.ong
Format	BMP PNG TGA HDR
Tone map	Gamma 🔻
Parameter	1.6 Exposure 1.0 HSV mode
Header cmds	irradianceblurgamma 0; Add 👻
Tailer cmds	Add
Render frame	Render sequence

This is what you should get in a couple of mins after you press render.



Oh yea, feel free to modify this scene to your liking and post results so we can see how all you are doing...

Next we'll go and optimize settings for a better GI.

Step 2

Okay, you can see in our last render that the GI solution is really smooth but it lacks a lot of contact shadows. This is due to low settings we use.

We're going to improve them step by step now. First we're gonna setup our photons right. Switch to Precomputed mode:

Kray rendering General Photo	o ptions ns FG Sampling Quality About	
Render preset	Set 💌	
Diffuse model	Dhatana astinata	
Dirruse model	Photons estimate	
Photons estimate	Precomputed	
GI mode	Independent 💌	

and make a render.



This render shows, in simplified explanation, cells where indirect light was computed (sampled). Now the cells are pretty big and the whole image doesn't look too smooth. Each cell contains bunch

of photons that have been blurred together to form a cell. We will need more cells to get better accuracy in shadows.

We'll tweak that in Photons tab. First switch photon preset to Medium. This preset will raise number of photons and some other not so important settings.

Kray rendering options	iampling V Qu	ality About		_	
GI resolution 1 m		Auto			
Photons preset Med	ium 🔻	Photonmap	Lightmap		
Global photons 600000	Emitted	Received	Multiplier	1.0]
Use Autophotons	N	600	Low	40.0 %	•
Prec	ache distance Precache blur	50.0 % 1 200.0 % 1	 High Steps 	80.0 % 3.0	
Caustics preset Low	*	Add to li	ghtmap]	
Caustics photons 100000	Emitted	Received	Multiplier	1.0]
Use Autophotons	N	500		10.0 %	
		10.0		30.0 %	
Render frame]	Rende	er sequence	e	

Render out a frame.



You can see in the above render that irradiance is smoother but you cannot really see any shadows forming under sofa for example. This means it will be hard for Kray to produce accurate shadows in Photon map mode. If you checked closely at render log it wrote something like this:

🎇 Kray 1.7 OB1	
	Render log
	*** Analyzing photons maps.
	*** Precomputing irradiances (s=1 r=0.300).
	*** Building precomputed KD (4744 cells)
	*** Blurring photon map.
	*** Rendering in progress (800x534)
	*** Done 1%

This means that 4700 cells were created for irradiance. That's quite low for a scene like this... We should be getting 30.000 cells rather or something around there...

We're gonna try to raise our cells first by turning on Auto for Gi resolution.



This effectively controls how samples are grouped together or something like that. The higher the resolution the bigger the cells will be... When you render a frame this is what you get:



The cells look much smaller actually they're even a bit too small now, and you can clearly see shadow under the sofa. Quite a few splotches have appeared though: this is because Kray wasn't able to smooth out photons well since filter settings (N and irradiance blur) were too low. We're gonna fix that by lowering number of photons. This way each cell will contain less photons which will filter out better. Let's try 300.000 photons instead if 600.000.

Kray rendering options			
General Photons FG Sampling Quality About			
Gi resolution 1 m			
Photons settings:			
Photons preset Medium Photonmap Lightmap			
Global photons 300000 Emitted Received Multiplier 1.	0		
Use Autophotons N 600 Low 40 Precache distance 50.0 % V High 80	0.0% ↔		
Precache blur 200.0 % 👽 Steps 3.	0		

If you checked render log you saw there were about 17.000 cells created. That's quite alright. The irradiance isn't completely smooth yet but it should work alright. I'll explain how to get precompute even smoother in advanced users section. You can skip that if you want to go straight to FG.



**** ADVANCED USERS *****

To get smoother precomputed render you have couple of advanced controls in photons tab. First you have to select custom preset which unlocks all advanced features.

Photons preset Custom	Photonmap Li	ghtmap
Global photons 300000 Emitted	Received	Multiplier 1.0
Vuse Autophotons N Precache distance Precache blur	600 50.0 % () 200.0 % ()	Low 40.0 % • High 80.0 % • Steps 3.0

The most important settings are:

N: this is the number of photons that will be filtered togather - hence making smoother irradiance.

Precache blur: this just blurs irradiance making it smoother. (I like using this one instead of N since it's a little bit faster)

Precache distance: this setting will control cells size. If you increase it cells will get larger, lower it and cells will be smaller.

Step 3 - Setting up FG

FG or Final Gathering is the final stage of "photon mapping" rendering. What it does is it computes GI only at important points in an image. This points are selected more densly by Kray on places where it is most likely for a shadow to occur.

So for start let's turn FG preset to Medium.

Kray renderin General Photo	g options ons FG Sampling (Quality About			
GI re	GI resolution 1 m 🖌 Auto				
Final Gathering set	Final Gathering settings:				
FG preset	Medium 🔻	1			
FG threshold Prerender	0.001 Min rays 50.0 % ●	100 Max 1000 ✓ FG reflections ✓ FG transparency/refractions			
Spatial tolerance Distance Min B/D	0.2 10.0% ⊕ 100.0% ⊕	Angle tolerance 89.0 * • Distance Max 500.0 % • Blur 10.0			
Show samples	Off Corners All	Color 255 000 255			
Path tracing for co	mers:				
Corner distance	50.0 %	Paths 1			
Render frame		Render sequence			

and see what we get.



Now that's not bad at all!

Thank you for your attention and happy rendering! 🖸 just kidding...

The outcome is quite good but we'll do some optimizing just to show you what you can tweak.

From here on we'll go more deeply into how to optimize Kray.

One of the most important things with FG is correct density of samples. If the samples are spread too far appart the shadows will look blurred, if they're too close you'll need more rays to get clean rendering.

We have couple of controls to control this. The most important ones are: FG threshold, FG

rays min and FG max.

FG rays min is the minimum amount of rays Kray will use at specific point.

FG max is maximum number of rays at specific point.

FG Threshold is the difference between to sampled points. When the difference is bigger than specified value Kray will increase number of rays untill it reaches maximum number of rays (FG max).

When number of rays are too low, you will begin to see splotches. When number of rays are too high you'll get longer render times than needed. So the trick is to find a balance between render times vs. quality.

We will first check where Kray computes FG points. To do this we need to turn Prerender to 0%,

next turn on Show samples All and just for the sake of faster rendering let's turn FG rays max to 100. Also go to sampling tab and set Antialiasing to None.

Kray rendering	options			
General Photons FG Sampling Quality About				
GI reso	GI resolution 1 m 🗸 Auto			
FG preset	Custom 💌]		
FG threshold	0.001 Min rays	100 Max	100	
Prerender	0.0 %	✓ FG reflections		
		🖌 FG transparency/	/refractions	
			_	
Spatial tolerance	0.2	Angle tolerance	89.0 *	
Distance Min	10.0 % 🔸	Distance Max	500.0 % 🔸	
B/D	100.0 % 🔸	Blur	10.0	
Show samples	Off Corners All	Color 25	5 000 255	
🎇 Kray rendering	options			
General Photons	s FG Sampling G	Quality About		
Antialiasing settings:				
AA preset Cu	istom 💌			
Antialiasing No	one 🔻			

We get this render:



You can see how Kray places samples (the pink dots) at "strategic" places where it expects shadows to occur. On large flat areas there are very few sampled points because Kray knows lighting won't change much there. On places around corner there are alot more samples to accurately compute shading.

The density of samples seems a little sparse in the above image so we will make them closer. We can do that with couple of advanced settings so this is the part where we will unlock "advanced settings". Select Custom from the preset list and settings will get unlocked.

The setting that influences density of samples the most is Spatial tolerance. Right now is set to 0.2 but we'll set it to 0.1 and how density of samples changes this way.



🎇 Kray renderin	g options				_ 🗆 🗡
General Photo	ns FG Sam	pling 🔍 Qu	uality About		
Gi re	solution 1 m		🗸 Auto		
FG preset	Custom	•			
FG threshold	0.001	Min rays	100	Max 100	
Prerender	0.0 %		 FG reflection 	ons	
			🗸 🛛 FG transpa	rency/refraction	s
Spatial tolerance	0.1		Angle tole	rance 89.0 *	•
Distance Min	10.0 %		Distance	e Max 500.0 %	
B/D	100.0 %			Blur 10.0	

You see how the samples are positioned much closer now. This will create more accurate shadows in those places. We can further tune samples with following settings:

Spatial tolerance	0.1	Angle tolerance 89.0 *
Distance Min	10.0 %	Distance Max 500.0 % 🔸
B/D	100.0 %	Blur 10.0
– Show samples	Off Corners All	Color 255 000 255

Distance Min/Max: this controls minimun and maximum distance between samples. If min and max are exactly the same, samples will be distributed equaly appart across all surfaces (and we don't want that).

B/D: this value will add more samples but only to places with high light contrast (corners). This can further improve quality of shadows if needed. I like to keep this value between 0-100% depending on the scene.

This is image with B/D set to 0%. You can see how samples in corners are not as dense as before.



I will now turn B/D to 50% since default 100% seems a bit high...



This looks good to me, we're gonna turn off Show samples now and tweak FG rays. Let's try this settings first and see if it's good enough: FG threshold = 0.0001, FG rays min = 100, FG max = 600.

General Photo Gire	g options ms FG Sampling solution 1 m	Quality About	
FG preset	Custom	•	
FG threshold Prerender	0.0001 Min ray	ys 100 Max 600 ✓ FG reflections ✓ FG transparency/refractions	ons
Spatial tolerance Distance Min B/D	0.1 10.0 % ↔ 50.0 % ↔	Angle tolerance 89.0 ° Distance Max 500.0 Blur 10.0	● ※ ●
Show samples	Off Corners All	Color 255 000	255



That looks pretty cool. You can see we get better shadows now than before when we used medium preset. I can't see any splotches either. I think I'm gonna try with even lower FG max to get faster results. Let's try... hmm.. max 300.



You can start seeing some artifacts in the corners and shadows start to fade away also... But we gained 2 minutes. So it's up to you to decide which way you want to go.

All there's left now is add some antialiasing. We'll cover Antialiasing in some other tutorial since that needs a bit more explanation. For this tutorial I'm just going to select a medium preset for a start and then customize some settings.

Upsample we can turn to o since this is used when you have fine details in your image that normal resolution cannot capture. Z distance is also a little bit low so I'm gonna turn it up a bit. That's it.

Kray renderi General Pho	ng options tons FG	Sampling	Quality	Abou	t	<u> </u>
Antialiasing settin	igs:					
AA preset	Custom	Ŧ				
Antialiasing Grid size	Grid 3	Ŧ		 ✓ 	FSAA Rotated grid	
Pixel filter	Mitchell	*				
Edge absolute Normal	0.1 0.0001	Relative Z	0.1	l	Jpsample 0	
Thickness	1	Overburn	1.0			

Here's our final image. (yea I know it needs some surfacing and lighting polishing but that's where you come in!) じ



내고마늬 1.7 OB1 :: Renderlime: 0 h 16 min 34 sec @ P4 3.2 :: re x 534 :: (C) 2006 800

Here's a final scene file if you wan't to test it yourself... http://www.vizualizacije.com/Kray_tut/final.lws

Hope you enjoyed this and I hope to hear your questions and comments!

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