RenderMan for Blender

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Preface

What a time it is to be a 3D artist! The tools, simulators, rendering packages, modeling software, and hardware all give us what we need to make stunning images and animations. To add to that we have many free tools at our disposal and thus lowering the barrier to entry to new students and artists coming from other disciplines.

This book aims at crossing the bridge between The Blender Foundation's Blender[1] and Pixar's RenderMan[2] renderer (for the rest of the book let's refer to RenderMan as *PRMan*). Both are released for free and Blender has no restrictions on making money from anything you made with it. PRMan *does* requires a commercial license if you plan on selling your work directly. For more information about monetization of your work visit Pixar's RenderMan web site for the legal details. But for making images for fun, to build a portfolio, or for research it is a great piece of software to use as you get the full package (minus Tractor)

This, however, is introduction to neither Blender or PRMan. Rather, this book explores the common grounds between the two software packages and gives you the logical "glue" to connect the two.

How to Read This Book

Throughout the book you will see items in a Sans-Serif font that denotes buttons, labels, or other on-screen type found in Blender, it, or LocalQueue. Links such as "http://renderman.pixar.com" appear as dark blue text and can lead you to either web pages or locations within the book itself. (Assuming you aren't reading this on paper!)

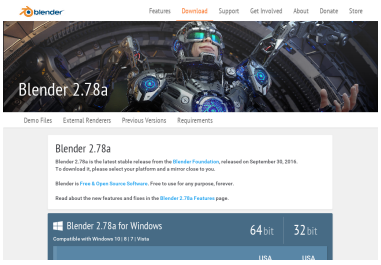
[1] http://www.blender.org
[2] http://renderman.pixar.com

Chapter 1

Getting Started

1.1 Installing Everything

First things first...we need to get everything together! Blender is easy enough to install. Head to http://www.blender.org with your favorite browser and download the appropriate version for your OS from the download section. Blender doesn't care where you install it. Just extract the archive and put it somewhere appropriate. Alternatively, if you are running Linux you can use your distribution's package manager to install it.



After installing Blender it is time to install PRMan. To download PRMan you need to have a forum account at http://renderman.pixar.com.

1.2 The Addon

The Addon itself is all that's left and its pretty easy to install and set up.

1.3 Quick Renders

Alright! Now that we are all set up it is time to test out the addon. We'll begin by rendering a quick cube on a simple plane. Go ahead and create a simple scene in blender and hit the F12 button.

"Marvelous Monotany" - image of cube on plane with default materials

If things are setup correctly then you should see your 3D view change to the Image Viewer and a progress bar start at the top of the screen. Periodically, the image will update as **prman** renders the image in an *incremental* fashion. Remember that word—we'll get to that later. For now bask in the glow of your image rendered with the exact same software that rendered Pixar's hit movies. Doesn't look so great though, right? Lets change that by adding a material.

At this time lets change our screen to something a bit more efficient. If you are an experienced Blender artist you may already have a workflow that works. Follow it. The addon won't make you veer too far from what you currently are used to. If you are just starting with Blender then I Awould suggest using one of the preset layouts. In the menu bar click the icon next to the Help menu. Of these preset layouts select Compositing. This layout features a Node Editor, Image Viewer, and a 3D Viewport. All 3 are useful and with that big Node Editor pane it helps so you don't feel too cramped. At any point of time you can press Ctrl+↓ to maximize the pane to the entire window and again to go back again. At this point it should be noted that there are multiple ways of doing things. Editing materials is one such way with multiple paths. You can use the Node Editor *and/or* you can use the Material's property panel. Right now we are going to focus on the node-centric method as visually its the clearest way to see organization of everything at once. If you are interested in learning about the other method please read Appendix

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Along the bottom of the Node Editor's pane is its menu bar. Next to Help menu there are some buttons. Change to Shader mode by clicking the one that resembles a checkered sphere. If your object already has a material assigned to it you'll see its name in the text box. If not just click the " + New" button and rename it if you wish. Now we need to instruct Blender that we want to assign materials through a node graph. We do this by checking the Use Nodes checkbox. You will see a couple nodes already in the editor. These are *Cycles* material nodes. You see, you can have multiple graphs for multiple renders in the same material. This is handy if you have to swap between Cycles, PRMan, Lux, Yafaray, or any other renderer. For now we are just going to delete it to reduce clutter. With your cursor in the Node Editor press `A` to select all and then press `X` to delete. With the Cycles nodes gone we have a blank canvas to make our material.

Lets start by adding a material output. Press `Shift+A` to bring up the Add menu and select PRMan Material from the PRMan Outputs submenu. This creates the endpoint node for all of the other nodes in the material. Its kind of a big deal. At this point you can see it has three inputs: Bxdf, Light, and Displacement. Bxdf can be thought as an analog to Cycles

Bsdf. They are a *closure* that the renderer uses to compute ray interaction. This is where most of your node networks will work toward. Below that we have the Light input. This is where you will attach a PxrMeshLight. By the way, if you see a node that doesn't start with "Pxr"...it probably shouldn't be plugged into the PRMan Material node. Lastly, there is the Displacement input. This is where you would connect your PxrDisplace node so you can procedurally modify the geometry of your object.

"All nodes lead to the ocean material" - screenshot of complex node setup leading to the PRMan Material node

PRMan has several Bxdfs that can be used for different purposes in different situations. The most common ones to use are PxrSurface or PxrDisney. The latter obviously is the production shader used for many of Pixar's more recent movies such as *Finding Dory*. Either shader has a lot of options and can be daunting at first. The key is to play with each to see what they do. Or the impatient can just go to the PRMan Documentation[1] and look at the page for the shader. The documentation gives examples of what each parameter does for most of the shaders and textures. Other nodes are listed below:

[1] https://renderman.pixar.com/view/documentation

PRMan Bxdf	Cycles equivalent Bsdf	Notes/Uses
PxrBlack	Holdout	Holdout and rendering nothing...fast.
PxrConstant	Emission	No Diffuse or Specular passes calculated thus just emitting light from faces[2]
PxrDiffuse	Diffuse BSDF	Good for rendering rough surfaces without a specular gloss
PxrDisney, PxrSurface	Über shader addon material	Well rounded "does everything" shader
PxrGlass	Glass BSDF	Glass, windows, transparent fluids with well defined ior boundaries
PxrHair	Hair BSDF	Hair and other fine strands
PxrLayerSurface	(no 1:1 node, have to use a combination of Mix and Add shaders)	Good for making complex shaders with varying intermixed materials.
PxrMarshnerHair	Hair BSDF	A hair shader that gives a lot of control over the look of the shader
PxrSkin	Subsurface Scattering	A SSS shader with a good deal of control over the look of the shader[3]
PxrVolume	Volume Absorption and Volume Scatter	Rendering various participating media including flames and smoke

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That sure is quite a few of shader nodes. Keep in mind that certain BSDFs in Cycles have functions in one or more of PRMan's BXDFs. Cycle's Velvet BSDF can be replicated with PxrDisney's Sheen parameters, for example.

1.4 Moving On

All told there are over 70 nodes that can be used and one can't be expected to learn about all of them in one sitting, can they? There are also a few Cycles nodes with no equivalent PRMan node. Such as the ever useful and required Math node. There are ways around that through different tricks or by writing your own shader code in OSL. These tricks you will learn in the coming chapters. Up next we will utilize the PxrGlass shader to render water along with PxrSurface and some of PRMan's built-in textures to create a convincing still-life.

Chapter 2

Apples and Oranges

2.1 The Juicy Details

Now that we are going we can do something other than simple primitives.

2.2 Material Nodes

2.3 Microdisplacement Mayhem

2.4 At first it's fruit. Then... *the World!*

Chapter 3

Render Me Excited

3.1 Integrators

3.2 Denoising

3.3 Optimizations

Chapter 4

Let Your Images Speak Volumes

4.1 Getting Some Atmosphere

4.2 When Smoke Gets in Your Eyes

4.3 Caveat Render

Chapter 5

Getting Node-Deep in Mud

5.1 Down and Dirty with OSL

5.2 Utility Poles

5.3 Manifold Mania

Chapter 6

Thinking Outside the Window

6.1 Using LocalQueue to render outside of Blender

6.2 Using 'it'

6.3 Animations

6.4 AOVs and LPEs PDQ!