Sirikata 3D Content Creation

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Document version 1.00 by Chris Platz, Ben Nadler, and Jason MacHardy

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Introduction

This document is designed for users to introduce themselves to the 3D production pipeline of Sirikata, a BSD licensed open source platform for games and virtual worlds. The various articles in this document will teach you how to prepare and import your 3D assets so that they may be viewed correctly in the engine. While Sirikata was designed so that even casual users may access virtual worlds, to create content for it is a more challenging task that requires at least an intermediate knowledge of such programs as Photoshop and 3D Studio Max 9. You should feel comfortable using the interfaces within these programs, including such activities as installing plugins, importing/exporting files, etc.

The 3ds Max Exporter for Sirikata is designed to take the object and shader set up from 3D Studio Max directly into Sirikata and maintain the Material settings and properties. Users of other 3D packages such as Maya, XSI, etc, can model, UV Map (up to 3 UV sets), export the mesh using Collada, and import the mesh into 3ds Max. Assuming the user has their mesh in 3ds Max, we have provided this workflow document to guide users in the creation of Materials in 3ds Max. Users can then take their 3D meshes specifically optimized for Sirikata, and export them using the provided plugin.

Basic Requirements

The evolving content production pipeline currently uses these programs and plugins in order for you to produce content for the engine.

- Adobe Photoshop CS or later
- 3D Studio Max 9 32-bit
- Latest version of Sirikata
- NVIDIA dds plug-in is for Photoshop to convert all texture maps into the .dds format.
- COLLADA for Maya - Currently most of our art team works in Maya for modeling and UV mapping, using COLLADA to export the mesh for 3ds Max.
- COLLADA for 3ds Max 9 - Used to import COLLADA files into 3ds Max.
- Ogre Exporter for 3ds Max 32 bit is a custom built exporter for the Sirikata engine by our team.

Optional Tools:
- Crazybump, a texture generator that uses a diffuse texture to create normal and specular maps.
- NVidia Texture Tools 2, a standalone version of the NVidia plugin for Photoshop that is GPU-accelerated.
- MysticThumbs allows you to see .DDS files as thumbnails in Windows Explorer. It has both 32 bit and 64 bit versions, unlike NVidia's own thumbnail extension.

Example Files

Along side this .PDF file, you've probably noticed a folder titled "example_files." Inside this folder you will find subfolders, each with specific files for each program. These folders have been included along with this document so that if you find yourself confused at any point, you can refer to our own files in order to try and figure out where you may have made a mistake. The guide was made using these files, so for those of you who are importing into Sirikata for the first time, it may be a good idea to follow along with the guide and use the example files.

Plugin Installation

Sirikata requires a number of plugins in order for your content to be imported into the engine. Instead of supporting multitudes of file types, these plugins allow for us to ensure that there is a standard way of creating content for Sirikata so that everything is uniform, making it easier to pinpoint problems (should there be any).

Installing the NVidia .dds file format plugin for Photoshop 32-bit

1. Go the NVidia plugin page and download the latest version.

Available Downloads

- Download Current Version (8.23.1101)
- Download Legacy Version (7.83.0628)

2. Once you have downloaded the plugin, follow the on screen instructions for installation.
3. You will be asked to choose a folder for installation. It will use the default Adobe directory. If you have installed Photoshop anywhere else, please change it accordingly.
4. Finish the installation and open Photoshop. Go to *File > New* and create a new, blank document.
5. Go to *File > Save As…* and choose *D3D/DDS (*.DDS)*. If you see this option, that means the installation of the plugin was successful.
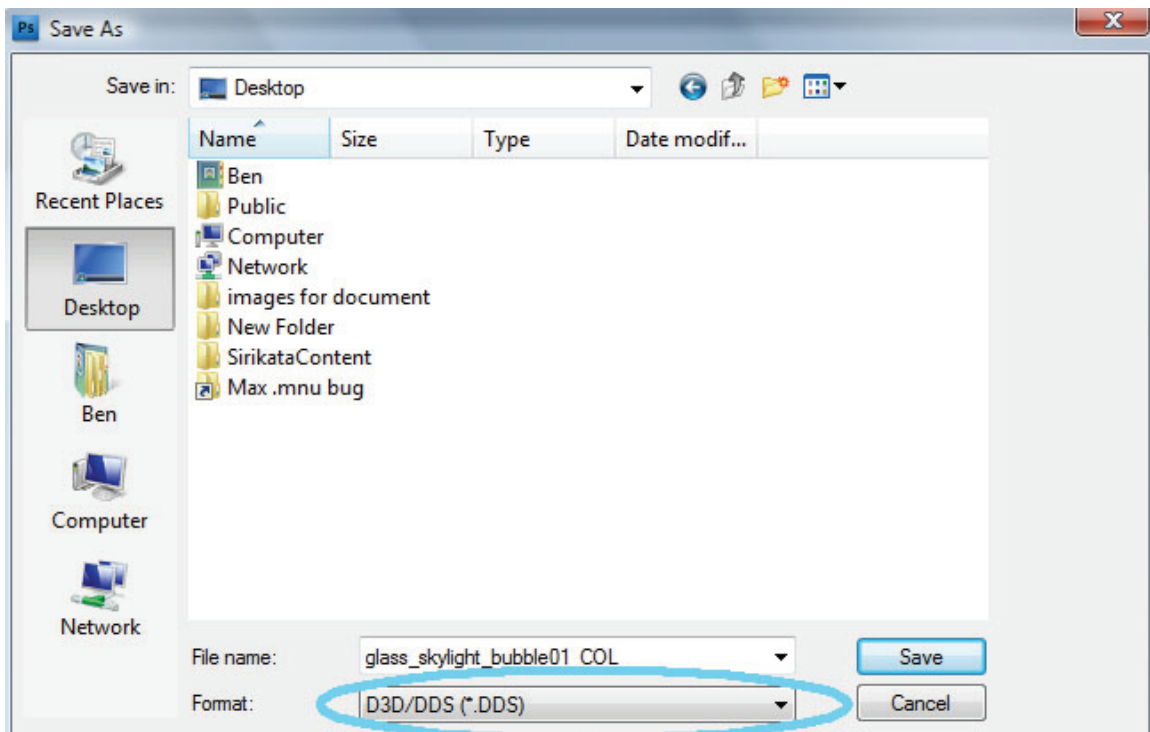
Troubleshooting for NVidia .dds plugin

1. The plugin does not work with 64-bit versions of Photoshop. If you have a 64-bit version of Windows, you will need to install the plugin for the 32-bit version of Photoshop, installed by default in *C:\Program Files (x86)\Adobe*.
2. If you cannot choose .DDS from the Save As… menu, the plugin may not have been installed properly. Go to your Photoshop folder, normally located at *C:\Program Files\Adobe*, or *C:\Program Files (x86)\Adobe* for 64-bit users, and open your Photoshop directory. Go to Plug-ins and then File Formats. Inside this director you should see a list of files with the extension .8BI. You should see the file dds.8BI. If not, run the installer again and make sure you install to the right directory (the installer wants the root directory of Photoshop, so always install to there: *C:\Program Files\Adobe\Adobe Photoshop CSX*).

Installing the Ogre Exporter for 3ds Max 9 32-bit

1. Download the Ogre Exporter for 3ds Max 32 bit from the Sirikata wiki.
2. Open SirikataSceneExport.zip and open the folder "OgreExporter."
3. Navigate to your 3ds Max 9 folder, located at *C:\Program Files\Autodesk\3ds Max 9* for 64-bit and *C:\Program Files\Autodesk\3ds Max 9* for 32-bit computers.
4. Open the 3ds Max 9 folder.
5. Go back to SirikataSceneExport.zip and copy the contents of "OgreExporter" into the main 3ds Max 9 folder.
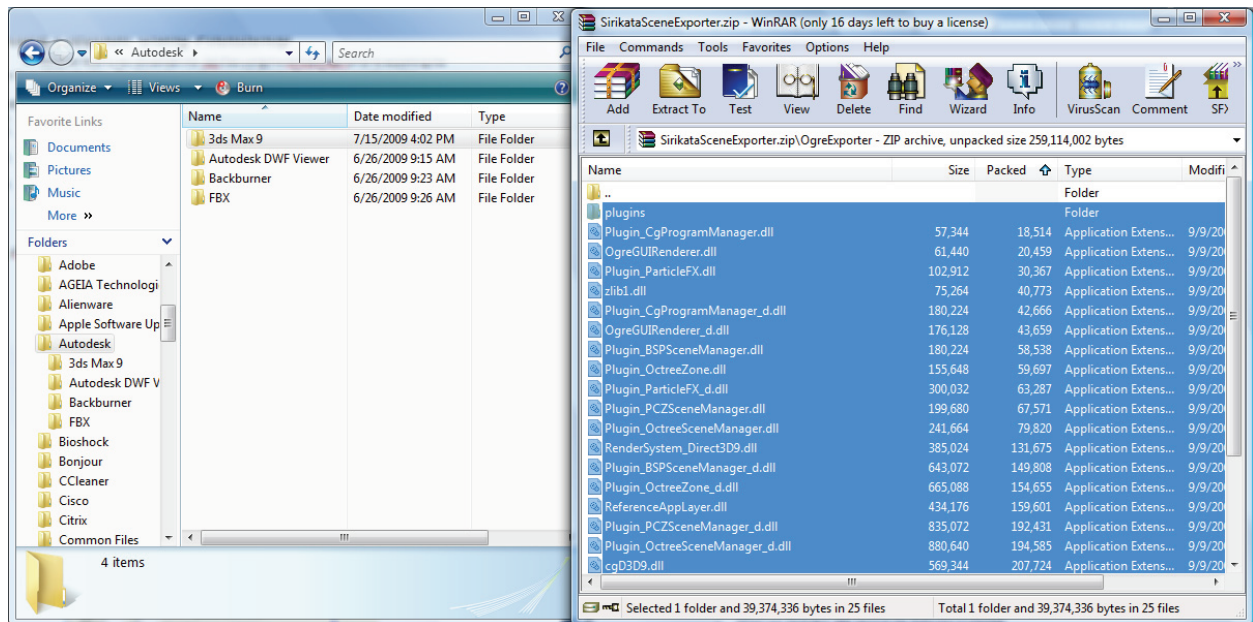

6. Give Windows permission to overwrite any necessary files.
7. Start 3ds Max and open your file. When it is ready to be exported, go to *OgreMax > Export Selected 0.1.3*.
8. **THE OGRE EXPORTER CAUSES 3DS MAX TO CRASH ON STARTUP. READ THE TROUBLESHOOTING SECTION FOR MORE INFORMATION.**

Troubleshooting for Ogre Exporter

1. The exporter currently has a bug which our team has been unable to fix. Every time the exporter is used, 3ds Max creates a .mnu file. The file, MaxStartUI.mnu, causes 3ds Max 9 to crash the next time it is loaded unless you delete MaxStartUI.mnu prior to opening the program. It is suggested that you make a shortcut to this folder and keep it on your Desktop or with your other Sirikata files so that it is easy to access. A fix for this problem is underway and will be released ASAP. The location of the folder varies depending on whether you are using XP or Vista.
   a) Vista: C:\Users\YourAccount\AppData\Local\Autodesk\3dsmax\9 - 32bit\enu\UI
   b) XP: C:\Documents and Settings\Administrator\Local Settings\Application Data\Autodesk\3dsmax\9 - 32bit\enu\UI
2. If you have any other problems with the Ogre Exporter, you may have installed it wrong. Make sure that the file OgreMaxSceneExporter.gup is in the plugins folder, found at C:\Program Files\Autodesk\3ds Max 9\plugins. If the file is located in plugins but you are still having problems, read on below.
3. Even if all of the Ogre Exporter files appear to be in order, if it does not appear as it should within 3ds Max 9, try reinstalling the plugin by copying all the files over again. You may have originally placed them in the wrong directory.

Installing COLLADA for 3ds Max 9 32-bit

1. Download COLLADA for 3ds Max 9. Under the dropdown menu COLLADAMax 1.4.1 plug-ins, choose ColladaMax_FREE_3.05C.exe. When you open this file, it should automatically find your 3ds Max 9 file folder.
2. Follow the on screen instructions. You will be prompted to choose if you want to install the plugin for more than one version of Max. You may install as many options as you want as long as the plugin is installed for 3ds Max 9.
3. Open 3ds Max and go to *File > Import*. You should be able to choose "COLLADA (*.DAE, *.XML)" under the file type options.
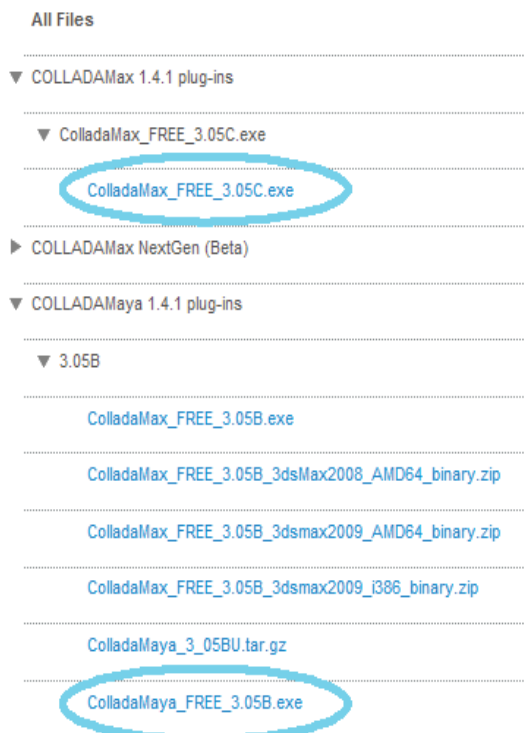
Installing COLLADA for Maya

1. Download COLLADA for Maya . Under the dropdown menu COLLADAMaya 1.4.1 plug-ins, choose ColladaMaya_FREE_3.05B.exe. When you open this file, it should automatically find your Maya folder.
2. Follow the on screen instructions. You will be prompted to choose if you want to install the plugin for more than one version of Max. You may install as many options as you want as long as the plugin is installed for your version of Maya.
3. Open Maya and go to *File > Export Selected*. You should be able to choose "COLLADA" under file type options.

Project Setup

Naming Conventions

It is imperative to have a basic understanding of file organizing and naming that is intuitive enough for most content creators to readily access content for use. For the purposes of Sirikata Content development and utilizing the import pipeline we are sharing the method we utilize for current projects in an attempt to help guide future developers.

NOTE: If you are sharing files with a group, place the date at the end of the file name (e.x. 07_29_09)

Mesh Naming

Mesh names within various 3D programs may be named in various fashions, for example in Maya you may rename an object "Object1" and Maya still maintains a sub meta-data called "Object1Shape". In any regard it is recommended to artists to control their naming to help prevent future confusion or conflicts.

In the following example each mesh is named finally within 3DS Max before exporting using the Ogre Exporter plugin. This way, the mesh name and the folder name of the exported mesh, materials, and so forth are contained within the appropriate folder of the name of the mesh. The method of naming is as follows:

- Material (Material Object is made out of NOT 3D/2D material - glass)
- Type (window or win)
- Structure (skylight or skylgt)
- Structure Type (if applicable - bubble)
- Project (if applicable; e.g., Kunst Bornholm Museum)
- Version # or Iteration

The example below is specifically the glass, and only the glass, used for the bubble type skylight of Bornholm's Kunst museum:
glass_window_skylight_bubble_kunst01

The frame for the skylight would be named as follows:
frame_skylight_bubble_01

It may not always be necessary to include the project name as this skylight can be reused, along with its glass component, within any project.

Texture Naming

The method for naming textures is similar to naming models. There are, however, key components that are required to maintain consistency between the various types of texture. They are abbreviated as the following:

- Color / Diffuse Map - COL
- Ambient Occlusion Map - AO
- Specular Map - SPC
- Tangent Normal Map - NRM
- Environment Reflection Map - ENV
- Glow Maps - GLO
- Bump Map - BMP
- Displacement Map – DISP

Here is an example set of textures created specifically for the skylight model mentioned before. You would want to emulate this name convention for your own texture files.

- glass_skylight_bubble01_COL
- glass_skylight_bubble01_SPC
- glass_skylight_bubble01_AO
- glass_skylight_bubble01_NRM

While some textures are made and UV mapped to a specific model, many textures in Sirikata are tileable and can be used on terrain or applicable models. Things such as grass, bricks, and concrete fall under the category of tileable textures. Listed below are examples of tileable textures:

- tree_bark01_COL – (tileable bark texture)
- grass_short01_COL – (short grass, could be any color, if a specific color needs to be handled then)
- grass_shortbrown01_COL – (short brown grass, probably dead or dying grass)
- rock_cliff_kunst01_COL – (a cliff texture specifically for the Bornholm Kunst Museum project)
- stone_path_kunst01_COL (a stone path texture specifically for the Bornholm Kunst Museum project)

A general list of top-level names for textures is as follows:

Tree	Bush	Rock	Stone	Dirt
Grass	Road	Concrete	Roof	Tar
Plaster	Brick	Drywall	Wood	Pattern
Stucco	Blacktop	Paint	Paneling	Siding

Sample Folder and File Structure

/sirikata/
       -The system, platform, engine and everything once it is imported.

/sirikatacontent/documentation/
-Where all documentation exists for Sirikata, Pipeline, Tutorials, etc.

/sirikatacontent/
       -Primary asset storage area for use by content designers, this resides separately and is before final import to Sirikata.

/sirikatacontent/mesh
       -The top directory for models. Every model will have its own folder within the directory.

/sirikatacontent/ogreexports/
-where all exported scenes go, the folder of the export and its accompanying files (/ash_01/ash_01.scene ash_01/materials etc) These folders within are ready to be dragged directly into Sirikata.

/sirikatacontent/textures
       -Finalized Textures ready for import, and to be used during material creation within Max.

/sirikatacontent/textures/TYPE
-Type deliniates the type of texture, this is purely for ease of storage use for artists as once the export is complete, the texture resides within its corresponding mesh folder, under materials.

/sirikatacontent/texture_ref/
       -The massive folder utilized for working on textures, texture references, photos and all collage references for each project.

/sirikatacontent/projects
       -Each new folder will be the storage location for import directly into Sirikata. (Ex. /Kunst/ for the Speed Limits Kunst museum project).

/sirikatacontent/scripts/
-Future useage for scripting, maybe CVS files can reside here?

/sirikatacontent/toolbox/
-Not to be confused by Utilities, this is where we drop photoshop brushes, config files, palet files, etc.

/sirikatacontent/utilities/
-All utilities that we are permitted to redistribute that are required by content designers (ogre exporter, dds plugin, etc)

NOTE: For group projects, make sure that the sirikatacontent folder is placed at the top level of your hard drive (C:) to avoid any potential file path errors when sharing content with your group.
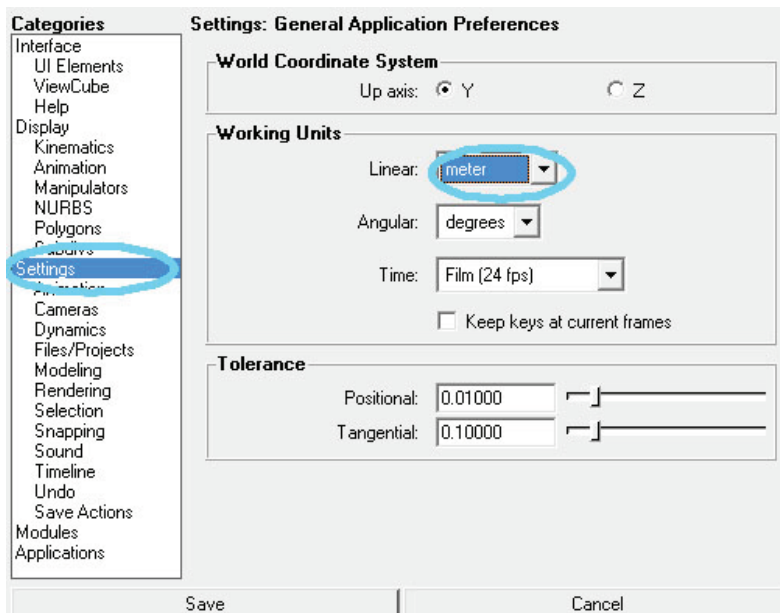
Modeling with Maya

Maya Setup

1. Open Maya and go to *Window > Settings/Preferences > Preferences*.
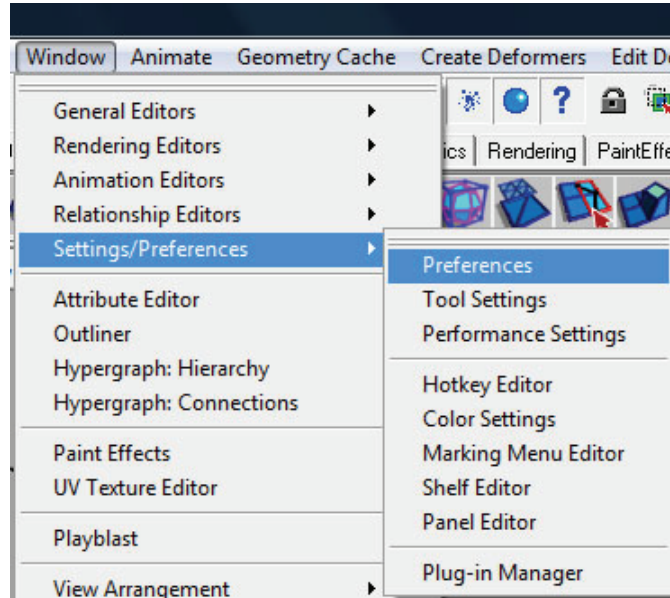
2. There are several changes that need to be made. Under the *Settings* category, change the Working Units to "meter."

3. Next, under the *Cameras* category, change "Far Clip" to 1,000,000 and the "Near Clip" to .001.

NOTE: The screenshot below shows incorrect information, but does show where and how to edit the Camera preferences. Input the values listed above, not those in the screenshot.
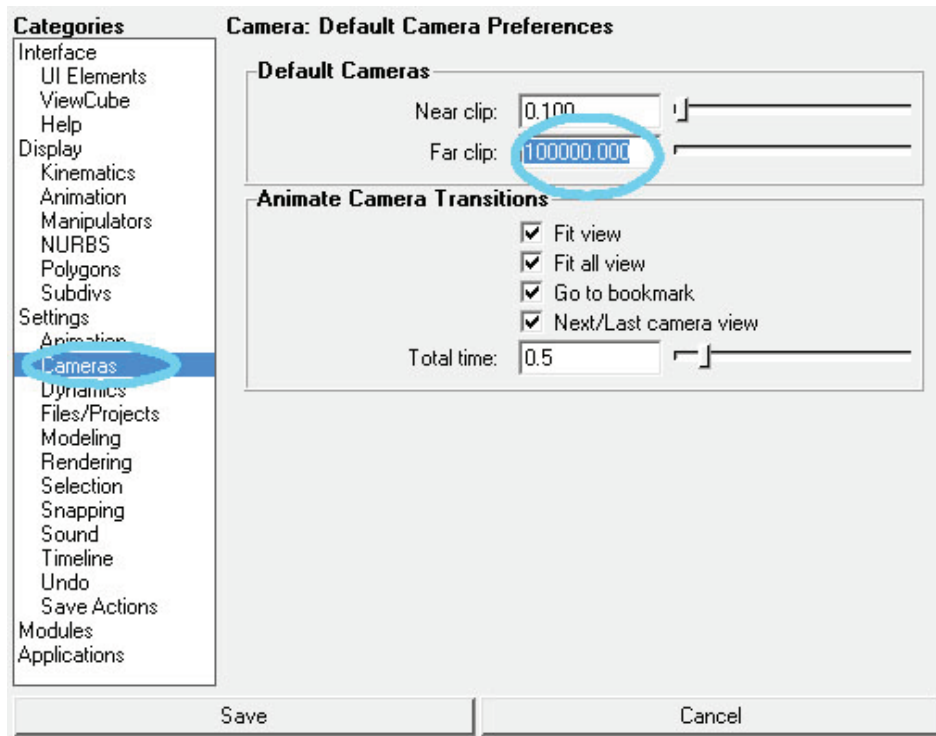
Working in Maya

Harden / Soften Normals:

Maya default assumes that all of your edges are hard-edged surfaces when you are modeling. In some instances you may want to soften certain edges or make certain edges hard. Select the edges to soften or harden via edge mode, then go to *Normals > Soften Edge (or Harden Edge)* in the polygon menu.
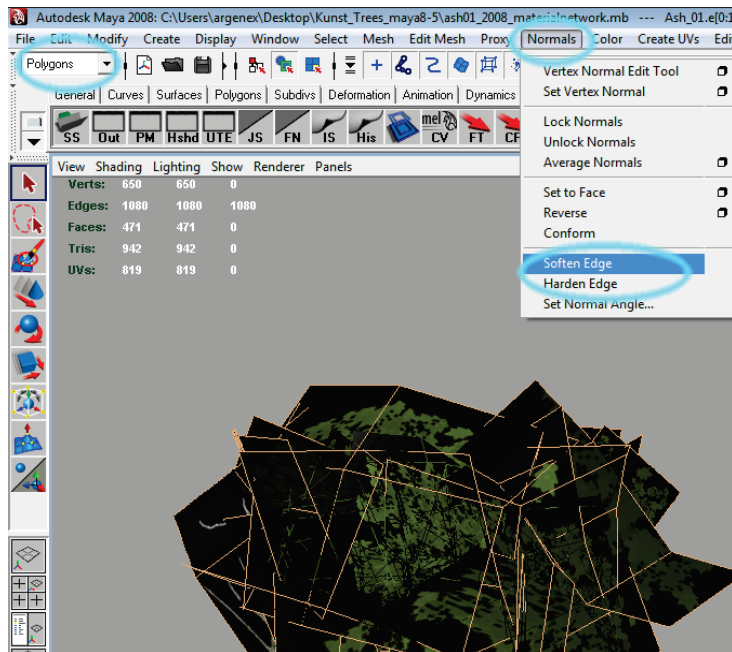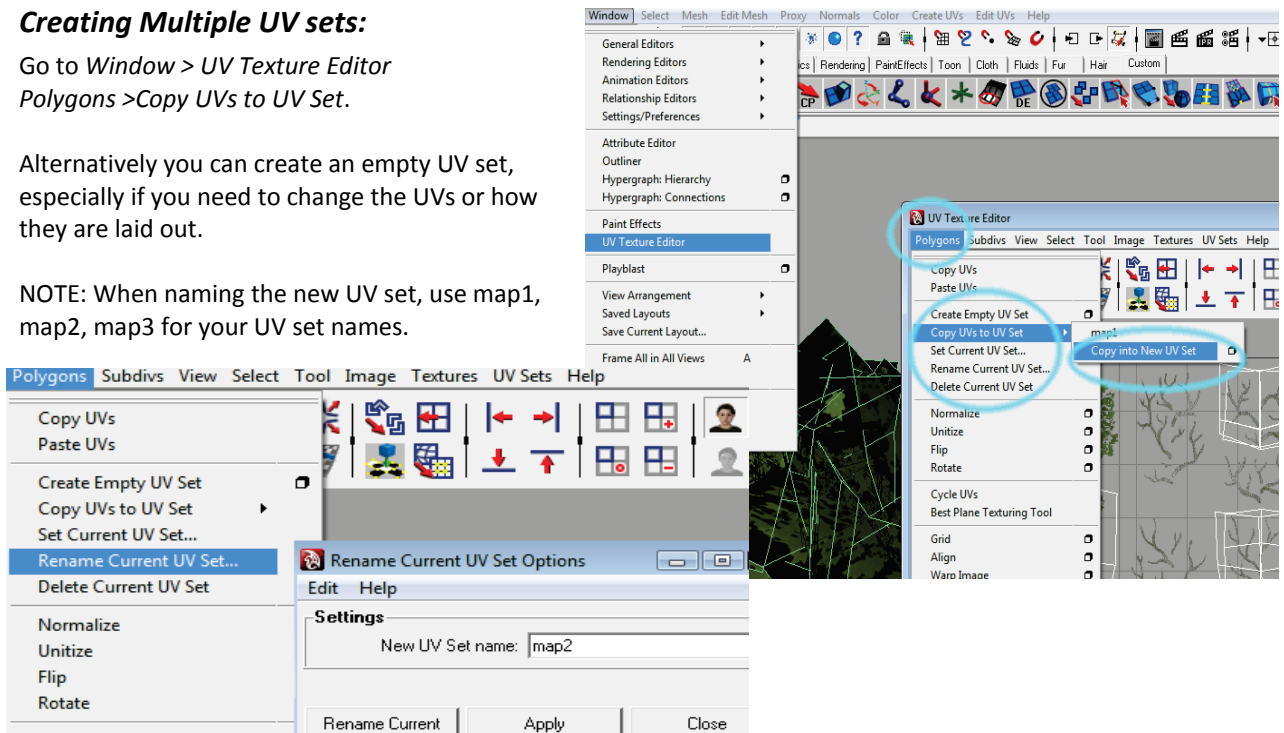

Creating Multiple UV sets:

Go to *Window > UV Texture Editor Polygons >Copy UVs to UV Set*.

Alternatively you can create an empty UV set, especially if you need to change the UVs or how they are laid out.

NOTE: When naming the new UV set, use map1, map2, map3 for your UV set names.

Assigning Multiple Materials to same Mesh to Faces (for Max)

In order to help speed up the process of working within 3DS Max, Maya users should utilize assigning different materials (always phong) to faces that use a different material, even if they are part of the final object. A case example would be the Glass of a window within its frame. The frame has a different material from the glass.

To do this in Maya, simply select the faces that will be the different material and either choose *Assign New Material > Phong* (or *Assign Existing Material* if you have already created a material).
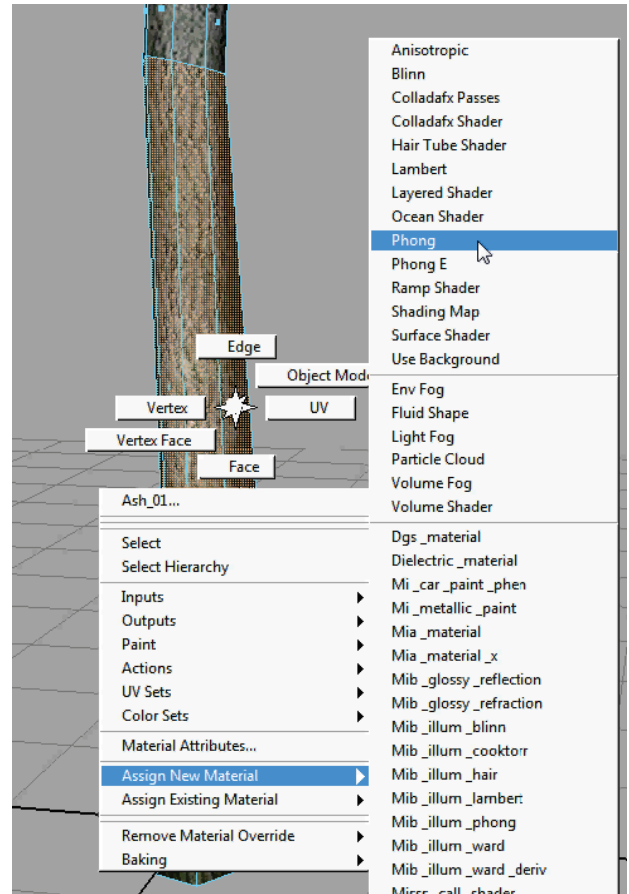
Object Naming (mesh names)

It is important to maintain naming for the purposes of redundancy and knowing what is what. Within Maya open *Window > Outliner* and simply double click on the mesh and rename it accordingly.

NOTE: Naming is important as the end exported FOLDER to Ogre must be named the mesh name, in this case /tree_ash01/. *(Disregard the file name in the screenshot; it should be tree_ash01)*

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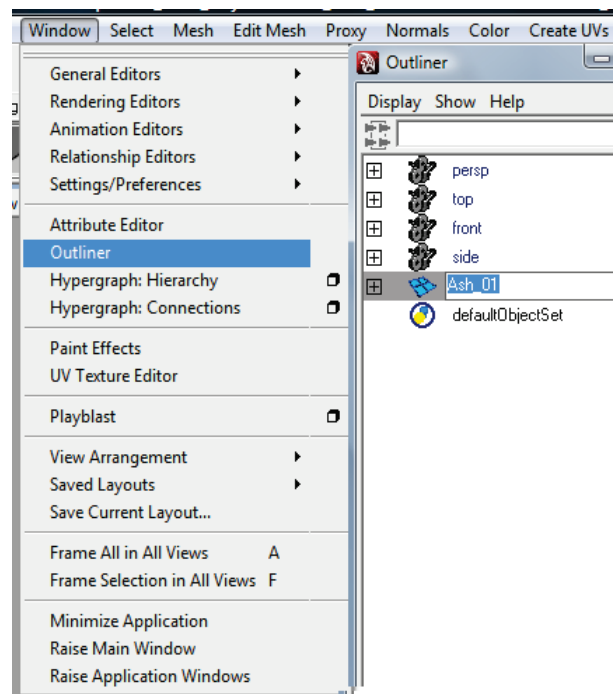
Set Pivot Points

There are several options depending on the workflow of your
scene to set the pivot point.
Primary Example:
A single object for import into Sirikata

Make sure to move the object to the center of the grid.   You can
do this by selecting the object, hitting W for translation, and
holding down 'X' to force the object to snap to the grid, then
moving it to the center of the grid.

This centers the object to the world space. In this example the
tree is standing on the grid, this way when moving around in
Sirikata the tree can be placed using its pivot on the bottom,
where it will be across Terrain. With other models you will want
to center the pivot first in the model, then snap the model to the
grid in Maya's World Space.

To Center the pivot of the model, go to *Modify > Center Pivot*.

After you are completely finished with the mesh, you should
delete the History to clear out any metadata that we don't need
to save. Go to *Edit > Delete All by Type > History*.
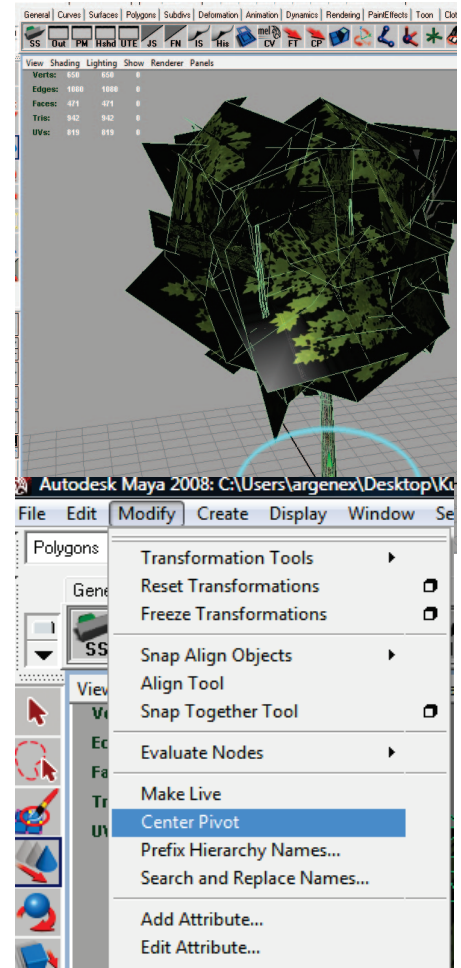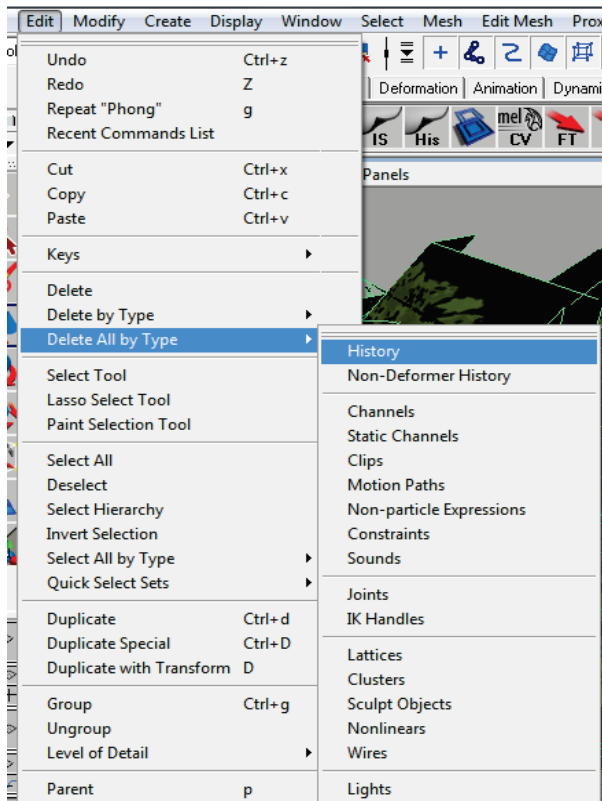
Freeze Transformations

Next is it important to freeze the transformations on the mesh. Do this when you are utterly completed with the mesh, and AFTER you have deleted the History. Go to *Modify > Freeze Transformations*.
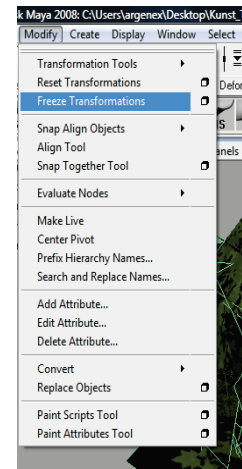
Exporting using COLLADA

Make sure the object or objects that are finished and ready for export are selected, and then go to *File > Export Selection…* A dialogue box will appear.
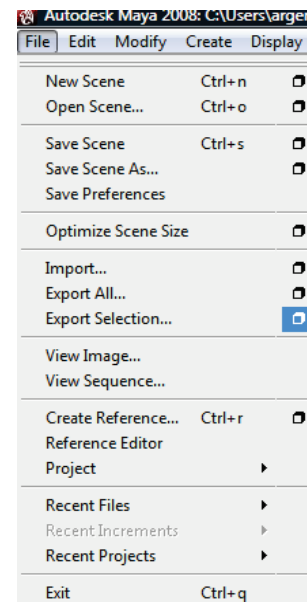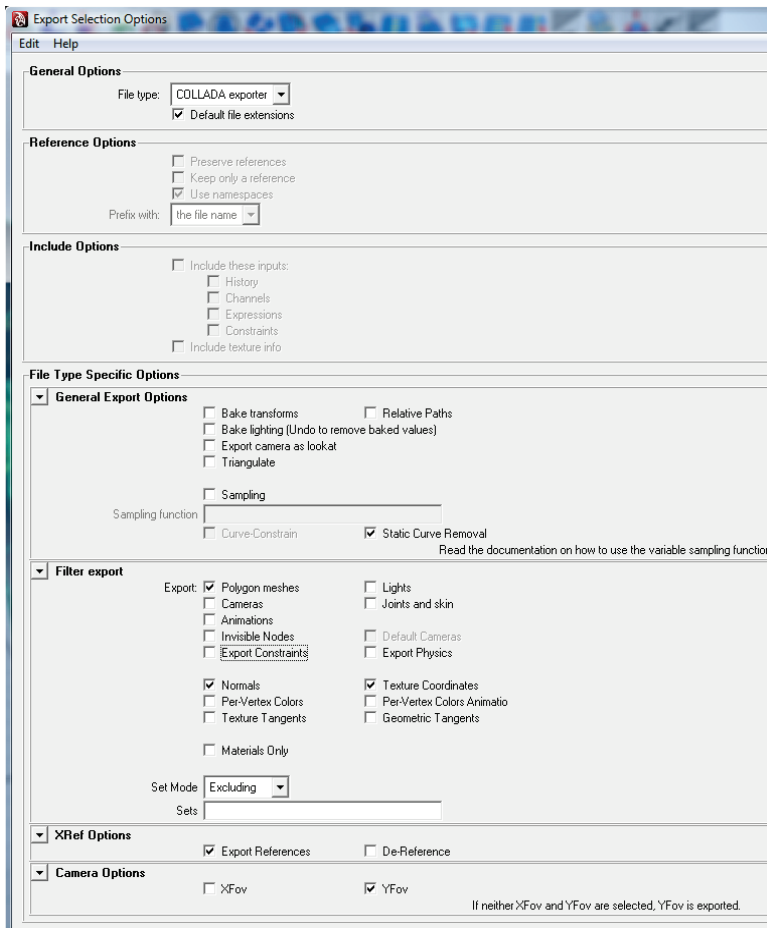
Make sure only the following checkboxes are checked;

- Default file extensions (.dae)
- Polygon Meshes
- Normals
- Texture Coordinates
- Export References
- YFov

Modeling with 3ds Max

3ds Max Setup

1. Open 3ds Max 9 and go to *Customize > Units Setup*. Under Display Unit Scale, select the "Metric" bubble and choose "Meters" from the dropdown menu. Click "OK."
2. Go to *Customize > Preferences* and select the "Viewports" tab. Under Display Drivers, choose "Configure Driver…" A pop-up called "Configure Direct3D" should appear.
3. In the pop-up, check "Enable Anti-Aliased Lines in Wireframe Views" under Appearance Preferences, and "Match Bitmap Size as Close as Possible" under both Background Texture Size and Download Texture Size. Set the sizes to their highest values, 1024 and 512 respectively. Click OK.
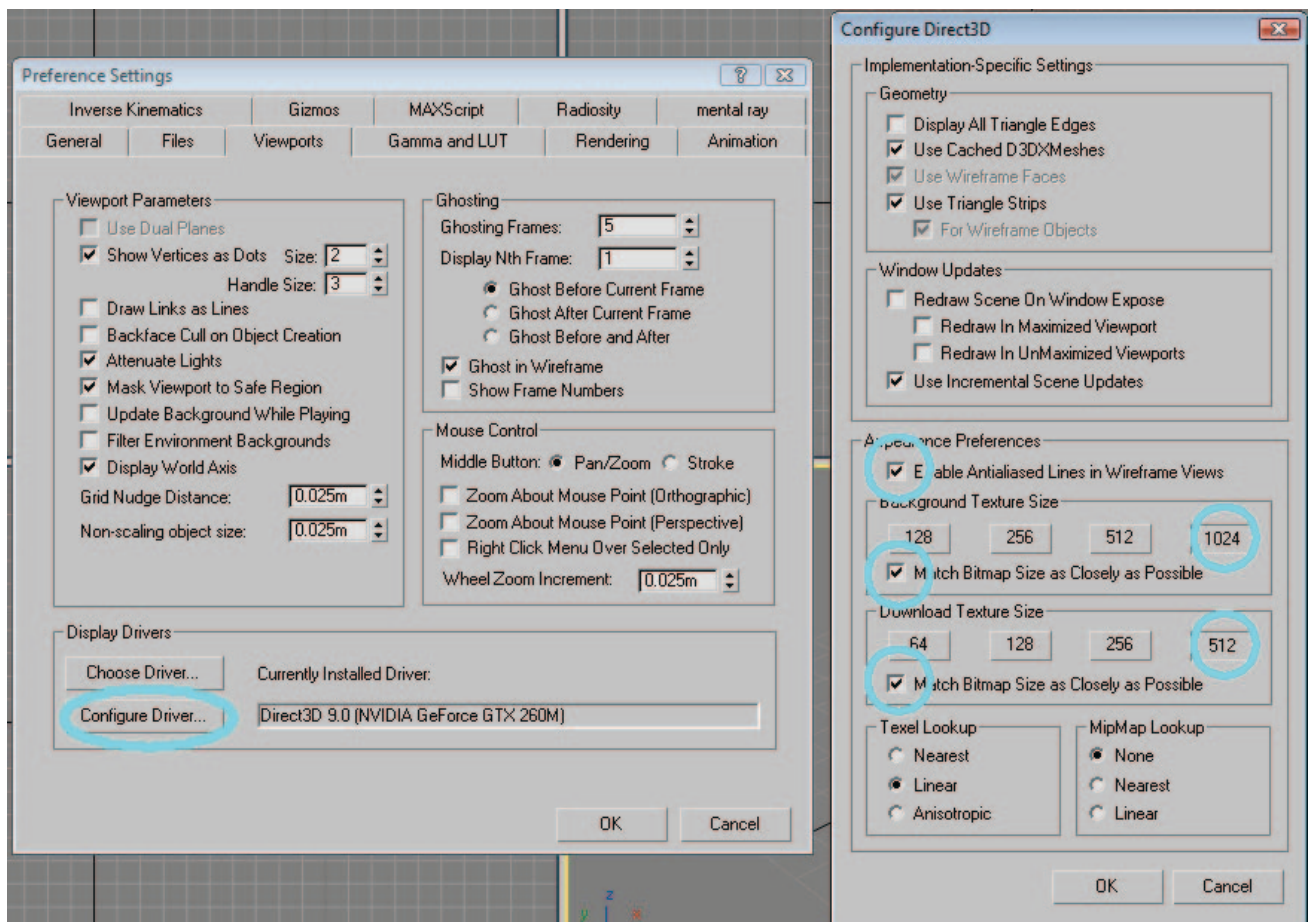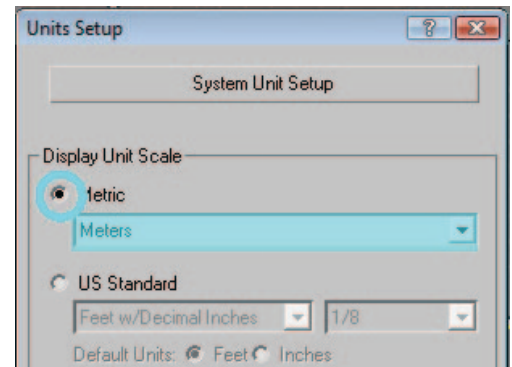
4. Now, go to the "Files" tab. If you're not very organized, you will want to turn on "Increment on Save," which will save each file as 01, 02, etc. Turn on Auto Backup and enter the settings below.
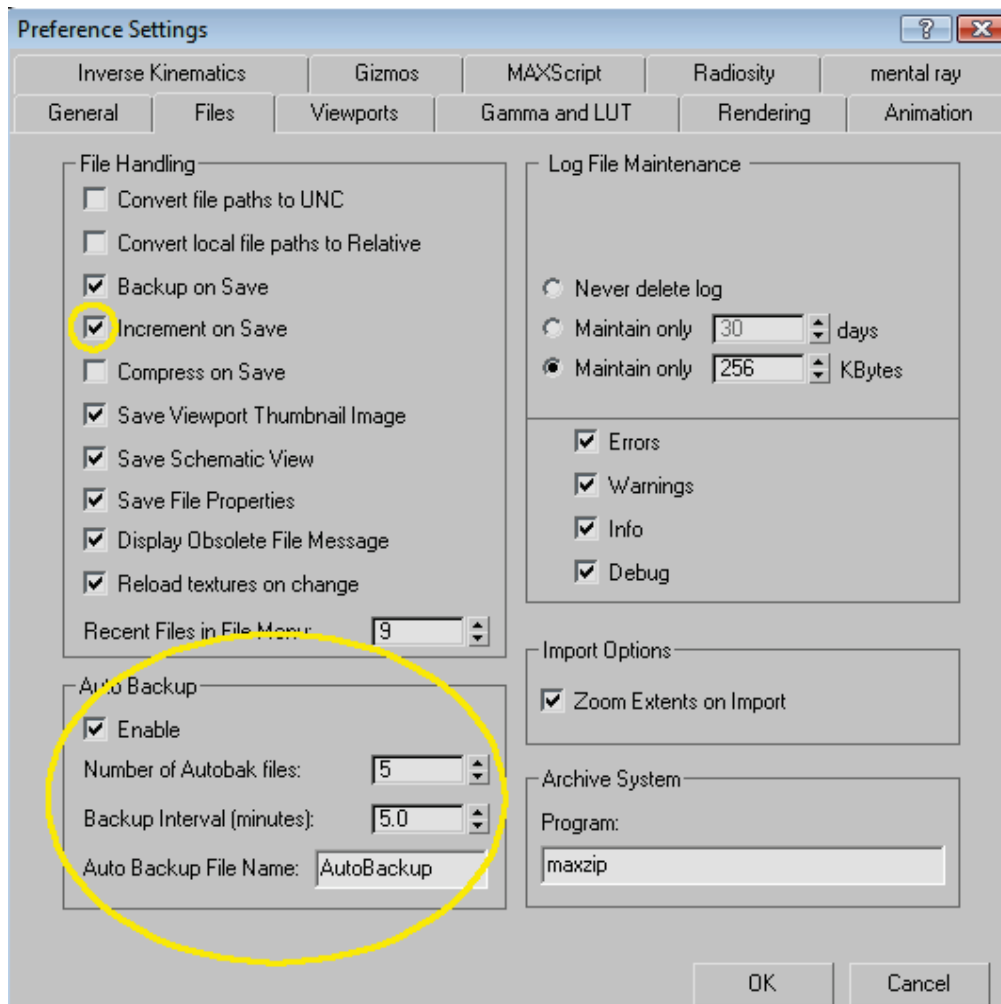

BUG: The Ogre Exporter creates the file MaxStartUI.mnu whenever 3ds Max is closed. This bug is documented in the *Troubleshooting for Ogre Exporter* section. Until this bug is fixed, the user *must* delete MaxStartUI.mnu or 3ds Max will crash on start up.

Importing into 3ds Max from COLLADA

1. Open 3ds Max 9 and go to *File > Import…* Select "COLLADA (*.DAE, *.XML)" as your file type.
2. Navigate to the folder where your COLLADA file is located and select it, then hit *Open*.
3. Select the model and navigate to the Modify tab on Command Panel. Your object should be listed as an "Editable Poly." If not, right click the object and select *Convert To: > Convert to Editable Poly*.
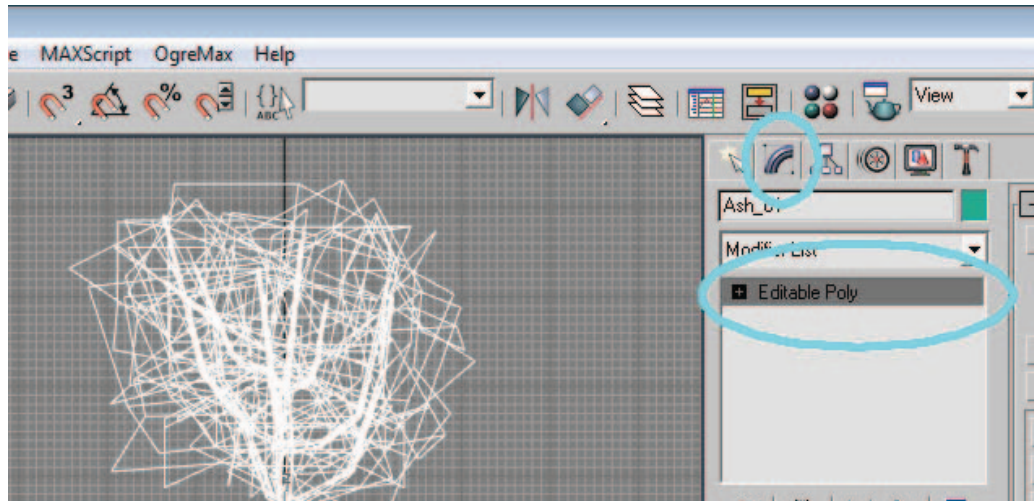
4. Open the Material Browser by pressing "M" on your keyboard. Use the eyedropper tool and select your mesh. A new material should appear in the first slot in the browser. This material is created when exporting a mesh from Maya with COLLADA, and it can cause massive errors. This material HAS to be deleted before you can go any further.
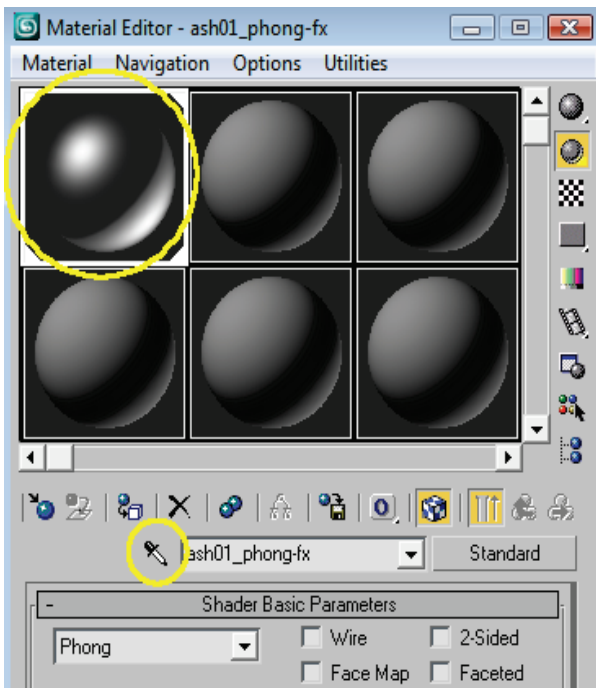

5. This is how the material browser will look right after you use the eyedropper. The problem material, in this case, is ash01_phong-fx. This name will change based upon your mesh and assigned material, but will ALWAYS end in "-fx."
6. Select a blank material slot and apply the material to your mesh. To get rid of the problem material, select it and push the "X" button above the eyedropper button. Choose the first option, "Affect mtl/map in both…" in order to delete the material from both your Material Browser AND the mesh it is applied to. If you choose the other option, it will only delete it from the browser, but its information will still reside in the mesh.
7. One problem, however, is that the material still retains its old name. In order to correct this, click and drag an empty material slot (any will do) over the slot with the name ending in –fx. Select the material slot of the –fx material and make sure there is no "COLLADA CA" dialogue box. If this is gone, you're golden.

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Working in 3ds Max

Smoothing Groups

Similar to Harden/Soften Normals in Maya, the Smoothing Groups feature in 3ds Max determines whether the edge of an object is hard, like the edge of a table, or soft, like the edge of a pillow. Select your object and click the drop down icon next to "Editable Poly" in the Modify tab. Select "Polygon." Navigate to the "Polygon Properties" section and drop the menu to find "Smoothing Groups." Set up your smoothing groups accordingly, or if you are importing using COLLADA, make sure that your smoothing groups have transferred over correctly from the program you originally modeled in. This model only has 1 smoothing group, because it is completely hard edged.
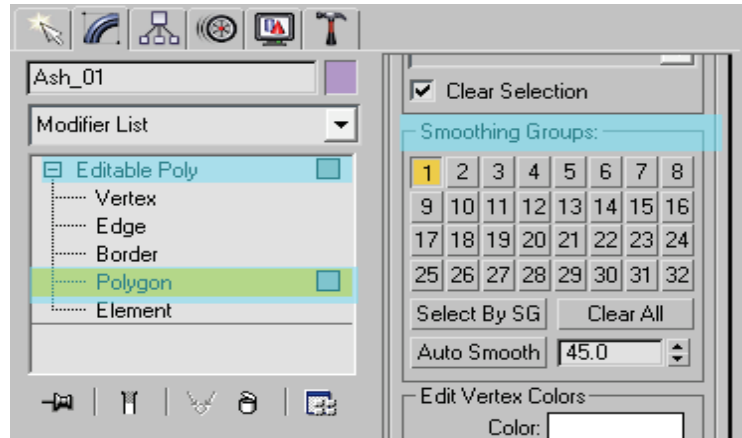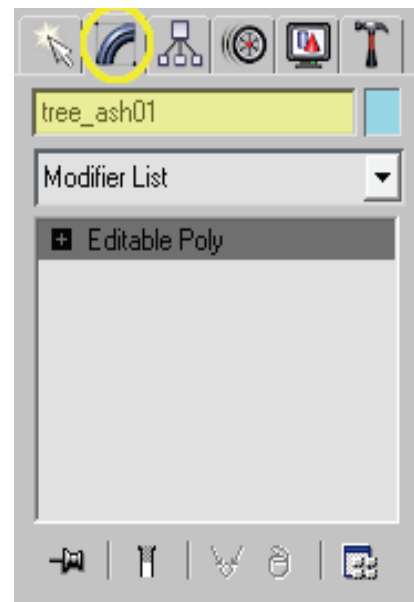
Material IDs

If your object needs to have more than one material applied to it (for example, a window: 1 material for glass, 1 material for the wood frame). The Material IDs section is located right above the Smoothing Groups, under "Polygon Properties" section. The model I am working with, tree_ash01, only has one material ID because it only needs one – the leaves and bark do not require separate materials because they would have the exact same material set up. There isn't a hard limit, but try and have less than 6 material IDs per object. You are welcome to try as many as you would like on an object.
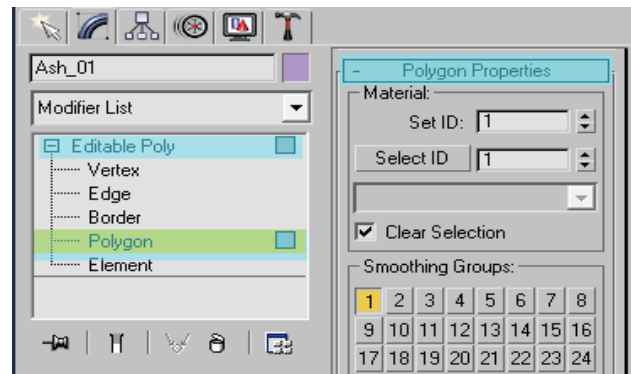
Object Naming

Whether you have imported your file using COLLADA or you started off in 3ds Max, it is important that your object maintains the name throughout its creation. In order to name your mesh, go to the Modify panel. The top input area is your mesh's name. Change it accordingly.

NOTE: Naming is important as the end folder to which Ogre exports your mesh to must be named the same as the mesh (in this case the folder would be /tree_ash01/).

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Creating an Object with Multiple Materials

When creating an object with multiple materials, you have to select the individual polygons you would like to apply the material to. In the image below, I've selected the frame of the window that I want to have the wood texture applied to. For the Material ID, go to "Set ID." Enter the number 1 and press Enter. Select the polygons of the next material and set the ID to 2, etc. Press M on your keyboard to open the Material browser and follow the steps for setting up a material.
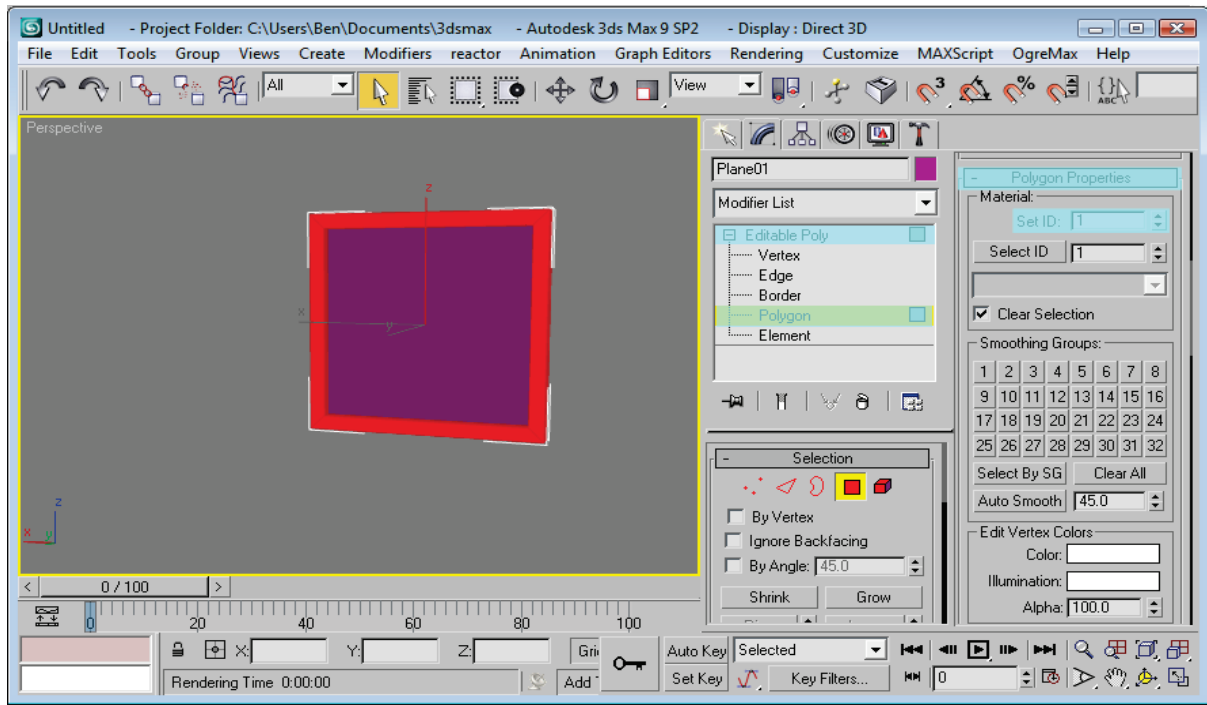
I created a material for wood and a material for glass and set up the UVs. Go to "Select ID" and choose ID #1, which should be the frame. These polygons should become outlined in red. Apply your wood frame material to Material ID #1. Now, select ID #2 and select the glass pane and apply the glass texture. You now have an object with multiple materials, broken down into organized ID sets.

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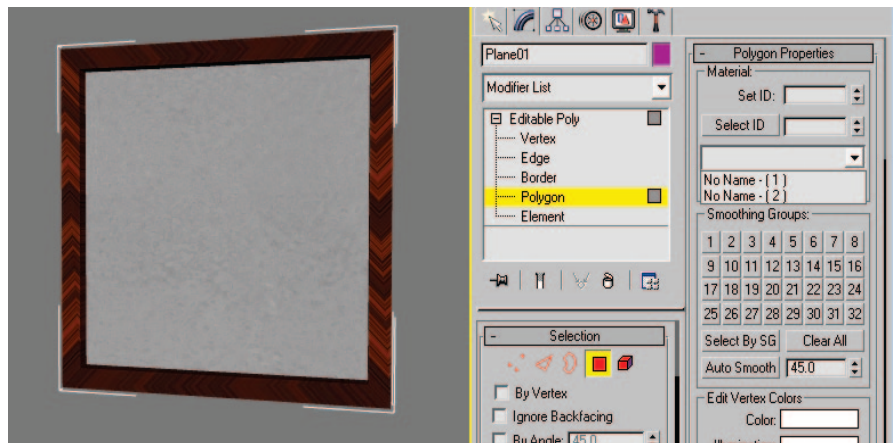
Map Channels and Multiple UV Sets

For more advanced meshes and materials, multiple UV sets may be required. Unfortunately, 3ds Max has trouble keeping track of multiple UV sets, or, as it refers to them, Map Channels. If you've imported from Maya using COLLADA, you may want to go through this process just in case. Go to the Modify tab and apply an "Unwrap UVW" modifier. Create your basic UV and make sure that the Map Channel is set to 1.
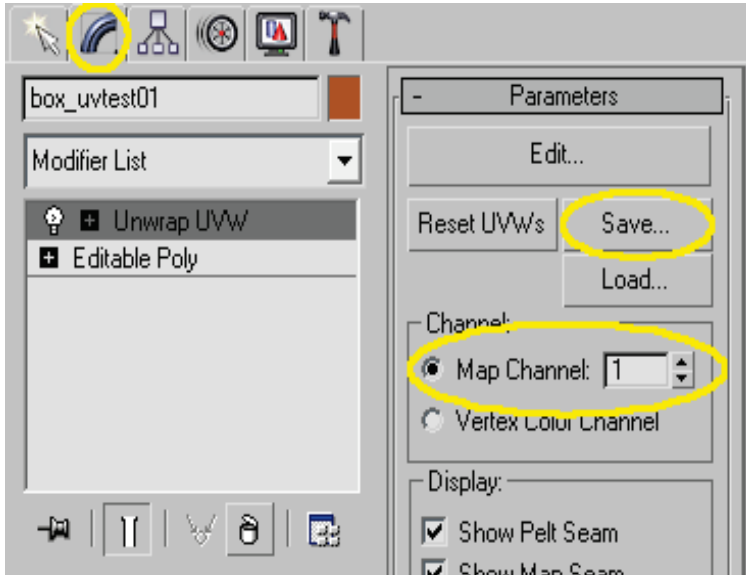
Now click "Save…" and save your UV out as map1.uvw. Now, right click on the "Unwrap UVW" and select "Collapse All." Confirm and you should only see Editable Poly left on the Modify tab. Now, apply another "Unwrap UVW" modifier and make sure you change Map Channel to 2. Now, choose "Load…" and select the .uvw file you saved out. Edit the UV as you see fit. You will be applying specific textures to each UV later.

a. Map Channel #1: 0 to 1 textures
b. Map Channel #2: Tileable textures.
c. Map Channel #3: Grunge maps

Creating .DDS Textures for 3ds Max and Sirikata

All textures need to be converted into .dds files using the NVidia plugin prior to exporting the model from 3D Studio Max. The link to the plugin is provided in the Basic Requirements section.

Texture Map Creation

1. Start Photoshop and open your texture file.
2. Keep master files for all textures at 2048x2048, or if possible 4096x4096. All textures must be in powers of 2 (e.g., 2x2, 512x512, etc.)
3. Before saving your file as a .dds, go to *Layers > Flatten Image*. Make sure there is only one layer when you go to save.
4. Go to *File > Save As >* and choose *.D3D/.DDS*
   a. For almost all texture maps save as a DTX1
   b. Have Generate MIP maps radio on for ALL TEXTURE MAPS
   c. Click Image Options and at the bottom check on Pre Modulate Color
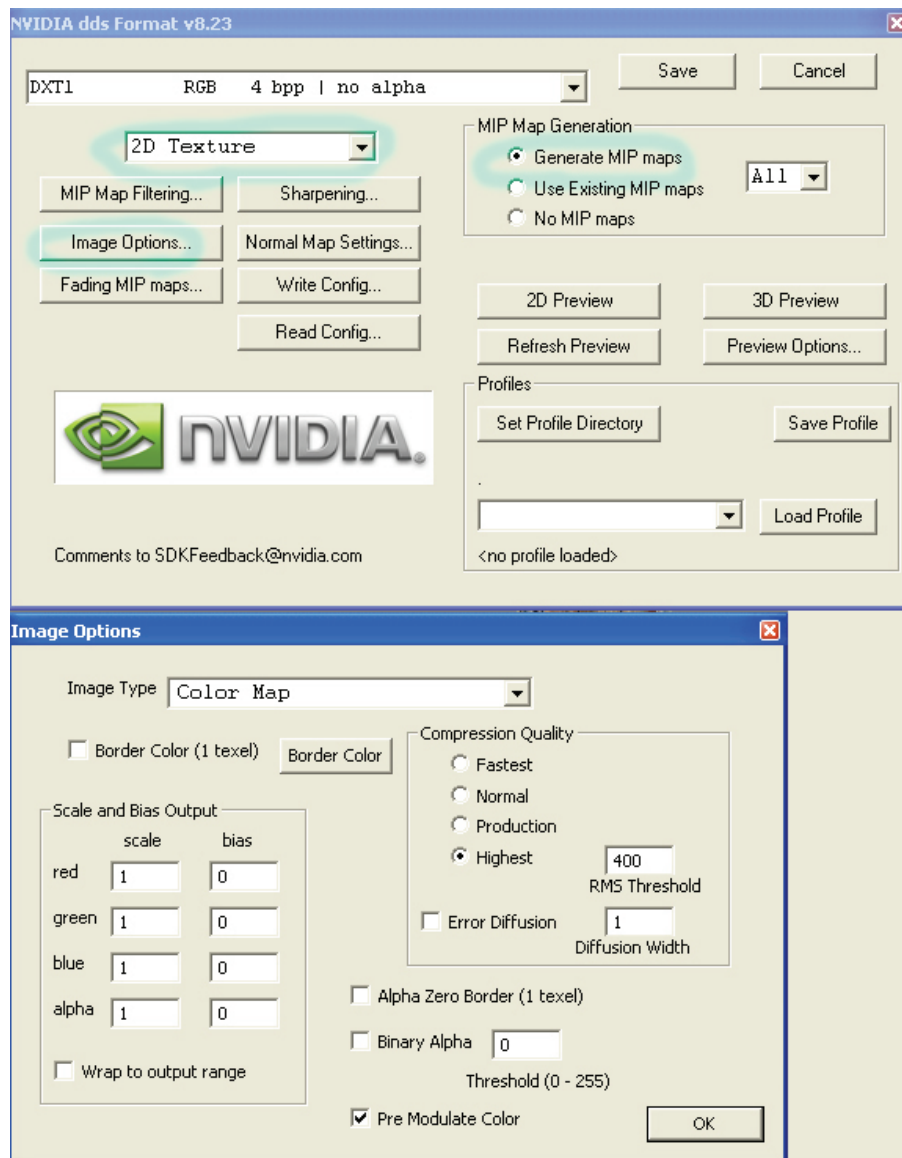
Normal, Occlusion, and Alpha Channel Textures

1. *Normal Map*
   a. Create your normal map using Crazybump or the NVidia Normal Map filter.
   b. Open your Channels browser by going to *Windows > Channels* or clicking the Channels tab.
   c. Right click the Red Channel and choose "Duplicate Channel…" Name it "Alpha."
   d. Hide the "Alpha" Channel and select the RGB Channel.
   e. When you *Save As > .dds*, be sure the Alpha box is checked.
   f. For Normal maps save as a DTX5 interpolated alpha (DO NOT use DXT5_NM)
      i. Use DTX3 explicit alpha if you don't want any gradient on your alpha borders (either ON or OFF)
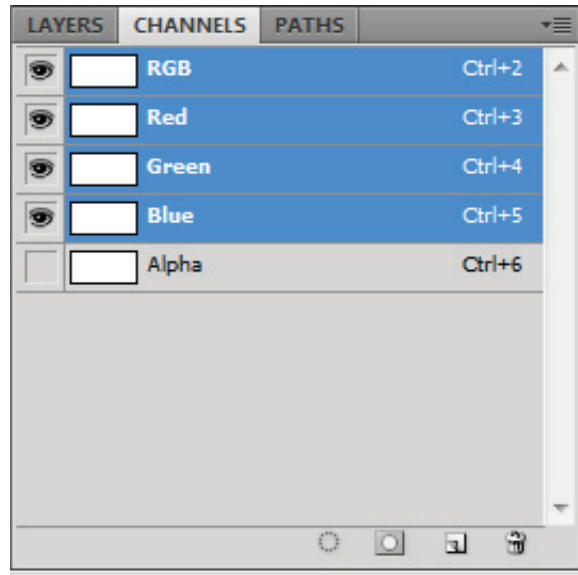
2. *Ambient Occlusion*
   a. Create an Alpha Channel
   b. Create a B&W grayscale Alpha mask, and copy it into the Alpha Channel.
   c. When you *Save As > .dds*, be sure the Alpha box is checked.
   d. If your Ambient Occlusion map has an alpha in the Alpha Channel, save the file with DTX5 compression (DO NOT use DXT5_NM).

3. *Alpha Channel Texture* (such as foliage, glass)
   a. Prepare your texture and its Alpha Channel.
   b. Save as DXT3 or DXT5.
   c. When you *Save As > .dds*, be sure the Alpha box is checked.

Material Creation in 3ds Max

Material Map Slots Explanation

When creating materials, all texture files loaded need to be in .dds format. To open the Material browser, press "M" on your keyboard. Underneath Shader Basic Parameters should be the Maps section. Drop down the menu to see all the available map slots. Below are detailed descriptions about the types of textures you would put into which slots.

Diffuse Color:
Your Diffuse map goes here. This Map slot has the most versatility for combining multiple Color Maps, Dirt Maps, separate Ambient Occlusion Maps, and so on. Detailed Material creation combinations are covered later.
1. For a basic Diffuse texture, click the map slot next to Diffuse Color and choose "Bitmap."

Ambient Occlusion:
1. If you have an ambient occlusion map, choose "RGB Multiply" instead of "Bitmap" for the Diffuse Color.
2. Color #1 is always the Ambient Occlusion Map. In the map slot, pick "Bitmap" and choose your Ambient Occlusion .dds file.
3. Color #2 can be any of the following:
    a. Your Diffuse texture, loaded as a Bitmap, or combined with other textures, such as grunge maps, through RGB Multiply, Composite, or Mix.
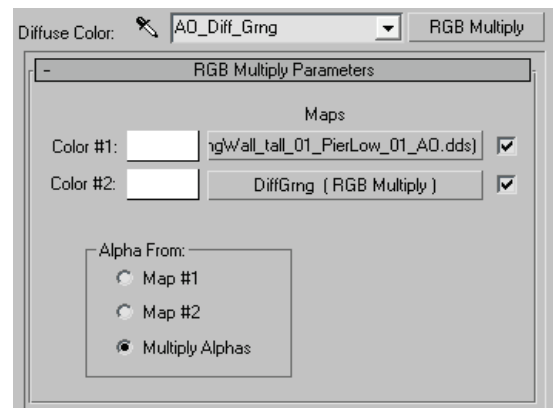
Specular Color:
1. Choose "Bitmap" and select your Spec Map texture.

Self Illumination:
Leave at 100%. The amount of glow your material will have will be based on the texture itself, not the map slot percentage. Note you must also turn on *Phong Basic Parameters > Self-Illumination > Check Color* and change the color picker to pure white.
1. Choose "Bitmap" and pick your Glow Map texture.
2. If there is no Diffuse Color Map, then embed the Alpha in this slot.
3. Filter Color: Check this on and it will be the HDRI Glow Map, it is Self Illumination/Filter Color amount. Actual Glow amount is determined by the percent of Field of View in Sirikata.


Opacity:
1. Check it on, but this map is only needed to display properly in Max.
2. If it has an Alpha, it must match the map channel of the Diffuse Texture Map in the Diffuse Color slot, and the Opacity slot must use the same Diffuse Texture Map.
3. The textures won't be loaded twice by the engine

Bump:

Both the Normal Map and Bump Map go into this slot. Select "Normal Bump" instead of "Bitmap", and enter the Normal map under the Normal slot. If you have a Bump map as well, enter it under the Additional Bump slot.
1. Tangent Space
2. Extra Expensive with Dirt Channel
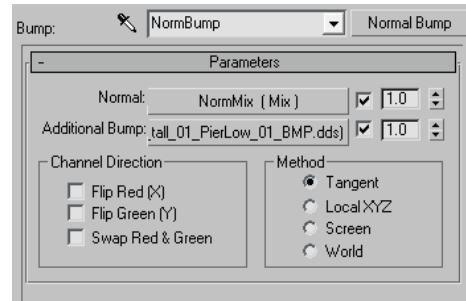
Reflection:

Enter the **Environment** cube Map in this slot. Good for large interiors and reflective objects. There is very little cost to the engine when rendering these.

Steps for Creating a Basic Material

To create a simple material, like the one to the right, is quite simple once you have all your textures saved in .dds format and your UVs set up properly. Open the Material Browser and select a blank, empty material. Under Shader Basic Parameters, change "Blinn" to "Phong." Following the Material Map Slots Explanation guidelines, set up your texture maps accordingly. Rename the material in a way that will make sense to whoever opens the document. The sample material, to the right, belongs to the mesh tree_ash01. This is a rather simple material. It has all the basic materials your model will need to look good.
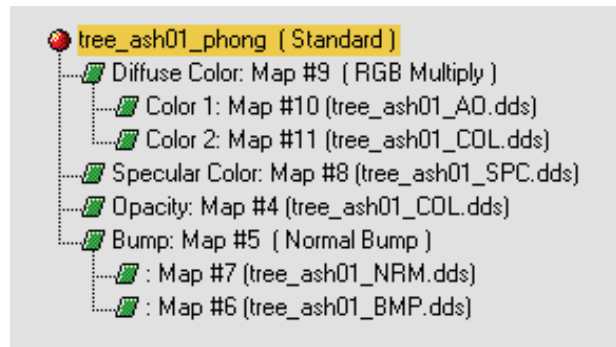
Steps for Creating a Multi Sub Object Material

Multi-Sub object materials are often used in conjunction with Material IDs. They allow for you to group multiple materials under a header, allowing you to apply all the sub-materials to a mesh in one go. One of the perks of this is that the sub-materials can still exist in the Material Browser in separate slots, allowing you to work on individual materials and simultaneously update the Multi Sub object material at the same time. In the Material Browser, select a new material. Below the material slots, you should see a button that says "Standard." Click this and choose "Multi/Sub-Object." You will now see multiple slots for materials. Drag materials that you have made in into the slots. Next to the slots you will see a space for input under "ID." This is where you will state the Material ID for each of the materials you place in your Multi Sub object. So, if I were to apply this Multi Sub material to my model, which has two Material IDs, which ever material is in slot #1 of my Multi Sub object will be applied to the polygons with Material ID #1, etc. If you have an object with multiple Material IDs and materials assigned, you can use the eyedropper to automatically create a Multi Sub Object material for you. If your object has multiple UV sets that were set up earlier, you can tell your "Bitmaps" which Map Channel to use by entering the Map Channel number in the dialogue box.
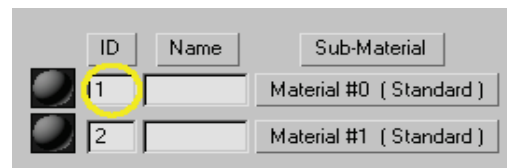
## Example of an Advanced Material

This Multi-Sub object material shows the power of the Material Browser. I will not provide step-by-step instructions explaining how to set up the material; rather, to the right is an image of the material's tree, showing you each of the individual parts that has gone into making each material. You should be able to look at this and reverse engineer it using your own textures.
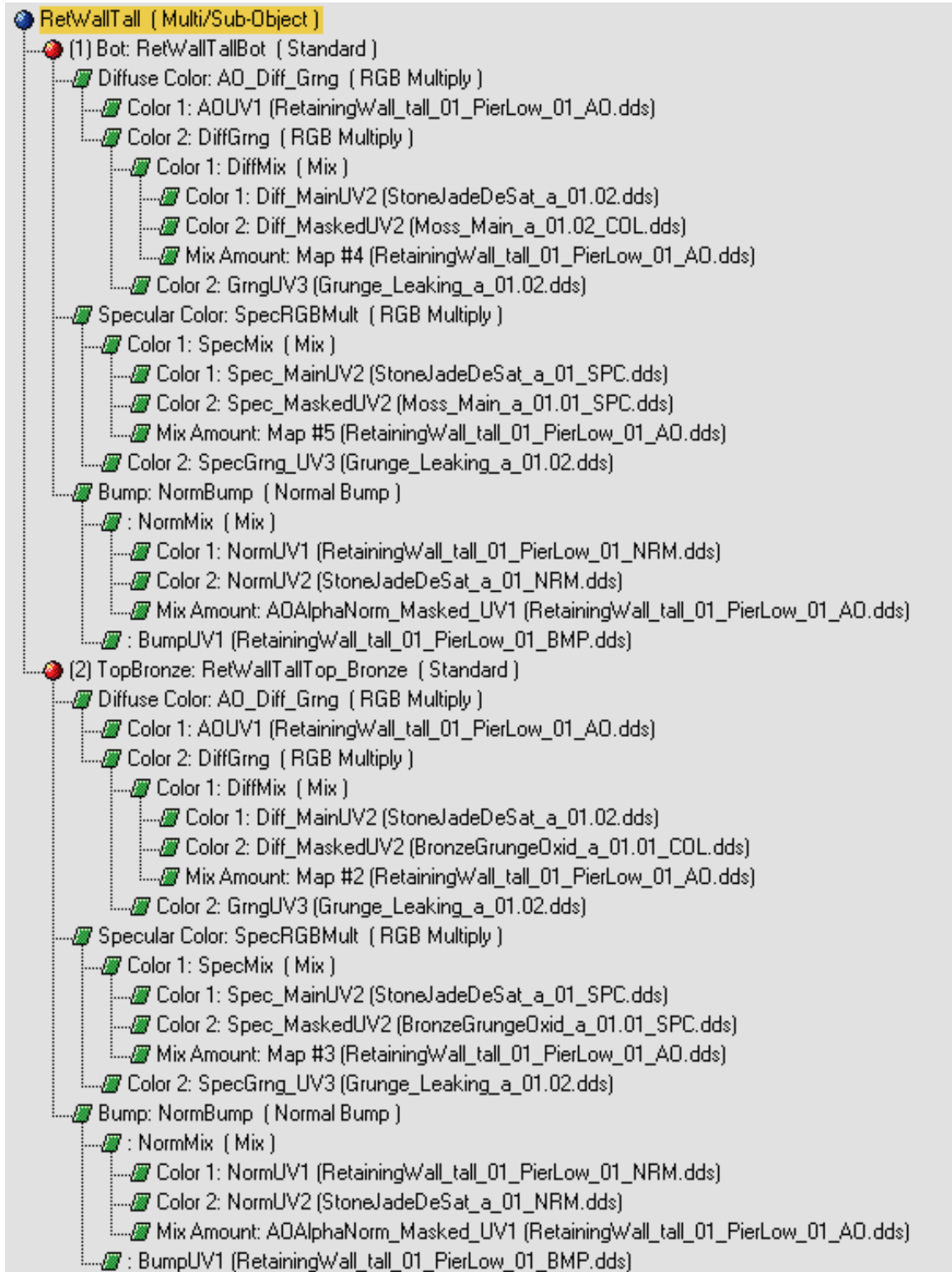
Hard Rules for Material Creation

1. **Maximum Maps per Material is 10**
   a. The maximum number of unique texture maps on any material is 10

2. **Certain Materials Are Applied to Specific UV Sets**
   a. Asda

3. **Match the Diffuse and Specular Maps in order, Material Type, and UV Set #'s**
   a. The structure of the maps for the Diffuse texture (after the AO RGB Multiply) and Spec should be the same.
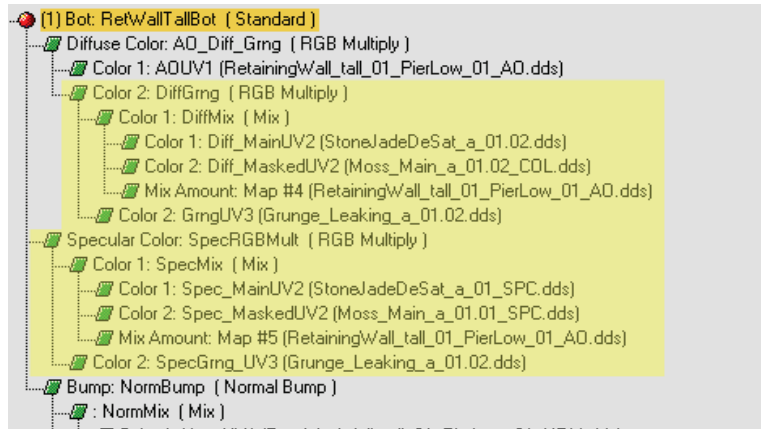
4. **The AO alpha channel will always be applied to the 2nd material**

   a. Except the Normal

5. **One Bump Map Allowed**
   a. The Bump map is by far the most expensive texture map to use (only if you have more than one UV set)
   b. Never try to use more than one, and if a Bump doesn't provide enough effect, do not use it at all.

6. **Map #2 for all materials must have matching UV Sets/Map Channel**

7. **UV Set #2 and #3 should be upright (perpendicular)**
   a. Tiling UV Set #2 should usually be upright (not rotated) and scaled to the correct Units (Determined by the size of your materials and the objects that are sharing those same materials). Most tileable textures are designed to tile in the upright position. If one makes a texture that runs parallel to the ground, then consult with the art team before completion.
   b. This should also keep normals aligned to the tangent space.

8. **Maximum of 3 UV Sets**
   a. Use up to 3 Map Channels and no more.

9. **Alpha Channels (Making Masks)**
   a. To make your Texture Map use and Alpha it must have the following radio buttons checked un the Bitmap Parameters dialog
      i. Mono Channel Output: Radio on for Alpha
      ii. RGB Channel Out: Radio on for Alpha as Gray
      iii. Alpha Source: Radio on for Image Alpha
      iv. Check on Premultiplied Alpha

  b. To make a texture with an Alpha do the following:
    i. Load your texture with the alpha channel into the Opacity slot under Maps, check it on, and make sure it is 100 for the Amount
    ii. The texture one uses for the Opacity slot must be the same map used in the first Diffuse Color slot.
    iii. They must also use the same UV Set.
  c. If your Material is 1-Sided (only visible from one side), it will not count as a new Material
  d. If your Material is 2-Sided (only visible from one side), it will as a new Material. Check the Make 2-Sided **(See Fig 3)** box under Shader Basic Parameters.

10. **Only 3 of the following Maps can be used on a given material**
  a. Glow
  b. 3rd Spec
  c. 3rd Diffuse
  d. 2nd Normal
  e. Reflection
  f. **Addtionally, only 2 of the following maps can be used on a given material**
    i. Glow
    ii. 3rd Spec
    iii. Reflection

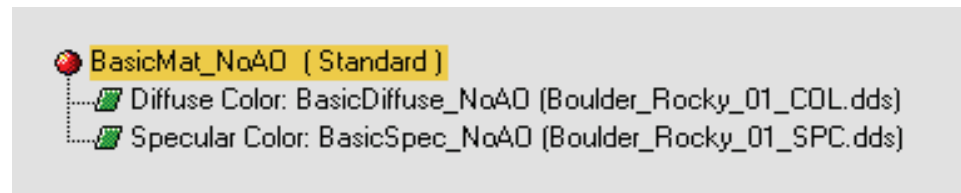11. **Specular Color can't have more maps than in Diffuse Color**

12. **Cost Considerations**
  a. Little Glow & AO
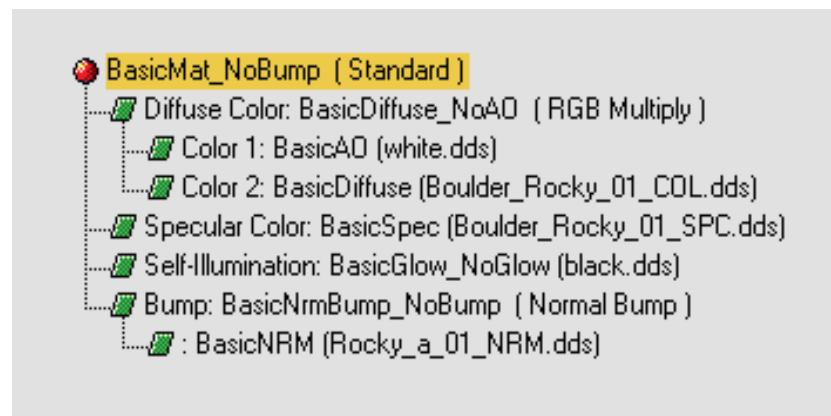Each new UV Set is another Multiple for the cost of a bump

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Sirikata Material Types

1. **BASIC MATERIAL**

Limitations: This material cannot use Ambient Occlusion, glow, reflection, environment, or grunge maps.
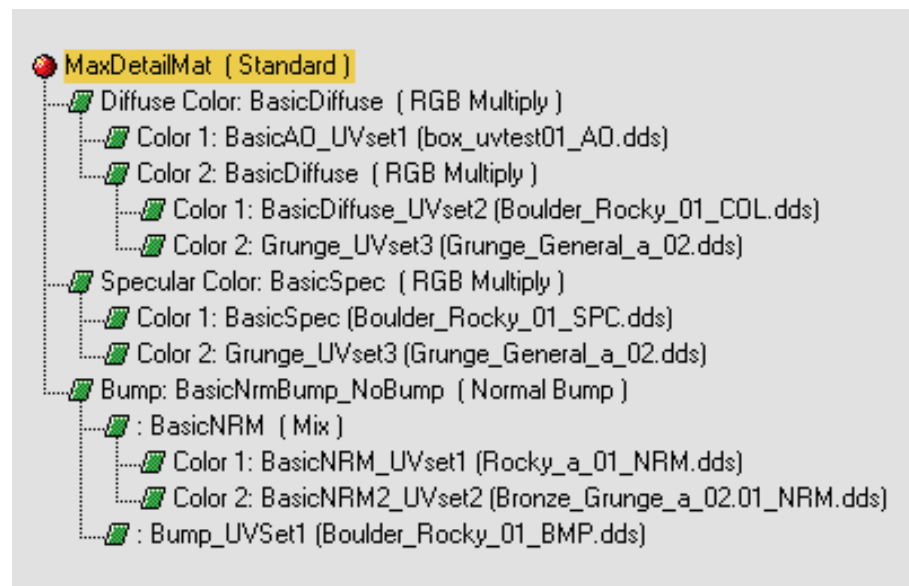
2. **BASIC MATERIAL, with Normal but no Bump**

Limitations: This material cannot use Ambient Occlusion, glow, reflection, environment, or grunge maps.

3. **SINGLE DIFFUSE, Max Detail**
One Diffuse with Ambient Occlusion and Grunge and Additional Normal on UV Set 1

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Working in 3ds Max, cont.

Setting the Pivot Point

Once you are COMPLETELY finished modeling, you'll need to make sure the pivot point is set up properly. The pivot point determines how your object is moved within Sirikata. While it can be placed anywhere you choose, in order to avoid possible errors, the pivot point should always be placed at the base of the object. Make sure the bottom of your object is touching the grid, or is extremely close. Go to the "Hierarchy" tab, select "Pivot," then "Affect Pivot Only" under Move/Rotate/Scale. Now, make sure you are using the "Move Tool." You should see the Move gizmo, but it will look a little different than normal because you are affecting the pivot point of the object rather than the object itself. Now, set the Z value (the height) of the pivot point, if it is not already, to 0. The pivot point of the object should now be the object's base, and on top of the grid.
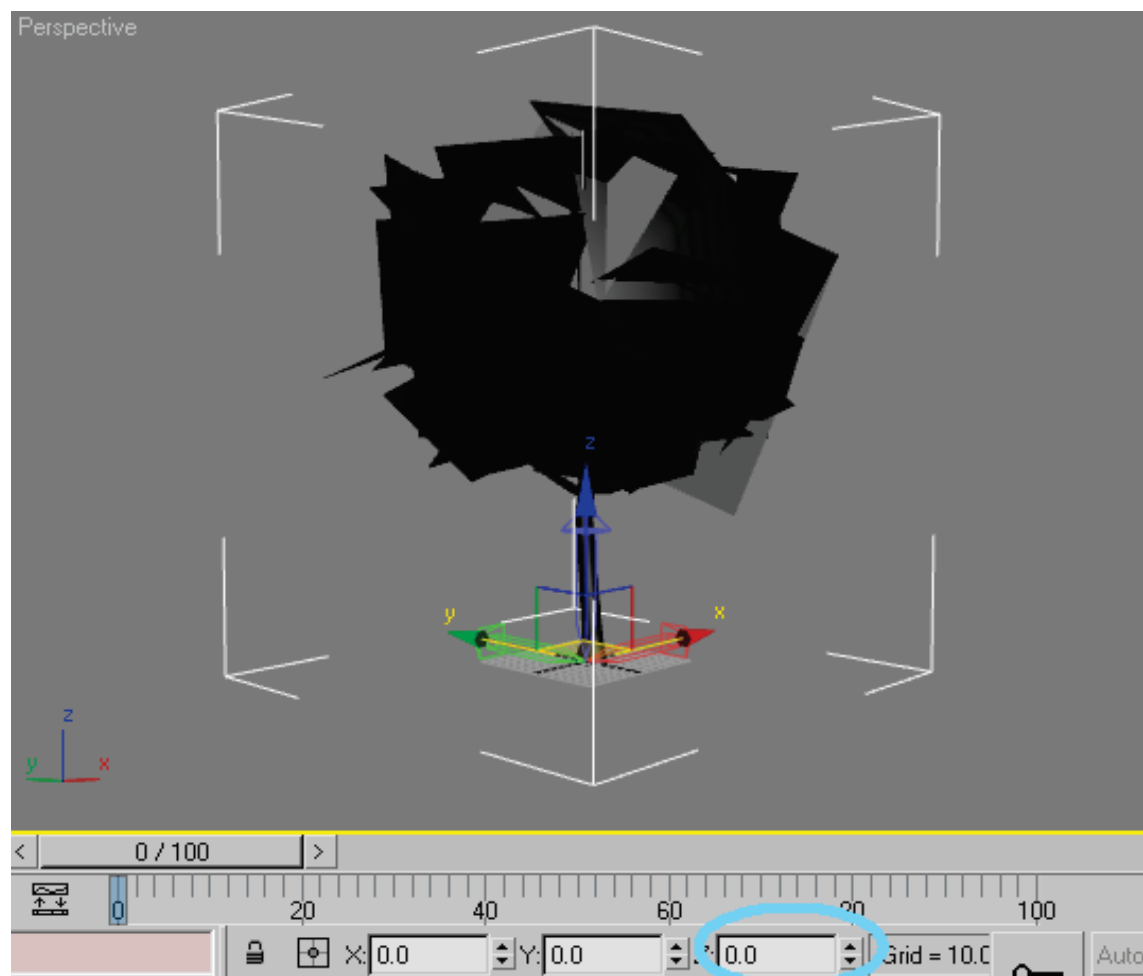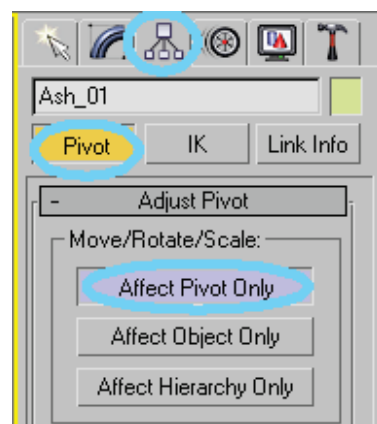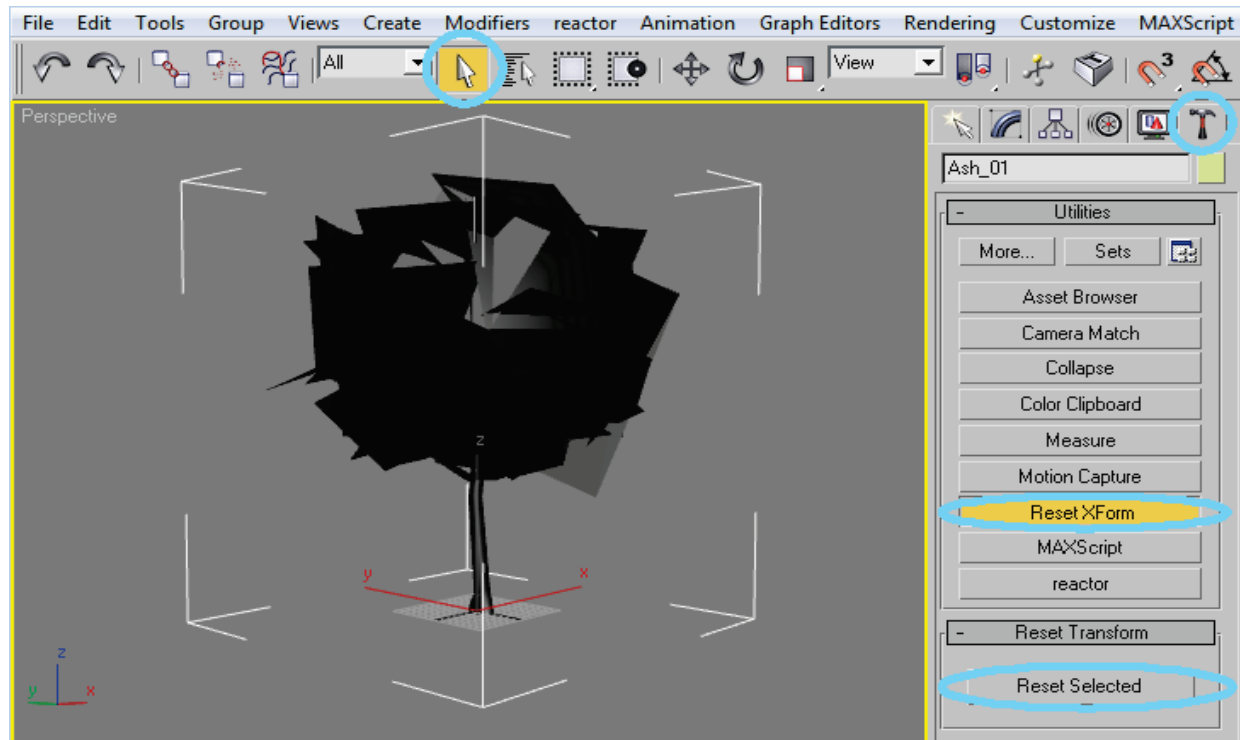
Reset XForms

Once you have set the pivot point, you're ready to do the last step before exporting. You need to reset the XForm of your object. Go to the "Utilities" tab and select Reset XForm. Make sure your object is selected and then choose "Reset Selected" under Reset Transform.

Go to the Modify tab. There should be a new XForm modifier on your object. When you select it, there should be an orange selection box around your object. If so, the Reset XForm worked. Right click on the XForm modifier and choose "Collapse All" from the drop down list. You should be left with an Editable Poly; if not, convert your object back to one.
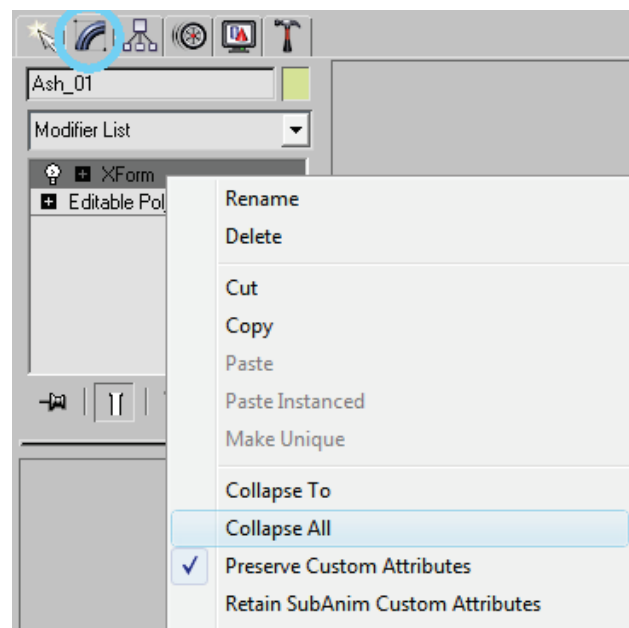
Exporting from 3ds Max

Once you have your materials set up and gone through the other required steps, you're ready to export your object using the Ogre Exporter. Select your object and go to *OgreMax > Export Selected 0.1.3*. Create a new folder under SirikataContent/Models and name it the same name as your object (in my case, tree_ash01). Save your .scene file in this new folder. 3ds Max will begin exporting. This can take a minute or two. If you check the folder, you should have a .scene file and three folders: exportlogs, materials, and models. Now you can try importing your object into Sirikata using the drag and drop feature. If it doesn't appear, check that you have named all your files correctly and that all your materials were in the correct folder when you exported.
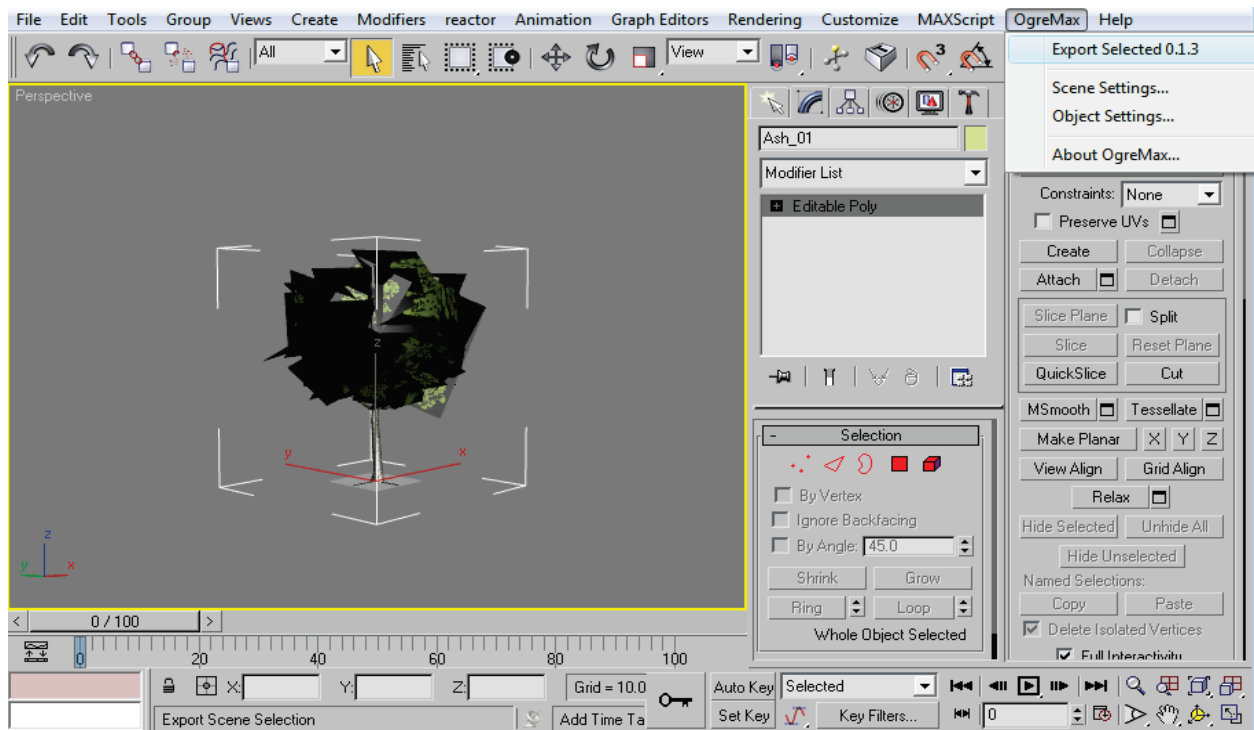
Installing and Running Sirikata

Installing Sirikata

1. For 32-bit users: Go to *C:\Program Files* and create a Sirikata folder. Skip to step 3.
2. For 64-bit users: Go to *C:\Program Files(x86)* and create a Sirikata folder.
3. Go to http://www.sirikata.com/builds/ and download the latest build of Sirikata.
4. Open the .zip file and go down one directory to get to the folder which contains sirikata.bat.
5. Copy the contents of this folder into the Sirikata folder you created.
6. If you have an older version of Sirikata installed already, give Windows permission to overwrite the files.
7. Delete the file ogre.cfg.

Running Sirikata

1. You need to be on the internet to access Sirikata, so much sure you have an active internet connection.
2. Double click sirikata.bat and let it load. Do not close the cmd.exe, the DOS window running in the background.
3. A configuration screen should appear, titled OGRE Engine Rendering Setup and choose the correct options. **(See Fig)**
   a) Rendering Subsystem: Direct3D 9 Rendering Subsystem or OpenGL
   b) Anti-aliasing: Whatever your GPU can handle
   c) Full Screen: No
   d) Video Mode: Whatever resolution your monitor and GPU can handle
4. Click "OK." The settings window will close and Sirikata will open.
5. It can take as long as a couple of minutes for the engine to load. Be patient.

Navigating Sirikata

Sirikata currently uses keyboard commands for all controls. A UI will be added soon.

Camera Movement
You can navigate scenes in Sirikata in a way similar to Second Life using the arrow keys on your keyboard.
- Up − move forward
- Down − move backward
- Left − pan left
- Right − pan right
- Page up − move up
- Page down − move down
- Shift + left − slower pan left
- Shift + right − slower pan right
- Left mouse click + drag − change camera angle

Object Manipulation (Using left click and drag on mouse)
- W − move selected object mode
   a) default behavior − move object in sync with mouse, i.e. on a plane parallel to the camera plane
   b) with SHIFT key down − move object along X axis
   c) with CTL key down − move object along Z axis
   d) with SHIFT+CTL key down − move object along Y axis (vertical)
   e) with ALT key down − slower, finer movement
- E − rotate selected object mode
   a) default behavior − rotate object about Y axis (rotate in place while standing on the ground)

       b)   with SHIFT key down – rotate about the X or Z axis. Which one is used depends on the orientation of the camera with respect to the bounding box. This is difficult to explain but is intuitive in practice.

       c)   with CTL key down – will rotate about the other axis.

       d)   with ALT key down – slower, finer movement

- R – scale selected object
- G – group selected objects
- Alt + G – ungroup
- Enter – enter group (selection is quirky)
- Esc – exit group
- D – duplicate selected object
- B – create light

Scene Save/Load

- CTRL + S – This will save a new file, scene_new.csv. To load this file the next time Sirikata runs, backup your current scene.csv file and rename scene_new.csv as scene.csv.

Loading Scene Files

1. In order to determine which scene to open, Sirikata searches for the file scene.csv in the main folder. This file tells Sirikata what to load and how to load it. Of course, in order to load a scene, you must have all the content files in the correct location for the scene to run. If you are sure you have all of the textures, meshes, sound files, etc. downloaded, you may open that scene.csv.
2. Backup your current scene.csv by renaming it scene_backup.csv or whatever name you like, such as scene_BornholmKunstMuseum.csv if you are backing up the Bornholm Kunst Museum scene.
3. Download your new scene file from http://www.sirikata.com/builds/scenes/.
4. Rename whichever file you download as scene.txt and drag it into the Sirikata directory.
5. Run sirikata.bat and the new scene should load.

Importing into Sirikata

1. Go to the directory where your Sirikata source files have been placed (normally C:\Sirikata).
2. Make sure you have the correct scene.txt ready so that you will import your object into the correct scene file.
3. Open sirikata.bat and wait for Sirikata to load.
4. Once your scene has opened, go the folder where your Ogre file folder should be located (normally C:\SirikataContent)
5. Drag the Ogre file folder into Sirikata. I am importing the file tree_ash01, an ash tree, so I am dragging the entire tree_ash01 folder that the Ogre Exporter created onto my Sirikata window.
6. Using the keyboard commands, move your object through the scene or manipulate it using scale and rotate.
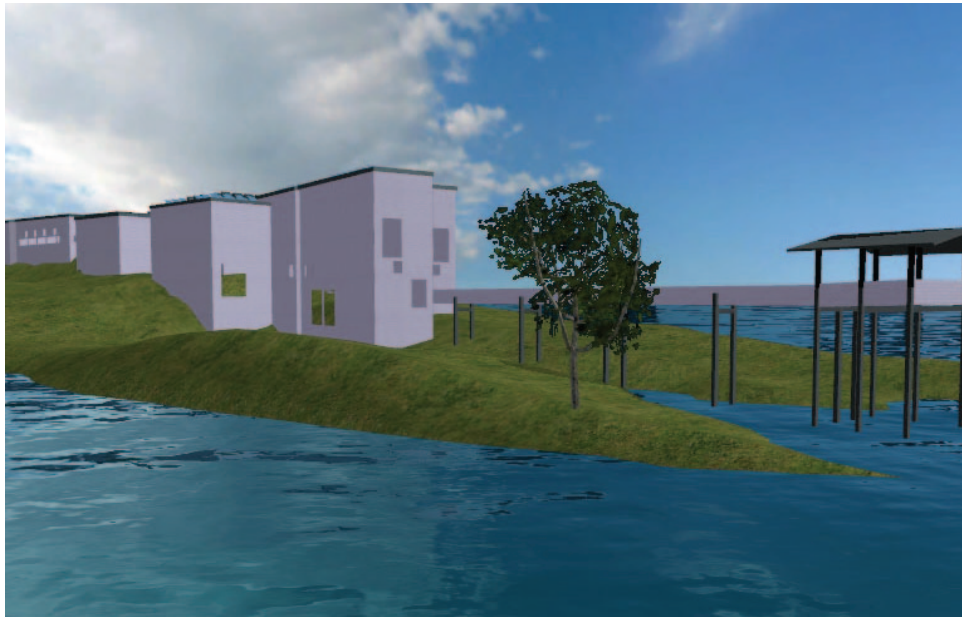
7. Once the object is set up as you like it, you can save your scene by pressing Ctrl + S. The file will be saved as scene_new.txt in your Sirikata directory so that it does not over write your current scene.txt file. Make sure to rename your files if you want to load the updated version next time you load Sirikata.

Notes

1. ~~Update the keyboard commands~~
2. ~~Materials section needs to be redone~~
3. ~~Map Channels and Multiple UV sets~~
4. ~~Include date in file naming for sharing~~